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THE IMPACT OF HUMAN CAPITAL ON SMES PERFORMANCE SUCCESS IN GUANGDONG PROVINCE, CHINA: THE MEDIATING ROLE OF OPEN INNOVATION

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Abstract

Based on the Resource-Based View Theory, this study aims to examine the relationships between human capital, open innovation, and performance success in SMEs. In the context of Guangdong Province, China, where SMEs play a vital role in the economy, understanding the dynamics of these relationships is particularly important. This study employs a quantitative research design, utilizing data collected from 200 employees working in SMEs in Guangdong. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data, allowing for the examination of complex relationships and the testing of mediation effects. The findings reveal that human capital has a positive and significant impact on SMEs' performance success. Furthermore, open innovation is identified as a mediator in this relationship. This study offers theoretical insights and provides practical guidance for SMEs seeking to improve their performance in a dynamic and competitive business environment.

Keywords: Human Capital; Open Innovation; Performance Success; Small and Medium-Sized Enterprises; PLS-SEM.

1. INTRODUCTION

1.1 Background of the study

The field of small and medium-sized enterprises has emerged as a critical area of research in the domain of business and management. In Guangdong Province, located in southern China, the SME sector is particularly vibrant and makes significant contribution to the local and national economy. In SMEs, human capital is very critical in determining their capacity to innovate, make strategic decisions, and effectively utilize resources.

SMEs, characterized by a proficient and well-informed workforce or management team, are more likely to possess the capabilities required for seizing opportunities, responding to market demands, and achieving sustainable success. In Indonesia, education acts a role in enhancing the caliber of human capital, including the augmentation of knowledge, proficiency in technology, innovation, and the adeptness to advance technology (Bawono, 2021).

Open innovation is a relatively new concept that has gained prominence in the literature. It challenges the traditional closed innovation paradigm by emphasizing the importance of collaboration and knowledge sharing with external partners.

This enables firms to uncover the value embedded in external resources, ultimately enhancing their overall performance (Zhu et al., 2023). The implementation of open innovation strategies

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by the firm positively impacted its business performance, including both market and financial aspects (J. Kim et al., 2022).

1.2 Resource-Based View (RBV) Theory

In SMEs, RBV theory suggests the unique bundle of resources and capabilities possessed by these firms can make them different from others, contributing to their performance and competitiveness (Madhani, 2010).

Certain resources under the company's jurisdiction, particularly those deemed valuable, rare, unique, and irreplaceable, have the ability to contribute to a competitive edge, thereby enhancing overall performance (Hussain et al., 2024). In this study, RBV theory provides a lens through which to examine the significance of human capital in shaping SMEs performance success.

2. LITERATURE REVIEW

2.1 Literature Review on Human Capital

Human capital refers to the distinct competitive advantage that employees bring to a company through their unique skills, intelligence, and expertise (He & Pérez Estébanez, 2023). Accordingly, investing in human capital through progressive reforms in education and training is crucial for meeting the demands of the Fourth Industrial Revolution (Zeynalli, 2021).

Human capital, encompassing the collective knowledge, skills, experience, and abilities of employees and managers, is regarded as a critical asset for organizations. Extensive studies has been conducted, aiming to understand the dimensions like knowledge, skills and experience, and the impact on organizational performance and survival (Alnoor, 2020; Al-Tit et al., 2022; Aman-Ullah et al., 2022; Asif & Lahiri, 2021; Borazon et al., 2022).

In this study, knowledge, skills and experience are identified as the main dimensions of human capital in SMEs, ranking in the top three in terms of frequency.

2.2 Literature Review on Open Innovation

OI categories are proposed as: OI behavior and cognition, OI strategy and design, OI stakeholders, OI ecosystem, and open governance (Bogers et al., 2017). Building upon these foundations, Open Innovation is a paradigm encouraging organizations to utilize external and internal ideas and channels for the market access.

It involves combining internal and external knowledge to create something new, resulting in a two-way process in which knowledge flows both within and outside the firm's boundaries (Asada et al., 2020).

In SMEs, the diversity of open innovation practices are adopted by the external, internal, and coupled paradigms (Almeida, 2021). Similarly, a OI construct comprises two dimensions: inbound and outbound (Valdez-Juárez & Castillo-Vergara, 2021).

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2.3 Literature Review on SMEs Performance Success

Firm performance success includes operational performance which encompass aspects related to product elements, process quality, efficiency and productivity and financial performance, such as profitability, ROI, and share price (Rumanti et al., 2022).

SME performance can be measured from the following five aspects: efficiency, growth, profit, owners' personal goals and company reputation(Sadiku-Dushi et al., 2019).

The study incorporates three conventional performance metrics: Return on Assets (ROA), Net Profit Margin (NPM) and ATO (Asset Turnover) serving as an indicator of the firm's capacity to utilize its assets in generating sales or revenue (Xu & Li, 2019). There are three distinct sections: technical performance, financial performance, and non-financial performance (S.-S. Kim, 2021).

It was observed that the top four dimensions, including financial performance, non-financial performance, business growth, and performance relative to competitors, had the highest frequency.

2.4 Literature Review on Relationships between Human Capital, Open Innovation and SMEs Performance Success

2.4.1 Relationships between HC and OI

In the dynamic landscape of open innovation (OI), numerous studies have shed light on the pivotal role of human capital in driving innovation success. Previous studies collectively emphasize the indispensable role of human capital across various dimensions of open innovation, ranging from its influence on strategic decisions to its influence on outcomes and success within organizations (Ahn et al., 2017; Alassaf et al., 2020; Latifah et al., 2022; Yao et al., 2023). As the exploration of the intricate web of open innovation deepens, it becomes increasingly evident that human capital is not merely a resource but a driving force that propels organizations towards innovation excellence.

H1: The human capital has a significant relationship with open innovation.

2.4.2 Relationships between OI and SMEs Performance Success

Valdez-Juárez & Castillo-Vergara (2021) underscored the crucial significance of open innovation in the performance of small and medium-sized enterprises. The capacity for innovation and, particularly, open entry innovation, can significantly boost organizational performance(Rumanti et al., 2022).

Dabić et al. (2023) delved into digitally mature companies, exploring the diverse pathways to enhance new product development (NPD) performance and underscored the particular advantages of outbound open innovation in bolstering NPD performance.

When companies expand their open innovation initiatives, they exert a positive influence on various dimensions of their business performance(Kim et al., 2022).

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They recognize that choosing open innovation leads to markedly higher returns compared to traditional innovation approaches(Dencik et al., 2023). Open innovation has played a pivotal role of in driving organizational growth and development(Annamalah et al., 2023).

H2: Open Innovation has a significant relationship with SMEs Performance Success.

2.4.3 Relationships between HC and SMEs Performance Success

Chen and Zhang (2022) found that within Chinese listed firms, the accumulation of human capital emerges as a pivotal determinant in bolstering the performance of SMEs. Similarly, Kamall Khan et al. (2022) conducted case studies on SMEs in South Australia and highlighted the importance of employees' knowledge, skills, and abilities in driving firm growth and promoting overall performance.

Moreover, Pérez Estébanez (2023) concluded that the positive influence on business performance is particularly evident when there is a focus on highly educated personnel.

H3: The human capital has a significant relationship with SMEs Performance Success.

2.4.4 Relationships between HC and SMEs Performance Success: mediating role of innovative leadership

In Saudi Arabia, Aman-Ullah et al. (2022) illustrated a notable and positive connection between the capacity, knowledge, and skills of human capital and the performance of small and medium-sized enterprises (SMEs), with innovative leadership playing a mediating role in this relationship.

H4: Open Innovation mediates the relationship between Human Capital and the Success of SMEs Performance.

2.5 Research Model

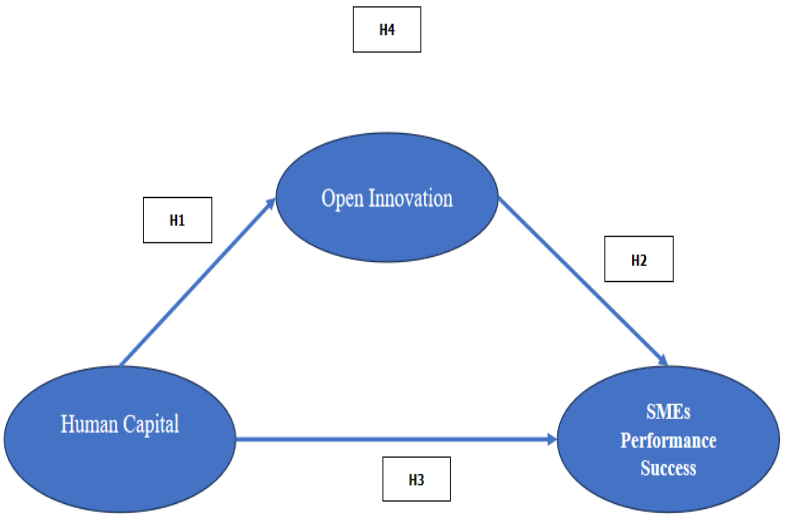

Figure 1: The conceptual framework

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3. METHODOLOGY

3.1 Population and Sampling

The minimum sample size for this study is 180 (9 dimensions x 20), increased by 20% to 220 to account for potential reductions during the survey. After rigorous questionnaire cleaning, the final valid sample size for analysis is 200, ensuring data accuracy and reliability.

3.2 Descriptive Statistics of formal survey

Table 1: Sample Demographic (n=200)

Demographic Variable	Category	Frequency	Percent
City	Guangzhou	70	35.0
	Shenzhen	37	18.5
	Zhuhai	7	3.5
	Foshan	10	5.0
	Dongguan	20	10.0
	Zhongsan	10	5.0
	Zhanjiang	12	6.0
	Other cities	34	17.0
Type	Small enterprise	117	58.5
	Medium enterprise	83	41.5
Industry	Manufacturing	73	63.5
	Wholesale/retail	60	30
	Information transmission /software	43	21.5
	cross-border e-commerce	41	20.5
	Other industries	31	15.5

The demographics are detailed in Table 1. Overall, the distribution of questionnaires effectively mirrors the distribution of different cities, types and industries, providing invaluable data support.

4. DATA ANALYSIS AND RESULTS

4.1 Measurement Model

Evaluating a reflective measurement model involves considering several criteria: indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The outcomes from the PLS-SEM algorithm program are presented in Table 2, Table 3, Table 4, and Figure 2. Specifically, the outer loadings range from 0.673 to 0.94, all exceeding the threshold of 0.6; the average variance extracted (AVE) values are greater than 0.5; and the composite reliability (CR) values are above 0.7.

The HTMT criterion is used to assess discriminant validity, with a stricter criterion requiring values $\leq$ 0.85 and a more lenient criterion allowing values $\leq$ 0.90(Hair et al., 2017). As indicated in Table 4, most HTMT values are below 0.90, except for HC-EP, which is slightly above at 0.905.

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Table 2: Validity and reliability for first order constructs

Dimension	Item	Outer loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
BG	BG1	0.931	0.959	0.959	0.968	0.859
	BG2	0.927				
	BG3	0.919				
	BG4	0.926				
	BG5	0.931				
CP	CP1	0.917	0.951	0.951	0.962	0.835
	CP2	0.895				
	CP3	0.937				
	CP4	0.916				
	CP5	0.904				
EP	EP1	0.907	0.944	0.945	0.957	0.817
	EP2	0.909				
	EP3	0.917				
	EP4	0.882				
	EP5	0.906				
FP	FP1	0.919	0.952	0.953	0.963	0.839
	FP2	0.915				
	FP3	0.94				
	FP4	0.901				
	FP5	0.903				
IB	IB1	0.865	0.973	0.973	0.976	0.77
	IB2	0.863				
	IB3	0.832				
	IB4	0.914				
	IB5	0.863				
	IB6	0.905				
	IB7	0.883				
	IB8	0.856				
	IB9	0.878				
	IB10	0.906				
	IB11	0.896				
	IB12	0.864				
K	K1	0.891	0.938	0.938	0.953	0.8
	K2	0.891				
	K3	0.916				
	K4	0.875				
	K5	0.901				
NFP	NFP1	0.921	0.959	0.959	0.968	0.859
	NFP2	0.932				
	NFP3	0.905				
	NFP4	0.94				
	NFP5	0.935				
OB	OB1	0.924	0.959	0.959	0.968	0.858

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	OB2	0.939				
	OB3	0.918				
	OB4	0.927				
	OB5	0.921				
SK	SK1	0.879	0.942	0.944	0.956	0.813
	SK2	0.886				
	SK3	0.929				
	SK4	0.891				
	SK5	0.922				

Table 3: Validity and reliability for second-order constructs

second-order constructs	item	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
HC			0.948	0.949	0.954	0.581
	K1	0.776				
	K2	0.732				
	K3	0.772				
	K4	0.721				
	K5	0.744				
	SK1	0.72				
	SK2	0.726				
	SK3	0.774				
	SK4	0.763				
	SK5	0.802				
	EP1	0.762				
	EP2	0.806				
	EP3	0.785				
	EP4	0.758				
	EP5	0.786				
OI			0.967	0.967	0.97	0.657
	IB1	0.827				
	IB2	0.826				
	IB3	0.811				
	IB4	0.89				
	IB5	0.876				
	IB6	0.876				
	IB7	0.836				
	IB8	0.831				
	IB9	0.863				
	IB10	0.865				
	IB11	0.866				
	IB12	828				
	OB1	0.723				
	OB2	0.73				
	OB3	0.753				
	OB4	0.668				

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second-order constructs	item	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
	OB5	0.727				
PS			0.958	0.958	0.961	0.555
	FP1	0.745				
	FP2	0.775				
	FP3	0.799				
	FP4	0.747				
	FP5	0.733				
	NFP1	0.728				
	NFP2	0.769				
	NFP3	0.75				
	NFP4	0.764				
	NFP5	0.757				
	BG1	0.778				
	BG2	0.757				
	BG3	0.747				
	BG4	0.768				
	BG5	0.769				
	CP1	0.711				
	CP2	0.673				
	CP3	0.721				
	CP4	0.78				
	CP5	0.686				

Table 4: Discriminant Validity of Constructs (HTMT)

	BG	CP	EP	FP	HC	IB	K	NFP	OB	OI	PS	SK
BG												
CP	0.529											
EP	0.656	0.561										
FP	0.612	0.545	0.666									
HC	0.727	0.621	0.905	0.723								
IB	0.644	0.593	0.671	0.631	0.758							
K	0.612	0.518	0.62	0.603	0.89	0.651						
NF	0.581	0.515	0.619	0.597	0.704	0.616	0.603					
OB	0.589	0.494	0.595	0.577	0.667	0.601	0.561	0.566				
OI	0.692	0.621	0.716	0.679	0.807	0.992	0.688	0.663	0.812			
PS	0.855	0.814	0.773	0.865	0.857	0.767	0.722	0.846	0.688	0.82		
SK	0.585	0.504	0.626	0.574	0.892	0.611	0.586	0.571	0.544	0.652	0.69	

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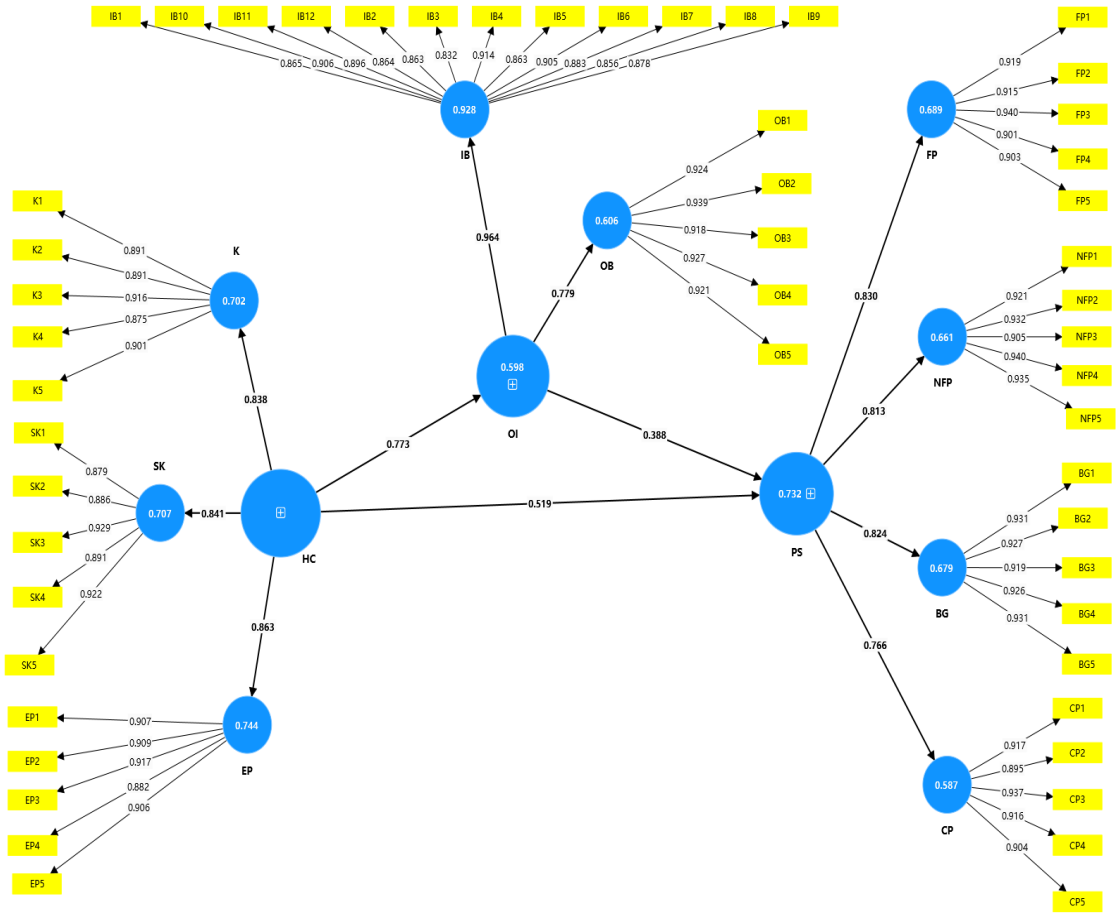

Figure 2: The results of the conceptual model

4.2 Evaluation of the structural model

4.2.1 Assessing the structural model for collinearity (The VIF)

Table 5: The VIF of Inner model

	BG	CP	EP	FP	HC	IB	K	NFP	OB	OI	PS	SK
HC			1				1			1	2.486	1
OI						1			1		2.486	
PS	1	1		1				1				

The Variance Inflation Factor (VIF) is an important indicator for measuring the degree of multicollinearity among independent variables. Observations from Table 5 reveal that the VIF values are less than 3, indicating that there is no multicollinearity issue in the model(Hair et al., 2017). Specifically, although some VIF value is 2.486, slightly higher than other variables, they are still within an acceptable range, suggesting minimal multicollinearity among these variables.

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4.2.2 Assessing the significance and relevance of the structural model relationships

(1) Testing Direct Effects

Table 6: Results of path analysis

hypothesis	Path	Standard deviation	T statistics	P values	f-square	results
H1	HC -> OI	0.045	18.085	0	1.486	accepted
H2	OI -> PS	0.094	3.865	0	0.225	accepted
H3	HC -> PS	0.094	6.026	0	0.404	accepted

From Table 6, Human capital, open innovation are well positively associated with performance success (T=6.026, 3.865; P=0); human capital has a positive impact on open innovation (T=18.085; P=0).

(2) Testing Indirect Effects

Table 7: Mediation test of path

Hypothesis	Path	Standard deviation	T statistics	P values	result
H4	HC -> OI -> PS	0.087	3.359	0.001	accepted

From table 7, Open Innovation mediates the relationship between Human Capital and the Success of SMEs Performance ((T=3.359; P=0.001). All hypotheses are accepted.

4.2.3 Assessing the model's explanatory power (R^2)

R^2 measures the variance explained in each endogenous variable. R^2 ranges from 0 to 1, with higher levels indicating higher explanatory power(Hair et al., 2019). Specifically, the R-square for each variable range from 0.587 to 0.928, indicating varying degrees of goodness-of-fit for the model. Among them, the R-square for the IB variable are both as high as 0.928, suggesting that the model explains the data variability of this variable extremely well and has a very high degree of fit.

Table 8: R-square

Dimensions	R-square	R-square adjusted
BG	0.679	0.678
CP	0.587	0.585
EP	0.744	0.743
FP	0.689	0.688
IB	0.928	0.928
K	0.702	0.7
NFP	0.661	0.66
OB	0.606	0.604
OI	0.598	0.596
PS	0.732	0.729
SK	0.707	0.705

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4.2.4 Assess the model of predictive power (Q^2)

From Table 4, it can be observed that for a majority of the indicators, Q^2 is greater than 0 and the PLS-SEM RMSE is smaller than the LM RMSE, indicating that the PLS-SEM analysis yields smaller prediction errors compared to the Linear Model, with a medium predictive power(Shmueli et al., 2019).

Table 9: PLS-Predict

	Q^2predict	PLS-SEM_RMSE	LM_RMSE	PLS_LM
BG1	0.443	1.001	1.044	-0.043
BG2	0.393	1.104	1.136	-0.032
BG3	0.376	1.079	1.127	-0.048
BG4	0.427	1.002	1.03	-0.028
BG5	0.4	1.073	1.106	-0.033
CP1	0.27	1.181	1.218	-0.037
CP2	0.242	1.219	1.274	-0.055
CP3	0.331	1.205	1.27	-0.065
CP4	0.291	1.199	1.261	-0.062
CP5	0.295	1.199	1.251	-0.052
EP1	0.576	0.908	0	0.908
EP2	0.648	0.844	0	0.844
EP3	0.614	0.839	0	0.839
EP4	0.572	0.86	0	0.86
EP5	0.614	0.855	0	0.855
FP1	0.395	1.028	1.079	-0.051
FP2	0.374	1.015	1.056	-0.041
FP3	0.45	0.981	1.02	-0.039
FP4	0.384	1.092	1.113	-0.021
FP5	0.359	1.038	1.09	-0.052
IB1	0.368	0.983	1.019	-0.036
IB10	0.471	0.966	1.011	-0.045
IB11	0.406	1.033	1.096	-0.063
IB12	0.401	1.082	1.155	-0.073
IB2	0.313	1.071	1.112	-0.041
IB3	0.373	0.98	1.013	-0.033
IB4	0.445	1.018	1.057	-0.039
IB5	0.364	1.074	1.132	-0.058
IB6	0.452	0.966	1.006	-0.04
IB7	0.371	1.048	1.101	-0.053
IB8	0.416	1.024	1.082	-0.058
IB9	0.463	0.928	0.975	-0.047
K1	0.6	0.827	0	0.827
K2	0.533	0.944	0	0.944
K3	0.596	0.91	0	0.91
K4	0.518	0.927	0	0.927
K5	0.553	0.896	0	0.896

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	Q²predict	PLS-SEM_RMSE	LM_RMSE	PLS_LM
NFP1	0.353	1.103	1.137	-0.034
NFP2	0.408	1.093	1.127	-0.034
NFP3	0.378	1.099	1.144	-0.045
NFP4	0.387	1.089	1.123	-0.034
NFP5	0.388	1.11	1.151	-0.041
OB1	0.322	1.159	1.197	-0.038
OB2	0.362	1.105	1.143	-0.038
OB3	0.358	1.078	1.117	-0.039
OB4	0.299	1.162	1.233	-0.071
OB5	0.357	1.111	1.166	-0.055
SK1	0.516	0.995	0	0.995
SK2	0.525	0.881	0	0.881
SK3	0.598	0.871	0	0.871
SK4	0.582	0.871	0	0.871
SK5	0.641	0.869	0	0.869

5. CONCLUSION

In conclusion, the findings of this study underscore the pivotal role of human capital in driving performance success, with open innovation acting as a critical mediator in this relationship. By emphasizing the importance of both human capital and open innovation, this research contributes valuable theoretical insights and offers practical guidance for enterprises seeking to enhance their competitiveness in today's dynamic business environment.

Limitations and Future Directions

The present study has limitations that suggest avenues for future research. Firstly, it focused on small and medium-sized enterprises (SMEs) in Guangdong Province, China, limiting the generalizability of the findings. Future studies can broaden the scope by including a wider range of regions and larger companies to enhance applicability and universality. Secondly, the study relied on a 5-point Likert scale questionnaire, which may not capture the depth and complexity of the phenomena. Future research can adopt a mixed-methods approach, combining quantitative data with qualitative data from open-ended questions, interviews, or case studies to gain a richer understanding. In conclusion, while the study offers valuable insights, future research can expand upon these findings by addressing these limitations, providing a more comprehensive understanding.

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