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Social Media Usage and International Performance: The Mediating Role of Open Innovation in Chinese Cross-Border E-Commerce SMEs

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ABSTRACT

Cross-border e-commerce (CBEC) has emerged as a major pathway for the internationalization of Chinese small and medium-sized enterprises (SMEs), and firms increasingly use social media to reach foreign customers, sense demand, and provide service. However, the pathway by which social media usage translates into superior performance in foreign markets remains unclear. This study tests whether open innovation mediates the relationship between social media usage and international performance among export-oriented SMEs in Yiwu, Zhejiang. A multi-wave field survey produced 289 valid firm-level responses. Established multi-item Likert scales measured social media usage across marketing, customer relations and service, and information accessibility; open innovation as inbound and outbound open innovation; and international performance with a multi-indicator scale. Measurement quality was verified through internal consistency checks and standard validity diagnostics. The analysis combined multiple regression with a bootstrapped mediation model based on 5,000 resamples. Results show that social media usage is positively related to international performance and that open innovation partially mediates this relationship. At the subdimension level, customer relations and service and information accessibility exhibit significant indirect effects through both inbound and outbound open innovation routines, whereas marketing does not display a non-significant mediated effect. Managers should channel social media activity into inbound knowledge sourcing and outbound commercialization routines, prioritizing customer service and information accessibility rather than marketing communication alone. Policymakers can support these routines by expanding knowledge-exchange platforms, providing intellectual property and compliance services, partner matchmaking, and training in data tools, thereby helping SMEs convert open innovation into measurable gains in international performance.

1. Introduction

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1.1 Background Problem

Global diffusion of social platforms is reshaping how SMEs internationalize by lowering search and transaction costs, accelerating market learning, and enabling continuous relationship-building with overseas customers [1,2]. In this setting, social media usage (SMU) is conceptualized not merely as a communication tool but as a knowledge interface that connects firms with customers, communities, and partners across borders, turning dispersed interactions into inputs for product and service improvement [3]. Open innovation (OI) refers to purposive knowledge inflows and outflows that accelerate internal innovation and expand external markets, with recent work elaborating OI maturity in the digital age [4,5]. Building on this perspective, SMU is expected to improve international performance (IP) through firm-level OI routines that source and diffuse external knowledge.

In China, CBEC has expanded rapidly, driven by the rollout of comprehensive pilot zones and the buildout of overseas warehouses, which reinforce platform-enabled internationalization and signal ongoing institutional support [6,7]. Within this competitive, data-intensive ecosystem, the quality of firms' social media usage (SMU) in content, interaction, and analytics, together with conversion capability, is decisive for export outcomes [2].

Despite growing evidence that exporters' social media use enhances relationship quality and cross-cultural communication with foreign buyers, mechanism-focused explanations in CBEC remain scarce [8]. This study advances a single-antecedent mediation framework in which SMU influences IP through OI routines that transform online interactions into innovation outputs and, ultimately, performance. Inbound OI denotes acquiring external knowledge and outbound OI denotes purposefully diffusing internal knowledge to external actors [9,10]. Recent SME evidence further links social-media-enabled knowledge acquisition to innovation and then to performance, supporting the proposed pathway in digitally intensive export settings [11,12].

A clear gap remains in explaining how SMU translates into IP in Chinese CBEC SMEs: recent studies emphasize associations while underspecifying firm-level mechanisms and the distinct roles of inbound versus outbound OI. Addressing this gap is practically significant for capability building in resource-constrained SMEs operating on platform ecosystems with intense competition and compliance demands. Accordingly, the study sets three objectives: (1) to develop and test a mediation model in which OI routines transmit the effects of SMU to IP; (2) to differentiate marketing, customer relations, and information accessibility paths; and (3) to derive actionable OI routines for CBEC SMEs.

1.2 Theoretical Framework

1.2.1 Diffusion of innovations theory

Diffusion of Innovations (DOI) explains how new ideas spread through a social system over time via specific channels, and it is shaped by four elements (innovation, communication channels, time, and the social system) and by five perceived attributes that influence adoption: relative advantage, compatibility, complexity, trialability, and observability [13]. Applied to CBEC, DOI provides a lens for understanding how Chinese SMEs utilize social media to create awareness and, critically, to enable low-cost market sensing, sustained interaction with global customers, and rapid experimentation with offerings (e.g., [14,15]). In this study, SMU is modeled as a diffusion channel that supplies actionable external knowledge and collaboration opportunities, which in turn feed inbound open innovation (acquiring and integrating external ideas and customer insights) and facilitate outbound OI (codifying and sharing firm knowledge for diffusion and commercialization). Through these

mechanisms, digital engagement is expected to translate into improved IP. In export selling contexts, social-media-enabled communication effectiveness translates into sales outcomes, reinforcing the diffusion lens for CBEC SMEs [16].

1.3 Hypotheses Development

1.3.1 The relationship between social media usage and the international performance of Chinese SMEs in CBEC

Social media offers Chinese SMEs in CBEC low-cost, real-time channels to reach foreign customers, manage relationships, and sense markets. Prior work shows that social media enables two-way communication, strengthens customer relationship management, and is associated with improved firm outcomes [17], including internationalization-related performance gains [18]. In CBEC settings, firms combine content, service interactions, and market scanning to enhance brand visibility, accelerate information flows, and support faster, better-informed decisions [19]. Such digital engagement has been linked to gains in brand equity, loyalty, and innovation through collaboration with external stakeholders [20], which together imply a positive association with IP.

Building on this literature, the study operationalizes SMU along three dimensions. Marketing activities should enhance brand assets and cross-border reach; customer relations and service should raise satisfaction, loyalty, and retention; and information accessibility should strengthen market intelligence and responsiveness. Accordingly, SMU is expected to relate positively to international performance among Chinese CBEC SMEs. In light of these observations, the following hypotheses are postulated:

H1: SMU is positively related to IP

H1a: Social media for marketing is positively related to IP

H1b: Social media for customer relations and service is positively related to IP

H1c: Social media for information accessibility is positively related to IP

1.3.2 The relationship between social media usage and open innovation

SMU creates continuous, interactive touchpoints with customers, communities, and partners, lowering the costs of external search, co-creation, and coordination that underpin OI. Prior research shows that social technologies support inbound OI by sourcing and integrating external ideas and user insights, and enable outbound open innovation by codifying, sharing, and commercializing knowledge with external actors (e.g., [21,22]). In CBEC, these effects are amplified: marketing activities build visibility and partner touchpoints; customer relations and service generate problem-specific feedback and co-solutioning that feed inbound routines; and information accessibility enhances market sensing and competitive/consumer intelligence, informing both inbound selection and outbound partnering. Accordingly, SMU should be positively associated with both inbound and outbound OI routines among Chinese CBEC SMEs.

H2: SMU is positively related to OI among Chinese SMEs engaged in CBEC

H2a: Social media for marketing is positively related to inbound OI

H2b: Social media for customer relations and service is positively related to inbound OI

H2c: Social media for information accessibility is positively related to inbound OI

H2d: Social media for marketing is positively related to outbound OI

H2e: Social media for customer relations and service is positively related to outbound OI

H2f: Social media for information accessibility is positively related to outbound OI

1.3.3 The relationship between open innovation and international performance of Chinese SMEs in CBEC

OI is conceptualized as inbound OI (acquiring and integrating external ideas, knowledge, and technologies) and outbound OI (codifying, sharing, and commercializing a firm's knowledge with external partners) [21]. Inbound OI improves product–market fit and responsiveness by embedding user and partner insights into offerings, while outbound OI expands reach and shortens time to market through partner-enabled diffusion and co-commercialization [22]. Recent syntheses report positive performance links for both directions of OI and highlight their complementarity when implemented together, implying additive gains for firms that combine inbound and outbound practices [23]. In the CBEC setting, digital platforms reduce search and coordination costs, making these routines especially effective for Chinese SMEs seeking to adapt offerings and scale commercialization across borders. Accordingly, both inbound and outbound OI routines are expected to relate positively to international performance.

H3: OI is positively related to IP

H3a: Inbound OI is positively related to IP

H3b: Outbound OI is positively related to IP

1.3.4 The mediating role of open innovation between social media usage and international performance

SMU provides SMEs with low-cost, real-time access to external knowledge and partners, and its contribution to IP depends on whether firms convert these digital inputs into implementable innovations through OI. OI supplies this conversion mechanism through inbound routines that integrate user and partner insights and outbound routines that codify, share, and commercialize knowledge with external actors [21,22]. In the CBEC context, platformization lowers search and coordination costs, so SMU more readily activates inbound sensing and feedback acquisition as well as outbound partnering and co-creation, and the joint use of these practices is associated with superior performance [24,25]. Accordingly, OI is expected to mediate the SMU–IP relationship at both the construct level and across SMU's marketing, customer relations and service, and information accessibility dimensions, while effectiveness ultimately depends on firms' capabilities to manage digital interactions to avoid information overload and diluted innovation focus [26]. As shown in Figure 1, social media usage (SMU) influences international performance (IP) directly (H1) and indirectly via open innovation (OI) through inbound and outbound routines (H2–H4).

H4: OI mediates the relationship between SMU and IP

H4a: Inbound OI mediates the relationship between social media for marketing and IP

H4b: Inbound OI mediates the relationship between social media for customer relations and services and IP

H4c: Inbound OI mediates the relationship between social media for information accessibility and IP

H4d: Outbound OI mediates the relationship between social media for marketing and IP

H4e: Outbound OI mediates the relationship between social media for customer relations and services and IP

H4f: Outbound OI mediates the relationship between social media for information accessibility and IP

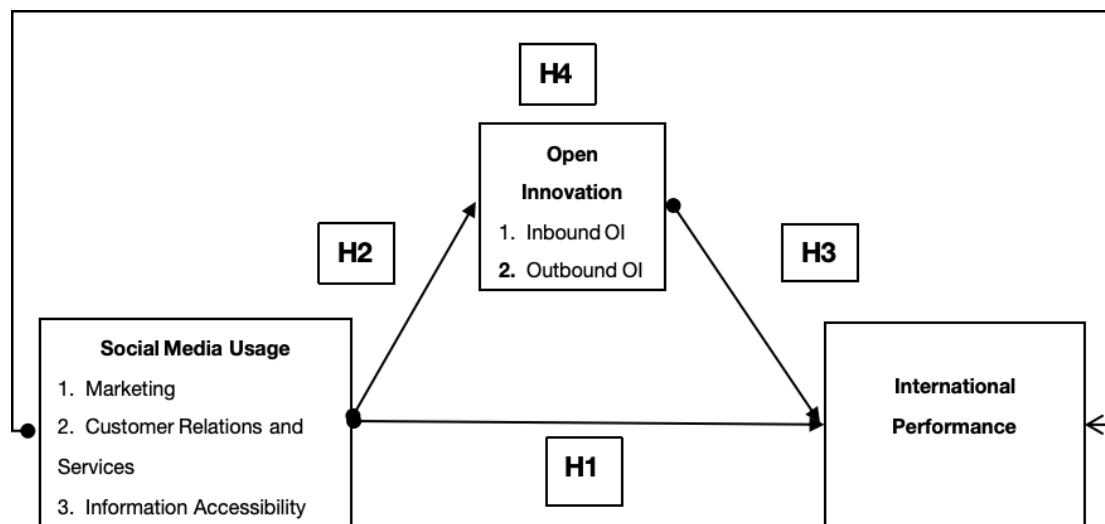


Fig. 1. Conceptual model and hypotheses (SMU → OI → IP)

2. Methodology

2.1 Research Design

A quantitative cross-sectional survey design is used to test a mediation model in which SMU influences IP through firm-level OI routines. The model specifies SMU as the antecedent, inbound and outbound OI as mediators, and IP as the outcome. Mediation effects are evaluated with nonparametric bootstrapping, consistent with contemporary conditional process analysis, using percentile-bootstrap confidence intervals with 5,000 resamples [27].

2.2 Sampling Frame and Data Collection

The target population comprised Chinese SMEs engaged in CBEC exporting in Yiwu, with emphasis on apparel, accessories, and beauty. The sampling frame was compiled using Yiwu E-commerce Industry Association listings, government business registries, and firm directories on major CBEC platforms, and then verified in Tianyancha against preset inclusion criteria: registered in Yiwu, primary activity in wholesale or retail trade, holding valid import–export credit certification, core business in apparel, accessories, or beauty, and meeting the MIIT definition of an SME. Given the nonprobability design, purposive recruitment with category quotas was used to ensure coverage of the three focal categories. Invitations were sent to information-rich firms identified in the frame; where registry coverage was incomplete, limited supplementation outside the frame was permitted under the same eligibility checks. One response per firm was enforced, and participation was voluntary with informed consent.

Data were collected via a structured online questionnaire administered over a two-month window to managers responsible for social media operations, international sales, or innovation. Procedural remedies to mitigate common method bias included construct separation, anonymity

assurances, and minimum completion-time rules [28]. The achieved sample size meets conventional guidance for multiple regression and bootstrapped mediation [27]. In total, 350 invitations were issued, 311 responses were received (response rate = 88.9%), and 289 complete, eligible questionnaires were retained after screening for completeness and internal consistency.

2.3 Measures of Variables

All latent constructs were measured with validated multi-item Likert scales in a unified five-point agreement format (1 = strongly disagree, 5 = strongly agree). To ensure semantic equivalence and contextual fit, a translation–back-translation procedure was implemented, followed by researcher review to harmonize item wording. Scale items were adapted from prior validated instruments and contextualized to the CBEC setting. A pilot survey was conducted prior to the main study to assess item clarity, response variance, and preliminary reliability, and minor wording adjustments were made accordingly.

2.3.1 Social media usage

Social media usage (SMU) is the extent and manner in which a firm uses social media platforms in the CBEC context to support marketing communication, customer relations and services, and access to market information [29,30]. SMU is operationalized as a three-facet construct—marketing, customer relations/service, and information access—assessed with 14 Likert items (5, 5, 4) adapted from prior scales [30-32] and contextually refined for Chinese CBEC SMEs.

2.3.2 Open innovation

Open innovation (OI) is the purposeful management of knowledge inflows and outflows with external partners to accelerate value creation and capture in products, processes, and markets [4,33]. Consistent with prior research, OI is operationalized with two facets: inbound (acquiring, integrating, and using external knowledge from customers, communities, platforms, partners, and research institutions) and outbound (sharing, licensing, and commercializing internal knowledge with external parties via collaboration and market mechanisms) [9,34]. The scale comprises 14 items (7 inbound; 7 outbound) adapted from validated measures and contextually refined for CBEC SMEs (e.g., [35,36]).

2.3.3 International performance of firms

International performance (IP) refers to the outcomes a firm achieves in foreign markets, including market share, sales growth, profitability, and progress toward international strategic objectives in the CBEC context [37,38]. IP is assessed with a five-item, multidimensional Likert-type scale adapted from validated instruments [39-42] and contextualized for Chinese CBEC SMEs. The five items capture foreign sales growth, foreign market share, profitability from international operations, attainment of international strategic objectives, and customer satisfaction/retention in foreign markets. The recall window is the past three years. A manager-reported, perceptual approach is appropriate for SMEs because comparable international accounting benchmarks are often unavailable, and managers' assessments provide a reliable summary of broader outcomes in CBEC settings [43].

2.4 Reliability and Validity

The abbreviations used in this section are: SMU (social media usage); SMM (social media marketing); SMC (customer relations and services); SMI (information accessibility); OI (open innovation); OII (inbound open innovation); OIO (outbound open innovation); and IP (international performance).

2.4.1 Reliability assessment

Internal consistency was evaluated using Cronbach's alpha, adopting $\alpha \geq 0.70$ as the conventional threshold for acceptable reliability [44]. Construct-level coefficients indicated good to excellent reliability: SMU ($\alpha = 0.837$; 14 items), OI ($\alpha = 0.908$; 14 items), and IP ($\alpha = 0.875$; 5 items). Subdimension alphas were likewise satisfactory: SMM ($\alpha = 0.800$), SMC ($\alpha = 0.857$), SMI ($\alpha = 0.823$), OII ($\alpha = 0.914$), and OIO ($\alpha = 0.899$). These results indicate adequate to strong internal consistency for all focal constructs and subdimensions (Table 1).

Table 1

Cronbach's alpha: Reliability analysis

Dimension	Reliability Analysis	
	Cronbach's Alpha	N of Items
SMU	0.837	14
SMM	0.8	5
SMC	0.857	5
SMI	0.823	4
OI	0.908	14
OII	0.914	7
OIO	0.899	7
IP	0.875	5

Note: $\alpha \geq 0.80$ = Good; $0.60 \leq \alpha < 0.80$ = Acceptable; $\alpha < 0.60$ = Poor (Sekaran & Bougie, 2019).

2.4.2 Validity assessment

An exploratory principal component analysis (PCA) with orthogonal Varimax rotation without Kaiser normalization was used to assess dimensionality and provide preliminary construct-related evidence for SMU (SMM, SMC, SMI), OI (OII, OIO), and IP. KMO values of 0.837 for SMU, 0.931 for OI, and 0.875 for IP, together with significant Bartlett's tests for each construct ($p < 0.001$), indicated sufficient intercorrelations for component extraction. Using the Kaiser criterion (eigenvalues greater than one), six components were retained and accounted for 64.255 percent of the total variance (Table 4); the rotation converged in six iterations (Table 3). Salience was defined as an absolute loading of 0.50 or higher, with coefficients below 0.50 suppressed for presentation. Items loaded cleanly on their intended components with no salient cross-loadings at or above 0.50. Rotated loading ranges by construct were IP 0.756–0.832; SMM 0.678–0.783; SMC 0.733–0.800; SMI 0.699–0.805; OII 0.750–0.816; OIO 0.737–0.788 (Table 3). These patterns provide preliminary evidence of convergent validity (substantial within-construct loadings) and discriminant validity (absence of salient cross-loadings), in line with established reporting standards [44] and the original Varimax rotation framework [45].

Table 2

KMO and Bartlett's Test

Construct	p (items)	KMO	Bartlett's χ^2	df	Sig. (p)
All items (SMU+OI+IP)	33	0.889	4856.616	528	< 0.001
SMU	14	0.837	1550.642	91	< 0.001
OI	14	0.931	2278.968	91	< 0.001
IP	5	0.875	669.007	10	< 0.001

KMO ≥ 0.80 indicates good sampling adequacy (Kaiser, 1974); Bartlett's test $p < 0.001$ indicates the correlation matrix is suitable for factor analysis

Table 3
Rotated Component Matrixa

	Rotated Component Matrixa					
	Component					
	1	2	3	4	5	6
IP1			.756			
IP2			.750			
IP3			.832			
IP4			.773			
IP5			.764			
SMM1					.678	
SMM2					.747	
SMM3					.783	
SMM4					.725	
SMM5					.688	
SMC1				.735		
SMC2				.778		
SMC3				.800		
SMC4				.798		
SMC5				.733		
SMI1						.699
SMI2						.805
SMI3						.764
SMI4						.805
OII1	.775					
OII2	.790					
OII3	.816					
OII4	.750					
OII5	.795					
OII6	.760					
OII7	.768					
OIO1		.737				
OIO2		.759				
OIO3		.788				
OIO4		.753				
OIO5		.764				
OIO6		.738				
OIO7		.782				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax without Kaiser Normalization.

a. Rotation converged in 6 iterations.

Table 4
Total Variance Explained

		Total Variance Explained	
Component	Total	Extraction Sums of Squared Loadings	
		% of Variance	Cumulative %
1	8.427	25.536	25.536
2	3.896	11.806	37.342
3	2.725	8.259	45.600
4	2.275	6.893	52.493
5	2.181	6.609	59.102
6	1.700	5.152	64.255

Extraction Method: Principal Component Analysis.

Common method bias

Given that SMU, OI, and IP were obtained from a single cross-sectional self-report survey, potential common method bias (CMB) was mitigated through procedural and statistical remedies. Procedurally, respondent anonymity was ensured and ambiguous or leading items were avoided to reduce social-desirability bias and improve clarity [46]. Statistically, an unrotated exploratory factor analysis (Harman's single-factor test) on all 33 items (SMU, OI, IP) yielded multiple components with eigenvalues greater than one; the first unrotated factor accounted for 25.536 percent of the variance—well below the commonly cited 40 percent heuristic—suggesting no dominant general factor. Consistent with recent guidance, this test is interpreted as a preliminary diagnostic; taken together, these procedures and diagnostics indicate that CMB is unlikely to materially bias the relationships among SMU, OI, and IP [46].

3. Result

3.1 Descriptive Statistics and Correlations

Descriptive statistics for the focal constructs (N = 289; five-point Likert) indicated that means were 3.755 for IP, 3.809 for SMU, and 3.873 for OI, with standard deviations of 0.856, 0.566, and 0.691, respectively; subdimensions averaged 3.898 (SMM), 3.833 (SMC), 3.696 (SMI), 3.909 (OII), and 3.837 (OIO). Skewness values (−0.546 to −0.909) and kurtosis values (−0.637 to 0.822) fell within conventional guidelines, supporting the use of parametric analyses (Table 3.1). Pearson correlations were positive and statistically significant (two-tailed): SMU–IP $r = 0.394$, OI–IP $r = 0.404$, and SMU–OI $r = 0.275$ (all $p < .01$; Table 6); no correlation exceeded 0.80, suggesting limited bivariate redundancy. Collinearity diagnostics for the outcome equation (IP regressed on SMU and OI) indicated no multicollinearity concerns, with VIFs of 1.21 for SMU and 1.22 for OI (Table 7). Collectively, these patterns provide initial support for the proposed relationships and motivate the subsequent regression and bootstrapped mediation analyses.

Table 5
Descriptive statistics

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
IP	289	1.4	5	3.755	0.856	-0.546	0.143	-0.637	0.286
SMM	289	1.6	5	3.898	0.695	-0.507	0.143	-0.273	0.286
SMC	289	1.4	5	3.833	0.807	-0.629	0.143	-0.451	0.286
SMI	289	1.25	5	3.696	0.84	-0.635	0.143	-0.08	0.286
SMU	289	1.55	5	3.809	0.566	-0.654	0.143	0.439	0.286
OII	289	1.429	5	3.909	0.838	-0.869	0.143	0.023	0.286
OIO	289	1.429	5	3.837	0.801	-0.682	0.143	-0.286	0.286
OI	289	1.429	5	3.873	0.691	-0.909	0.143	0.822	0.286
Valid N (listwise)	289								

Table 6
Pearson correlations among SMU, OI, and IP

	IP	SMU	OI
IP	1	0.394**	0.404**
SMU	0.394**	1	0.275**
OI	0.404**	0.275**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7
Collinearity Statistics

Collinearity Statistics		
	Tolerance	VIF
SMU	0.829	1.21
OI	0.821	1.22

3.2 Regression Results (Direct Effects)

Ordinary least squares (OLS) regressions show that SMU is positively associated with IP after controls ($\beta = 0.394$, $t = 7.257$, $p < .001$; $N = 289$), supporting H1. When the three SMU subdimensions are entered simultaneously—marketing (SMM), customer relations and service (SMC), and information accessibility (SMI)—SMM is not significant ($\beta = 0.005$, $t = 0.082$, $p = .935$), whereas SMC ($\beta = 0.240$, $t = 4.226$, $p < 0.001$) and SMI ($\beta = 0.287$, $t = 4.931$, $p < 0.001$) are positive and significant, providing partial support at the subdimension level (H1b and H1c supported; H1a not supported). The construct-level model explains 15.5% of the variance in IP ($R^2 = 0.155$; $F(1, 287) = 52.667$; $p < 0.001$), and the subdimension model explains 18.0% ($R^2 = 0.180$; $F(3, 285) = 20.827$; $p < 0.001$). Standardized coefficients (β) and two-tailed tests are summarized in Table 8.

Table 8

Direct relationship between SMU and IP

Hypotheses	Relationships	β (Standardized)	t-value	p-value	Decision
H1	SMU $\rightarrow$ IP	0.394	7.257	<0.001	Supported***
H1a	SM for Marketing (SMM) $\rightarrow$ IP	0.005	0.082	0.935	Not Supported
H1b	SM for Customer Relations and Service (SMC) $\rightarrow$ IP	0.240	4.226	<0.001	Supported***
H1c	SM for Information Accessibility (SMI) $\rightarrow$ IP	0.287	4.931	<0.001	Supported***

Model Summary:

Construct-level (IP $\sim$ SMU): $R^2 = 0.155$, $F = 52.667$, $p < 0.001$

Dimension-level (IP $\sim$ SMM + SMC + SMI): $R^2 = 0.180$, $F = 20.827$, $p < 0.001$.

Remarks: Two-tailed tests. Standardized coefficients (β) are reported. Listwise N = 289. Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Consistent with H2, a construct-level simple regression shows a positive association between SMU and OI ($\beta = 0.275$, $t = 4.846$, $p < 0.001$; $R^2 = 0.076$; $F(1, 287) = 23.486$; $N = 289$; two-tailed tests). At the subdimension level (SMM, SMC, SMI entered simultaneously), SMC and SMI predict inbound OI ($\beta = 0.254$, $t = 4.267$, $p < 0.001$; $\beta = 0.148$, $t = 2.431$, $p = 0.016$), whereas SMM is not significant ($\beta = -0.044$, $p = 0.468$); model $R^2 = 0.099$, $F(3, 285) = 10.482$, $p < 0.001$. A similar pattern holds for outbound OI—SMC and SMI remain significant ($\beta = 0.124$, $t = 2.044$, $p = 0.042$; $\beta = 0.200$, $t = 3.204$, $p = 0.002$), whereas SMM is not ($\beta = -0.061$, $p = 0.321$); model $R^2 = 0.061$, $F(3, 285) = 6.160$, $p < 0.001$. Overall, social-media-enabled customer relations and service, as well as information accessibility, rather than marketing alone, drive both inbound and outbound OI routines (Table 9).

Table 9

Direct relationship between SMU and OI

Hypotheses	Relationships	β (Standardized)	t-value	p-value	Decision
H2	SMU $\rightarrow$ OI	0.275	4.846	< 0.001	Supported***
H2a	SM for Marketing (SMM) $\rightarrow$ inbound OI	-0.044	-0.727	0.468	Not Supported
H2b	SM for Customer Relations and Service (SMC) $\rightarrow$ inbound OI	0.254	4.267	< 0.001	Supported***
H2c	SM for Information Accessibility (SMI) $\rightarrow$ inbound OI	0.148	2.431	0.016	Supported*
H2d	SM for Marketing (SMM) $\rightarrow$ outbound OI	-0.061	-0.995	0.321	Not Supported
H2e	SM for Customer Relations and Service (SMC) $\rightarrow$ outbound OI	0.124	2.044	0.042	Supported*
H2f	SM for Information Accessibility (SMI) $\rightarrow$ outbound OI	0.2	3.204	0.002	Supported**

Model Summary:

Construct-level (OI ~ SMU): $R^2 = 0.076$, $F = 23.486$, $p < 0.001$

Dimension-level:

Inbound model (OII ~ SMM + SMC + SMI): $R^2 = 0.099$, $F = 10.482$, $p < 0.001$.

Outbound model (OIO ~ SMM + SMC + SMI): $R^2 = 0.061$, $F = 6.160$, $p < 0.001$

Remarks: Two-tailed tests. Standardized coefficients (β) are reported. Listwise N = 289. Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Consistent with H3, a construct-level simple regression shows that OI positively predicts IP ($\beta = 0.404$, $t = 7.481$, $p < 0.001$; $R^2 = 0.163$; $F(1, 287) = 55.969$; $N = 289$). When inbound OI (OII) and outbound OI (OIO) are entered simultaneously, both are positive and significant predictors of IP, with a comparatively larger effect for OII ($\beta = 0.290$, $t = 4.870$, $p < 0.001$) and a smaller yet significant effect for OIO ($\beta = 0.187$, $t = 3.144$, $p = 0.002$; two-predictor model $R^2 = 0.166$; $F(2, 286) = 28.386$; $p < 0.001$). These results indicate that both inbound and outbound OI routines are associated with higher IP, with inbound activities exhibiting the stronger standardized effect in this specification (Table 10).

Table 10

Direct relationship between OI and IP

Hypotheses	Relationships	β (Standardized)	t-value	p-value	Decision
H3	OI $\rightarrow$ IP	0.404	7.481	< 0.001	Supported***
H3a	Inbound OI (OII) $\rightarrow$ IP	0.290	4.870	< 0.001	Supported***
H3b	Outbound OI (OIO) $\rightarrow$ IP	0.187	3.144	0.002	Supported**

Model Summary:

Construct-level (IP ~ OI): $R^2 = 0.163$, $F = 55.969$, $p < 0.001$

Two-direction (IP ~ OII + OIO): $R^2 = 0.166$, $F = 28.386$, $p < 0.001$

Remarks: Two-tailed tests. Standardized coefficients (β) are reported. Listwise N = 289. Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

3.3 Mediation Results Via Open Innovation

Mediation was tested with PROCESS Model 4 using 5,000 bootstrap resamples and 95% percentile bootstrap confidence intervals; indirect effects were deemed significant when the CI excluded zero. At the construct level, SMU exhibited a significant positive indirect effect on IP via OI ($ab = 0.133$, $BootSE = 0.036$, 95% CI [0.070, 0.208]), supporting H4 and indicating partial mediation (the direct effect of SMU on IP remained significant). At the dimension level, inbound OI yielded significant indirect effects for customer relations and service (H4b: 0.0914, $BootSE = 0.0263$, 95% CI [0.0440, 0.1456]) and for information accessibility (H4c: 0.0646, $BootSE = 0.0227$, 95% CI [0.0240, 0.1124]), whereas marketing was not significant (H4a: 0.0305, $BootSE = 0.0222$, 95% CI [-0.0082, 0.0793]). For outbound OI, customer relations and service (H4e: 0.0462, $BootSE = 0.0200$, 95% CI [0.0120, 0.0906]) and information accessibility (H4f: 0.0536, $BootSE = 0.0200$, 95% CI [0.0198, 0.0976]) were significant, while marketing was not (H4d: 0.0135, $BootSE = 0.0206$, 95% CI [-0.0244, 0.0575]). Taken together, these results indicate that SMU contributes to IP primarily by activating inbound and outbound OI routines centered on customer relations and service and on information accessibility, rather than on marketing alone (Table 11).

Table 11

Bootstrapped indirect effects via inbound OI and outbound OI

Hypothesis	path	Indirect effect (a × b)	BootSE	BootLLCI	BootULCI	Decision
H4	SMU → OI → IP	0.133	0.036	0.070	0.208	Supported (partial mediation)
H4a	SM for Marketing → Inbound OI → IP	0.0305	0.0222	-0.0082	0.0793	Not Supported
H4b	SM for Customer Relations and Service → Inbound OI → IP	0.0914	0.0263	0.0440	0.1456	Supported
H4c	SM for Information Accessibility → Inbound OI → IP	0.0646	0.0227	0.0240	0.1124	Supported
H4d	SM for Marketing → Outbound OI → IP	0.0135	0.0206	-0.0244	0.0575	Not Supported
H4e	SM for Customer Relations and Service → Outbound OI → IP	0.0462	0.0200	0.0120	0.0906	Supported
H4f	SM for Information Accessibility → Outbound OI → IP	0.0536	0.0200	0.0198	0.0976	Supported

4. Conclusion

4.1 Interpretation of Findings

4.1.1 Social media usage and international performance (H1)

The evidence indicates that H1 is supported: SMU is positively related to IP. At the facet level, H1b and H1c are supported, meaning effects arise primarily through customer relations and service and through information accessibility, while H1a (marketing) is not supported. Substantively, value comes less from one-way promotion and more from routines that resolve customer issues, capture feedback, and convert market signals into action. Firms convert online engagement into performance when they institutionalize social listening, inquiry handling, and market sensing rather than relying on broadcast communication alone [17,18].

4.1.2 Social media usage and open innovation (H2)

Evidence supports H2: SMU is positively related to OI. At the subdimension level, H2b and H2c are supported for inbound OI, and H2e and H2f are supported for outbound OI, whereas H2a and H2d are not. In practical terms, service interactions and information accessibility, not marketing alone, consistently feed firms' OI routines. Managers should formalize pipelines that capture conversational insights, translate them into problem definitions and solution backlogs, and maintain partner arrangements for joint development and commercialization. This interpretation aligns with research showing that social technologies facilitate outside in and coupled knowledge flows [21,22].

4.1.3 Open innovation and international performance (H3)

The evidence indicates that H3 is supported: OI is positively related to international performance. At the facet level, H3a and H3b are both supported, with inbound OI showing the stronger association

and outbound OI providing additional gains. Substantively, systematic acquisition and assimilation of external ideas improve product–market fit and responsiveness, while codification, sharing, and partner commercialization help scale solutions across markets. These roles are complementary and align with prior findings that firms benefit most when they combine outside-in learning with outside-out diffusion in a coordinated system [23,47]. Managerially, firms should strengthen scanning, evaluation, and assimilation routines, link them to outward mechanisms for co-development and licensing, and track execution metrics such as time to insight and time to implementation.

4.1.4 The mediating role of open innovation (H4)

Evidence supports H4 as partial mediation based on PROCESS Model 4 with 5,000 bootstrap resamples and 95 percent confidence intervals. Social media usage improves international performance in part because it activates open innovation routines. At the subdimension level, mediation is selective: H4b and H4c are supported through inbound OI, and H4e and H4f are supported through outbound OI, whereas H4a and H4d are not supported. Substantively, customer relations and service and information accessibility supply inputs that firms can absorb, integrate, codify, and diffuse, while marketing alone does not yield a reliable mediated pathway. Managerially, firms should formalize pipelines that connect social listening and service interactions to inbound screening, assimilation, and learning, and then to outbound partnering and commercialization, with execution metrics such as time to insight and time to implementation. This pattern is consistent with the view that open innovation provides the channel through which digital engagement is translated into performance gains, and it aligns with resampling-based mediation inference [22,48].

4.2 Theoretical Contributions

This study contributes to CBEC research in three respects. First, it pinpoints the facets of SMU that matter for international performance, showing that customer relations and service and information accessibility, rather than marketing communication, align with the communication and knowledge flows central to diffusion theory and more reliably convert digital engagement into export outcomes [13,49]. Second, it establishes open innovation as the transmission mechanism and distinguishes inbound from outbound routines, with evidence of partial mediation in which inbound acquisition and integration relate more strongly to performance and outbound codification, sharing, and commercialization add complementary gains [50]. Third, it proposes a concise, testable framework that links SMU to international performance through inbound and outbound open innovation, advancing mechanism-based explanations of digitally enabled internationalization in SME settings [49,50].

4.3 Managerial and Policy Implications

Managers should treat social media as infrastructure for learning and service rather than only as a promotional outlet. Prioritize workflows for customer inquiry handling, social listening, and market sensing, and connect social channels to CRM, ticketing, and a searchable knowledge base so that each interaction yields reusable knowledge. Formalize inbound open innovation gates for capturing, screening, and assimilating external insights, and develop outbound open innovation playbooks for partner co-development, trials, and selective knowledge sharing. Track a small set of execution metrics such as response time, first-contact resolution, time to insight, and time to implementation.

These practices reflect evidence that social technologies create value when embedded in cross-functional routines and linked to innovation processes [49].

Policymakers can amplify these firm-level efforts by lowering the costs of learning and collaboration. Useful levers include knowledge-exchange platforms, accessible IP and compliance advisory, partner matchmaking for pilots and commercialization, and targeted training in customer analytics and inquiry management. Such support aligns with open-innovation guidance that stresses building absorptive and diffusion capacity alongside internal R&D so that SMEs can translate digital engagement into measurable international performance [50].

4.4 Limitations and Future Research

This study relies on cross-sectional, self-reported measures from single informants, which may inflate associations and underrepresent the behavioral micro-processes unfolding on social platforms and in partner interactions. Causal direction cannot be established, so endogeneity and reverse causality remain possible along the SMU → OI → IP pathway. External validity is bounded by a Yiwu-based CBEC sample and by firm-level, aggregate indicators of inbound and outbound OI that do not capture project portfolios, partner types, or governance specifics. Future work should combine surveys with multi-source evidence such as platform digital traces, customer-service logs, partner contracts, and archival export indicators to triangulate interactional and information flows and to mitigate common-method concerns [51]. Researchers should also broaden generalizability through comparative designs across regions, platforms, and industries, and incorporate fine-grained indicators of inbound and outbound routines, partner roles, and governance of IP and compliance; such extensions align with guidance that effective open innovation requires orchestrating internal absorption with outward diffusion and commercialization [50].

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