

Human Capital Development and SME Innovation in Indonesia: The Contingent Roles of Financial and Managerial Practices

M Fahmi

Mahasiswa Universitas Pamulang, Indonesia
Fahm_653@gmail.com

Abstract

Purpose: This study examines how human capital development is associated with innovation capability and business performance among Indonesian small and medium-sized enterprises (SMEs), and whether financial and managerial practices condition these relationships. **Design/methodology/approach:** A sequential explanatory mixed-methods design combined survey responses from 285 SMEs with in-depth interviews involving 35 respondents. Quantitative analysis used descriptive statistics, multiple regression, and partial least squares structural equation modeling (PLS-SEM); qualitative data were analyzed thematically to interpret the statistical patterns. **Findings:** Human capital development was positively associated with innovation capability ($\beta = .412$, $p < .001$), and innovation capability was positively associated with business performance ($\beta = .389$, $p < .001$). The indirect association between human capital and performance through innovation capability was significant ($\beta = .160$, $p < .001$), while the direct association remained significant ($\beta = .198$, $p = .001$), a pattern consistent with partial statistical mediation. Financial practices strengthened the human capital–innovation relationship ($\beta = .187$, $p = .004$), whereas managerial practices strengthened the innovation–performance relationship ($\beta = .213$, $p < .001$). Interviews indicated that employee development, financing constraints, and digital competencies were central to firms' innovation experiences. **Originality/value:** The study integrates human capital theory, the resource-based view, and dynamic capabilities reasoning to explain not only whether human capital relates to SME outcomes, but also how innovation transmits this relationship and under what organizational conditions it becomes stronger in an emerging-market setting.

Keywords: human capital development; innovation capability; SME performance; financial practices; managerial practices; Indonesia; PLS-SEM

1. Introduction

Small and medium-sized enterprises (SMEs) are central to employment creation, local value formation, and entrepreneurial experimentation in emerging economies. In Indonesia, their strategic role is reinforced by a regulatory framework that classifies micro, small, and medium enterprises primarily through business-capital and annual-sales criteria and provides a basis for public facilitation and empowerment (Republic of Indonesia, 2021). Yet the economic relevance of SMEs does not automatically translate into sustained productivity or competitiveness. Many firms operate with limited managerial depth, restricted access to finance, and uneven adoption of digital technologies, making their internal knowledge and learning capacity especially consequential.

Human capital refers to the knowledge, skills, experience, and productive competencies embodied in individuals (Becker, 1993). At the firm level, these attributes can constitute valuable and difficult-to-replicate resources when they are aligned with organizational routines and strategic priorities (Barney, 1991). For SMEs, whose formal structures and financial reserves are often limited, owner-manager competence and employee expertise may be particularly important because strategic decision making, opportunity recognition, and implementation are concentrated in relatively few

people. Empirical research has linked human capital to SME innovation, productivity, and organizational performance, although the strength and pathway of these associations vary across settings (Aman-Ullah et al., 2022; Timothy, 2022; Wongsansukcharoen & Thaweepaiboonwong, 2023).

Innovation capability is a plausible mechanism through which human capital becomes economically productive. The Oslo Manual distinguishes product and process innovation from organizational and marketing forms of innovation, emphasizing that innovation includes both technological and non-technological change (OECD/Eurostat, 2018). Employees and owner-managers use their expertise to interpret market signals, recombine knowledge, solve operational problems, and implement new products, processes, channels, or business models. Dynamic capabilities theory similarly argues that firms require the capacity to sense opportunities, seize them, and reconfigure their resource base in changing environments (Teece et al., 1997). Human capital can therefore be viewed as a foundation for the learning and reconfiguration processes that constitute innovation capability.

However, human capital does not operate in isolation. Financial practices determine whether firms can budget for training, evaluate investment alternatives, manage cash-flow risk, and sustain experimentation. Managerial practices determine whether innovations are selected, coordinated, commercialized, and scaled. In resource-constrained SMEs, these organizational practices may function as complementary capabilities that amplify—or suppress—the value generated by knowledge and innovation. Prior Indonesian studies document the relevance of human-resource capacity, innovation, technology utilization, and financial management for SME productivity and sustainability (Hernita et al., 2021; Menne et al., 2022; Purwati et al., 2021; Surya et al., 2021), but the combined mediating and moderating architecture remains insufficiently specified.

This study addresses that gap by examining a model in which human capital development is associated with business performance both directly and indirectly through innovation capability, while financial and managerial practices operate as boundary conditions. The study makes three contributions. First, it integrates human capital theory with resource-based and dynamic-capabilities perspectives in an Indonesian SME context. Second, it distinguishes the transmission mechanism of innovation capability from the contingent roles of financial and managerial practices. Third, it supplements cross-sectional statistical results with interview evidence, allowing the quantitative patterns to be interpreted in relation to firms' reported development priorities and constraints.

Accordingly, the study asks: (1) Is human capital development positively associated with SME innovation capability and business performance? (2) Is the human capital–performance relationship statistically mediated by innovation capability? and (3) Do financial and managerial practices strengthen the focal relationships in the model?

2. Theoretical Background and Hypothesis Development

2.1 Human capital development and innovation capability

Human capital theory conceptualizes education, training, experience, and skill acquisition as investments that increase productive capacity (Becker, 1993). In SMEs, these investments are manifested not only in formal qualifications but also in tacit industry knowledge, problem-solving competence, and entrepreneurial judgment. From a resource-based perspective, human capital creates advantage when it is valuable, scarce, imperfectly imitable, and organizationally deployed (Barney, 1991). The relevance of these conditions is heightened in SMEs because knowledge is frequently concentrated in the owner-manager and a small core workforce.

Innovation requires the identification of opportunities and the conversion of ideas into changes that are implemented and used. Education can enhance information-processing capacity; professional skills support technical execution; experience improves pattern recognition; training updates routines; and entrepreneurial competencies facilitate initiative, risk assessment, and opportunity exploitation. Evidence from SMEs indicates that managerial education and sectoral experience are associated with

different forms of technological and non-technological innovation (Timothy, 2022), while innovative human-resource practices can strengthen innovation capability (Wongsansukcharoen & Thaweepaiboonwong, 2023). Intellectual capital research also shows that human capital contributes to innovation when combined with dynamic capabilities and knowledge-management arrangements (Cabrilo et al., 2024; Farzaneh et al., 2022).

H1. Human capital development is positively associated with SME innovation capability.

2.2 Innovation capability and business performance

Innovation capability enables SMEs to renew offerings, improve processes, reach customers through new channels, and adapt their organizational arrangements. These outcomes can enhance differentiation, responsiveness, efficiency, and customer value. Indonesian evidence has linked innovation capability to business performance and shown that social capital and entrepreneurial leadership can support this relationship (Purwati et al., 2021). Other studies similarly identify innovation as a mechanism through which adaptive and entrepreneurial orientations are converted into performance outcomes (Savitri et al., 2021).

Not every innovation produces an immediate financial return; poorly selected or weakly implemented projects may consume scarce resources. Nevertheless, firms with stronger innovation capability are better positioned to repeatedly identify, implement, and refine valuable changes. This repeatable capability—not a single innovation event—is expected to be positively associated with broader performance indicators such as sales growth, profitability, employment growth, customer satisfaction, and competitive position.

H2. Innovation capability is positively associated with SME business performance.

2.3 Human capital development and business performance

Human capital may also relate directly to performance. Skilled and experienced personnel can improve productivity, service quality, cost control, customer relationships, and decision quality even when these improvements are not classified as innovation. Studies across organizational settings report positive associations between human-capital capacity, knowledge, skills, and performance (Aman-Ullah et al., 2022). In Indonesian SMEs, capacity strengthening has likewise been linked to productivity and sustainability (Hernita et al., 2021; Surya et al., 2021).

H3. Human capital development is positively associated with SME business performance.

2.4 The mediating role of innovation capability

The direct human capital–performance relationship does not explain how knowledge and competence are transformed into market outcomes. Dynamic capabilities reasoning suggests that resources create value through organizational processes that deploy and reconfigure them (Teece et al., 1997). Innovation capability represents one such process: human capital supports opportunity recognition and implementation, while realized innovations contribute to performance. Prior SME research has found that marketing innovation mediates part of the association between top managers' human capital and productivity (Timothy, 2022), and that innovation capabilities transmit the performance implications of innovative human-resource practices (Wongsansukcharoen & Thaweepaiboonwong, 2023).

Because human capital may improve routine operations as well as innovation, a partial rather than complete indirect relationship is theoretically plausible.

H4. Innovation capability statistically mediates the positive association between human capital development and SME business performance.

2.5 Financial practices as a moderator

Innovation commonly requires discretionary resources, financial planning, and tolerance for uncertain returns. Sound record-keeping, budgeting, cash-flow management, performance monitoring, and access to external finance can help an SME allocate resources to training and experimentation, evaluate innovation proposals, and absorb implementation setbacks. Conversely, weak financial systems may prevent knowledgeable employees from acting on viable ideas. Indonesian studies emphasize the

interaction of human-resource development, capital support, technology use, and financial management in SME sustainability (Menne et al., 2022; Surya et al., 2021).

H5. Financial practices positively moderate the association between human capital development and innovation capability, such that the association is stronger when financial practices are more developed.

2.6 Managerial practices as a moderator

Innovation generates performance only when it is strategically selected, coordinated, marketed, and operationalized. Managerial practices—such as strategic planning, human-resource management, marketing management, and operational control—provide the routines through which innovations are aligned with customer needs and converted into repeatable value. This complementarity is consistent with the resource-based view: a resource or capability may have limited value unless the firm possesses the complementary organizational arrangements needed to exploit it (Barney, 1991).

H6. Managerial practices positively moderate the association between innovation capability and business performance, such that the association is stronger when managerial practices are more developed.

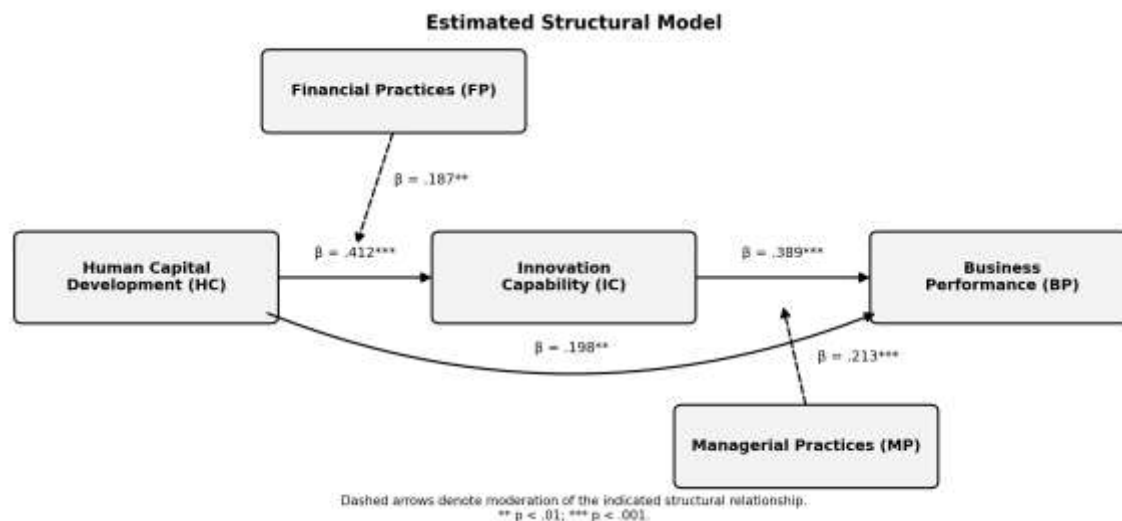


Figure 1. Estimated structural model and moderating relationships.

3. Methods

3.1 Research design

The study used a sequential explanatory mixed-methods design in which a quantitative survey was followed by qualitative interviews intended to interpret the statistical results (Creswell & Plano Clark, 2018). This design was appropriate because the hypothesized relationships required multivariate testing, whereas the interview component provided contextual evidence regarding how SME owners and managers experienced employee development, financing constraints, and technology-related skill requirements.

The design was cross-sectional. Consequently, the reported path coefficients and indirect effects should be interpreted as associations that are consistent with the proposed theoretical model, not as definitive evidence of temporal or causal effects.

3.2 Population, eligibility criteria, and sample

The study population comprised small and medium-sized enterprises operating in selected locations across Indonesia. Purposive sampling was used to recruit firms that had operated for at least three years, held formal business registration, and reported engagement in innovation-related activities. The

final quantitative sample included 285 SMEs in manufacturing, services, and trade. The source dataset classified 223 firms (78.2%) as small enterprises and 62 (21.8%) as medium enterprises.

The geographic distribution was reported by macro-region: Java (52.3%), Sumatra (18.6%), Sulawesi (15.4%), Kalimantan (8.4%), and other regions (5.3%). Because the sampling frame was non-probabilistic and the specific provinces were not documented in the source manuscript, statistical generalization to the entire Indonesian SME population should be made cautiously. SME classification should be verified against the capital and annual-sales thresholds in Government Regulation No. 7 of 2021 before submission (Republic of Indonesia, 2021).

3.3 Data collection

A structured questionnaire was administered to SME owners and managers through direct distribution and an electronic Google Forms version. Attitudinal items used five-point Likert-type response categories ranging from 1 (strongly disagree) to 5 (strongly agree). The survey covered human capital development, innovation capability, financial practices, managerial practices, business performance, and firm characteristics. The data-collection period lasted four months; the calendar dates and response-rate denominator were not specified in the source manuscript and should be added by the authors.

The qualitative component involved in-depth interviews with 35 survey respondents. Interview accounts were used to clarify the mechanisms and constraints underlying the quantitative relationships. Financial records, business plans, and organizational documents were reviewed where available to cross-check selected self-reported information.

3.4 Measures

Human capital development (HC) was operationalized through formal education, professional skills, work experience, training participation, and entrepreneurial competencies. The construct represented the stock and development of knowledge and capabilities available to the SME. Cronbach's alpha was .847.

Innovation capability (IC) incorporated technological and non-technological dimensions: product innovation, process innovation, technology adoption, marketing innovation, organizational innovation, and business-model innovation. This multidimensional operationalization is broadly consistent with the Oslo Manual's distinction between product/business-process and organizational/marketing change (OECD/Eurostat, 2018). Cronbach's alpha was .823.

Financial practices (FP) included financial record-keeping, budgeting and planning, cash-flow management, access to external financing, and financial-performance monitoring. Cronbach's alpha was .791.

Managerial practices (MP) included strategic planning, human-resource management, marketing management, operational management, decision processes, and organizational systems. Cronbach's alpha was .815.

Business performance (BP) combined objective and perceptual indicators. Objective items covered sales growth, profit margin, and employment growth, whereas subjective items addressed competitive position, customer satisfaction, and overall business success. Cronbach's alpha was .869. The source manuscript did not report the exact questionnaire items or their original scale sources; these should be supplied in an appendix or online supplement to ensure replicability.

3.5 Data analysis

Quantitative analysis was conducted using SPSS 26 and SmartPLS 3. Descriptive statistics characterized the sample and construct indicators. Pearson correlations assessed bivariate associations. Multiple regression estimated the association of the five human-capital dimensions with innovation capability; the reported coefficients are presented as unstandardized B coefficients because the model includes an intercept.

PLS-SEM was used to estimate the hypothesized direct, indirect, and interaction relationships. PLS-SEM is suitable for prediction-oriented models with multiple latent constructs and interaction terms,

but transparent reporting requires separate evaluation of the measurement and structural models (Hair et al., 2019). The source manuscript reported Cronbach's alpha, path coefficients, t statistics, p values, SRMR, and NFI, but did not provide item loadings, composite reliability, rho_A, average variance extracted (AVE), heterotrait-monotrait ratios (HTMT), endogenous-construct R², predictive relevance, effect sizes, or the number of bootstrap resamples. Therefore, the present revision does not assert convergent or discriminant validity beyond the available internal-consistency evidence. These diagnostics should be added before journal submission (Fornell & Larcker, 1981; Henseler et al., 2015).

Interview data were analyzed thematically by identifying recurring patterns, reviewing candidate themes, defining their conceptual boundaries, and relating them to the quantitative findings (Braun & Clarke, 2006). The integration stage compared qualitative themes with the estimated structural relationships.

4. Results

4.1 Sample characteristics

The sample was dominated by small enterprises (78.2%). Services accounted for 39.3% of firms, manufacturing for 34.4%, and trade for 26.3%. Most firms had operated for 6–10 years (43.5%), and 45.3% of owners held at least a bachelor's degree. Table 1 summarizes the sample profile.

Table 1. Sample demographic characteristics (N = 285)

Characteristic	Category	n	%
Enterprise size	Small	223	78.2
	Medium	62	21.8
Business sector	Manufacturing	98	34.4
	Services	112	39.3
	Trade	75	26.3
Enterprise age	3–5 years	87	30.5
	6–10 years	124	43.5
	>10 years	74	26.0
Owner education	High school	89	31.2
	Diploma	67	23.5
	Bachelor's	108	37.9
	Postgraduate	21	7.4
Number of employees	1–10	156	54.7
	11–50	98	34.4
	51–100	31	10.9

4.2 Human capital, innovation, and financial-practice indicators

Work experience had the highest mean among the human-capital dimensions (M = 3.81, SD = 0.72), followed by professional skills (M = 3.67, SD = 0.78). Training participation had the lowest mean (M = 3.24, SD = 0.94), suggesting comparatively weaker engagement in formal development activities.

Table 2. Human capital development indicators

Dimension	Mean	SD	Min	Max
Formal education level	3.42	0.89	1	5
Professional skills	3.67	0.78	1	5
Work experience	3.81	0.72	2	5
Training participation	3.24	0.94	1	5
Entrepreneurial competencies	3.58	0.83	1	5
Overall human capital	3.54	0.71	1.6	5

Product innovation and marketing innovation were the most prevalent innovation activities, reported by 72.3% and 68.4% of firms, respectively. Business-model innovation had the lowest mean and engagement rate, indicating that the sample emphasized incremental product and market changes more than comprehensive reconfiguration of how value was created and captured.

Table 3. Innovation capability indicators

Innovation type	Mean	SD	Firms engaged (%)
Product innovation	3.52	0.86	72.3
Process innovation	3.31	0.91	64.2
Technology adoption	3.18	0.97	58.6
Marketing innovation	3.45	0.84	68.4
Organizational innovation	3.12	0.93	54.7
Business-model innovation	2.98	1.02	47.4
Overall innovation capability	3.26	0.78	—

Financial record-keeping was the most widely implemented financial practice (71.2%), whereas access to external financing had the lowest mean ($M = 2.89$, $SD = 1.08$) and implementation rate (48.8%). This pattern is consistent with interview reports that firms often possessed ideas and skills but lacked sufficient capital to implement them.

Table 4. Financial-practice indicators

Practice	Mean	SD	Implementation rate (%)
Financial record-keeping	3.56	0.88	71.2
Budgeting and planning	3.28	0.95	62.5
Cash-flow management	3.41	0.87	67.4
Access to external financing	2.89	1.08	48.8
Financial-performance monitoring	3.34	0.91	64.9
Overall financial practices	3.30	0.79	—

Table 5. Construct reliability and available descriptive statistics

Construct	Cronbach's α	Mean	SD
Human capital development	.847	3.54	0.71
Innovation capability	.823	3.26	0.78
Financial practices	.791	3.30	0.79
Managerial practices	.815	Not reported	Not reported
Business performance	.869	Not reported	Not reported

Note. The source manuscript did not report composite reliability, rho_A, AVE, HTMT, or item loadings. These should be supplied before submission.

4.3 Correlations

All focal constructs were positively correlated ($p < .01$). The largest bivariate association was between innovation capability and business performance ($r = .561$), followed by financial and managerial practices ($r = .534$) and human capital and innovation capability ($r = .524$). The correlations were below levels typically associated with severe construct redundancy, although formal discriminant-validity assessment requires item-level measurement-model statistics.

Table 6. Correlation matrix

Variable	1	2	3	4	5
1. Human capital	1.000				
2. Innovation capability	.524**	1.000			
3. Financial practices	.412**	.467**	1.000		
4. Managerial practices	.489**	.512**	.534**	1.000	
5. Business performance	.478**	.561**	.498**	.523**	1.000

Note. ** $p < .01$ (two-tailed).

4.4 Regression of innovation capability on human-capital dimensions

The five human-capital dimensions jointly explained 34.2% of the variance in innovation capability, $F(5, 279) = 29.04$, $p < .001$. All coefficients were positive and statistically significant. Entrepreneurial competencies had the largest estimated coefficient ($B = .267$, $p < .001$), followed by professional skills ($B = .234$, $p < .001$). Variance-inflation factors ranged from 1.31 to 1.67, providing no indication of problematic multicollinearity in this regression.

Table 7. Regression of innovation capability on human-capital dimensions

Predictor	B	SE	t	p	VIF
Intercept	.847	.234	3.62	< .001	—
Formal education	.156	.052	3.00	.003	1.42
Professional skills	.234	.058	4.03	< .001	1.56
Work experience	.189	.054	3.50	.001	1.38
Training participation	.178	.049	3.63	< .001	1.31
Entrepreneurial competencies	.267	.061	4.38	< .001	1.67

Note. $R^2 = .342$; adjusted $R^2 = .330$; $F(5, 279) = 29.04$, $p < .001$. B denotes the reported unstandardized coefficient.

4.5 Structural model and hypothesis tests

The reported SRMR was .067, below the commonly used .08 reference value. NFI was .892, which is close to but below the conventional .90 benchmark; it is therefore described as marginal rather than

unambiguously acceptable. In PLS-SEM, these global indices are supplementary and should not replace measurement-model and predictive assessment (Hair et al., 2019).

Table 8. Structural paths and hypothesis tests

Hypothesis	Path	β	t	p	Decision
H1	HC $\rightarrow$ IC	.412	7.84	< .001	Supported
H2	IC $\rightarrow$ BP	.389	6.92	< .001	Supported
H3	HC $\rightarrow$ BP	.198	3.45	.001	Supported
H4	HC $\rightarrow$ IC $\rightarrow$ BP (indirect)	.160	4.23	< .001	Supported
H5	FP $\times$ HC $\rightarrow$ IC	.187	2.89	.004	Supported
H6	MP $\times$ IC $\rightarrow$ BP	.213	3.67	< .001	Supported

Note. HC = human capital development; IC = innovation capability; BP = business performance; FP = financial practices; MP = managerial practices.

Human capital development was positively associated with innovation capability ($\beta = .412$, $p < .001$), supporting H1. Innovation capability was positively associated with business performance ($\beta = .389$, $p < .001$), supporting H2. The direct human capital–performance path was also significant ($\beta = .198$, $p = .001$), supporting H3. The indirect coefficient through innovation capability was .160 ($p < .001$). Because the direct path remained significant, the pattern is consistent with partial statistical mediation, supporting H4. Given the cross-sectional design, this indirect effect should not be interpreted as proof of a temporal causal process.

4.6 Moderation results

Table 9. Moderation analysis

Interaction	β	SE	t	p	ΔR^2
HC $\times$ FP $\rightarrow$ IC	.187	.065	2.89	.004	.028
IC $\times$ MP $\rightarrow$ BP	.213	.058	3.67	< .001	.034

Financial practices strengthened the positive association between human capital development and innovation capability ($\beta = .187$, $p = .004$; $\Delta R^2 = .028$), supporting H5. Managerial practices strengthened the association between innovation capability and business performance ($\beta = .213$, $p < .001$; $\Delta R^2 = .034$), supporting H6. The interaction effects were statistically significant but modest in incremental explanatory contribution.

4.7 Qualitative findings and mixed-methods integration

Three themes were identified from the 35 interviews. The themes did not constitute an independent causal test; rather, they provided contextual explanations for the quantitative relationships.

Table 10. Qualitative themes and integration with quantitative findings

Theme	Interpretive summary	Relation to model
Investment in employee development	Training was described as a deliberate mechanism for improving problem identification and product development.	Supports the HC $\rightarrow$ IC relationship.
Financial constraints on innovation	Respondents reported that viable ideas were often delayed or reduced because capital was insufficient.	Explains why financial practices condition HC $\rightarrow$ IC.
Integration of human capital and technology	Digital, e-commerce, and online-marketing skills were viewed as increasingly necessary for innovation.	Clarifies the content of contemporary human-capital development.

“We allocate budget every year for employee training because we believe skilled workers can identify problems and suggest improvements that lead to new products.”

“We have many ideas for new services, but limited capital prevents us from implementing them fully.”

“Our employees need digital skills now more than before. We invest in training for e-commerce and digital marketing because that is where innovation happens.”

Taken together, the qualitative evidence was congruent with the quantitative model. Employee development was described as a source of ideas and implementation capacity, financing was described as a constraint on converting those capabilities into innovation, and digital competence emerged as a concrete domain in which human-capital investment was needed. The interviews also reinforce the interpretation that financial practices are enabling conditions rather than substitutes for human capital.

5. Discussion

5.1 Principal findings

The central finding is that human capital development was associated with business performance through two routes: a direct relationship and an indirect relationship through innovation capability. The significant HC → IC path supports the proposition that education, skills, experience, training, and entrepreneurial competence provide the cognitive and practical resources required to generate and implement new ideas. The result is consistent with prior SME evidence showing that managerial human capital is linked to innovation and productivity (Timothy, 2022) and that innovative human-resource practices contribute to performance through innovation capability (Wongsansukcharoen & Thaweepaiboonwong, 2023).

The relative coefficients in the regression provide additional nuance. Entrepreneurial competencies and professional skills had the largest estimated coefficients, whereas formal education, although significant, was smaller. This pattern suggests that practical and opportunity-oriented capabilities may be more proximal to innovation than credentials alone. Formal education may expand general cognitive capacity, but its business value depends on translation into domain-specific skills, entrepreneurial judgment, and organizational action.

Innovation capability had the strongest bivariate correlation with business performance and a substantial structural coefficient. This result aligns with Indonesian research emphasizing innovation as a determinant of SME performance (Purwati et al., 2021; Rustiarini et al., 2022). However, the descriptive results show that the sample concentrated on product and marketing innovation, while organizational and business-model innovation were less common. The performance gains observed in the model may therefore be driven primarily by incremental forms of innovation rather than radical transformation.

5.2 Theoretical contributions

First, the study connects human capital theory with the resource-based view by treating individual knowledge and competence as strategically relevant resources, while recognizing that their value depends on organizational deployment (Barney, 1991; Becker, 1993). Human capital was not modeled as an automatic source of performance; it generated part of its association through innovation capability.

Second, the mediation result extends dynamic capabilities reasoning. Human capital can be understood as an input to sensing, learning, and reconfiguration processes, while innovation capability is the organizational mechanism through which those processes produce new offerings and routines (Teece et al., 1997). The persistence of a significant direct path indicates that human capital also contributes to routine operational performance, not only innovation.

Third, the moderation results identify complementary organizational conditions. Financial practices strengthened the translation of human capital into innovation, whereas managerial practices strengthened the conversion of innovation into performance. This distinction is theoretically important: finance enables resource commitment and risk management at the front end of innovation, while management enables coordination and value capture at the commercialization and implementation stages.

5.3 Managerial and policy implications

SME owners should avoid treating training as a stand-alone intervention. The strongest benefits are likely when training is linked to concrete innovation objectives, such as product redesign, process improvement, digital marketing, financial analytics, customer-data use, or e-commerce. Programs should combine technical competence with opportunity recognition, experimentation, and implementation discipline.

Financial capability should be developed in parallel. The low score for external financing indicates that access remains a material constraint, but access alone is insufficient. Firms require reliable records, budgets, cash-flow forecasts, and project-evaluation routines to make innovation financeable and to demonstrate creditworthiness. The moderation result implies that better financial practices increase the likelihood that knowledge and ideas become implemented innovations.

Managerial systems are equally necessary after an innovation is conceived. Strategic planning, market validation, role clarity, operational control, and performance monitoring help firms convert innovations into customer value and economic returns. For policymakers, integrated programs that combine workforce development, digital skills, financial literacy, advisory support, and appropriately designed financing instruments are likely to be more effective than isolated training or credit schemes.

5.4 Limitations and future research

Several limitations constrain interpretation. First, the cross-sectional design does not establish temporal ordering or causality. The indirect effect is statistically consistent with mediation but cannot demonstrate that human capital preceded innovation or that innovation preceded performance. Longitudinal or time-lagged designs are needed.

Second, purposive sampling and incomplete documentation of the sampling frame limit population generalization. Future studies should identify provinces explicitly, calculate response rates, and use stratified or probability-based sampling where feasible. Multi-group analysis could test whether the model differs by sector, enterprise size, region, or firm age.

Third, the source manuscript did not provide full measurement-model evidence. Before submission, the authors should report item wording, outer loadings, composite reliability, ρ_A , AVE, HTMT, collinearity diagnostics, endogenous-construct R^2 , f^2 , Q^2 or PLSpredict results, bootstrap settings, and robustness checks. Without these statistics, construct validity and predictive performance cannot be fully evaluated (Hair et al., 2019; Henseler et al., 2015).

Fourth, several measures relied on owner-manager perceptions, creating potential common-method and social-desirability bias. Future work should separate predictor and outcome measurement in time, obtain data from multiple respondents, and incorporate objective financial and innovation indicators (Podsakoff et al., 2003).

Finally, the qualitative component was limited to three reported themes and a small number of illustrative quotations. Future mixed-methods research should document interview selection, saturation, coding procedures, reflexivity, and negative cases more comprehensively.

6. Conclusion

This study shows that human capital development is positively associated with innovation capability and business performance among the sampled Indonesian SMEs. Innovation capability carries a significant portion of the human capital–performance relationship, while financial and managerial practices strengthen different stages of the value-creation process. The results therefore support an integrated interpretation: knowledge and competence matter, but their economic value depends on firms' ability to finance innovation and manage its implementation.

The practical implication is not merely to invest more in training. SMEs and support agencies should align human-capital development with innovation priorities, strengthen financial discipline, and build managerial routines for commercialization and scaling. Such a coordinated capability-building

approach offers a more credible route to innovation-driven SME performance than isolated interventions.

Declarations

Acknowledgements: The author thanks academic reviewers and colleagues who may provide comments during the journal submission process.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Competing interests: The authors declare no competing interests.

Data availability: The dataset may be requested from the corresponding author subject to institutional permission and confidentiality requirements.

References

- Aman-Ullah, A., Mehmood, W., Amin, S., & Abbas, Y. A. (2022). Human capital and organizational performance: A moderation study through innovative leadership. *Journal of Innovation & Knowledge*, 7(4), 100261. <https://doi.org/10.1016/j.jik.2022.100261>
- Bangun, W., Saragih, S., Veronica, M., Zaniarti, S., & Budiningsih, T. (2024). Embracing the role of business performance to foster the association between digital marketing, intellectual capital, and business sustainability. *International Journal of Management and Sustainability*, 13(4), 795–807. <https://doi.org/10.18488/11.v13i4.3898>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press. (Original work published 1964).
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Cabrilo, S., Dahms, S., & Tsai, F.-S. (2024). Synergy between multidimensional intellectual capital and digital knowledge management: Uncovering innovation performance complexities. *Journal of Innovation & Knowledge*, 9(4), 100568. <https://doi.org/10.1016/j.jik.2024.100568>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE.
- Farzaneh, M., Wilden, R., Afshari, L., & Mehralian, G. (2022). Dynamic capabilities and innovation ambidexterity: The roles of intellectual capital and innovation orientation. *Journal of Business Research*, 148, 47–59. <https://doi.org/10.1016/j.jbusres.2022.04.030>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Halme, M., & Korpela, M. (2014). Responsible innovation toward sustainable development in small and medium-sized enterprises: A resource perspective. *Business Strategy and the Environment*, 23(8), 547–566. <https://doi.org/10.1002/bse.1801>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hernita, H., Surya, B., Perwira, I., Abubakar, H., & Idris, M. (2021). Economic business sustainability and strengthening human resource capacity based on increasing the productivity of small and medium enterprises (SMEs) in Makassar City, Indonesia. *Sustainability*, 13(6), 3177. <https://doi.org/10.3390/su13063177>
- Menne, F., Surya, B., Yusuf, M., Suriani, S., Ruslan, M., & Iskandar, I. (2022). Optimizing the financial performance of SMEs based on sharia economy: Perspective of economic business sustainability and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), 18. <https://doi.org/10.3390/joitmc8010018>
- OECD/Eurostat. (2018). *Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation* (4th ed.). OECD Publishing. <https://doi.org/10.1787/9789264304604-en>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>

- Purwati, A. A., Budiyanto, Suhermin, & Hamzah, M. L. (2021). The effect of innovation capability on business performance: The role of social capital and entrepreneurial leadership on SMEs in Indonesia. *Accounting*, 7(2), 323–330. <https://doi.org/10.5267/j.ac.2020.11.021>
- Republic of Indonesia. (2021). Government Regulation of the Republic of Indonesia Number 7 of 2021 on facilitation, protection, and empowerment of cooperatives and micro, small, and medium enterprises. State Gazette of the Republic of Indonesia No. 17 of 2021.
- Rustiarini, N. W., Bhegawati, D. A. S., & Mendra, N. P. Y. (2022). Does green innovation improve SME performance? *Economies*, 10(12), 316. <https://doi.org/10.3390/economies10120316>
- Savitri, E., Dp, E., & Syahza, A. (2021). Can innovation mediate the effect of adaptability and entrepreneurial orientation on business performance? *Management Science Letters*, 11(8), 2301–2312. <https://doi.org/10.5267/j.msl.2021.3.014>
- Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H., & Idris, M. (2021). Economic growth, increasing productivity of SMEs, and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 20. <https://doi.org/10.3390/joitmc7010020>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)
- Timothy, V. L. (2022). The effect of top managers' human capital on SME productivity: The mediating role of innovation. *Heliyon*, 8(4), e09330. <https://doi.org/10.1016/j.heliyon.2022.e09330>
- Wongsansukcharoen, J., & Thaweepaiboonwong, J. (2023). Effect of innovations in human resource practices, innovation capabilities, and competitive advantage on small and medium enterprises' performance in Thailand. *European Research on Management and Business Economics*, 29(1), 100210. <https://doi.org/10.1016/j.iemeen.2022.100210>