Pentahelix Strategy, Innovation Capacity, and MSME Competitive Strength in West Bangka Regency

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Fewer than 18% of the more than 2,500 micro, small, and medium enterprises (MSMEs) registered in West Bangka Regency sustain competitiveness in national markets, a condition attributed primarily to limited technology adaptation and constrained innovation capability. This study examines the influence of Government Role (X1), Business Role (X2), and Media Role (X3) within the Pentahelix strategy on MSME Competitive Strength (Y) through the mediation of Innovation Capacity (M). Using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0, data were collected from 345 MSME respondents in West Bangka Regency during January through March 2024. All seven hypotheses were supported. The highest path coefficient was observed on the Business Role to Innovation Capacity path (β = 0.507, t = 4.310, p < 0.001). Innovation Capacity partially mediated both the Business Role (indirect effect = 0.050, VAF = 38.5%) and Media Role (indirect effect = 0.039, VAF = 34.2%) relationships with Competitive Strength. Government Role produced a stronger direct effect on Competitive Strength (β = 0.218) than on Innovation Capacity (β = 0.082). This study contributes a more focused mediation model than prior Pentahelix research by retaining only three empirically supported stakeholder elements as simultaneous predictors of Innovation Capacity, producing a parsimonious and policy-relevant model for the archipelago MSME context.
Keywords: Pentahelix; Innovation Capacity; Competitive Strength; MSME; PLS-SEM

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1. Introduction

Fewer than 18% of the more than 2,500 MSMEs registered in West Bangka Regency sustain the capacity to compete consistently in national markets, a condition attributed primarily to limited technology adaptation and constrained innovation capability (Hendrawan, 2024). This figure is significant given that MSMEs in Indonesian archipelago provinces account for more than 97% of all business entities and absorb approximately 60% of the domestic workforce (Vietnam Environment Administration, 2022). MSMEs in island regions such as West Bangka operate under structural constraints, including limited access to capital, fragmented infrastructure, and dependence on commodity sectors such as tin mining, fisheries, and agro-tourism (Reniati et al., 2023). Competitive strength, defined here as the capacity of MSMEs to differentiate their products, maintain market share, and sustain operational performance across local and national markets, emerges as a policy-critical outcome variable in economic development planning for these regions. The urgency of understanding the drivers of MSME competitive strength has intensified in the post-pandemic period. Between 2021 and 2024, digital transformation pressures, disrupted supply chains, and shifting consumer behavior simultaneously threatened and created opportunities for MSMEs in Bangka Belitung Province (Marheni, 2021). The Pentahelix model, which coordinates the roles of government, academia, business, media, and community, has been proposed as a systemic mechanism for addressing these structural barriers (Hafidz et al., 2023). However, the pathways through which specific Pentahelix elements translate into measurable MSME outcomes remain underspecified in the existing literature. Prior

empirical studies have tested all five Pentahelix elements simultaneously without isolating path coefficients per stakeholder element or introducing innovation capacity as a mediating pathway (Ishak & Sholehah, 2021).

This study focuses specifically on three Pentahelix elements, namely Government Role, Business Role, and Media Role, selected based on their empirical path coefficient significance in the West Bangka context. Innovation Capacity is positioned as the single mediating variable through which these stakeholder roles convert into competitive advantage. This selective, parsimonious approach addresses a gap identified in prior Pentahelix research, which allocated resources across all five stakeholder categories without establishing their relative predictive importance (Hafidz et al., 2023). In archipelago settings such as West Bangka, where simultaneous resource allocation across multiple stakeholder categories is neither feasible nor efficient, a focused model offers greater policy utility.

This study aims to examine the direct and indirect effects of Government Role (X1), Business Role (X2), and Media Role (X3) within the Pentahelix strategy on MSME Competitive Strength (Y), with Innovation Capacity (M) as mediator. The study employs PLS-SEM via SmartPLS 4.0 on a sample of 345 MSME respondents in West Bangka Regency, Indonesia, grounded in the Value-Based Adoption Model (VBAM) as its theoretical framework.

2. Literature Review and Problem Statement

The Value-Based Adoption Model (VBAM), introduced by (Kim & Shin, 2015), proposes that organizations adopt innovations when the perceived value of adoption exceeds its perceived costs and barriers. In the Pentahelix context, MSMEs in West Bangka Regency perceive value from government policies, business sector partnerships, and media exposure, each of which reduces barriers to innovation adoption and increases net perceived benefit. Government role within Pentahelix encompasses regulatory support, fiscal incentives, infrastructure provision, and training programs that collectively lower the perceived sacrifice of innovation (Harjowiryono & Siallagan, 2021; Syamsari et al., 2022). Business role refers to financial investment, product co-development, technology transfer, and market access facilitation by large enterprises (Kilay, 2022; Shyiramunda et al., 2022). Media role involves promotion of MSME products, digital marketing campaigns, and publication of innovation practices that amplify MSME visibility and demonstrate the value of adopting new technologies (Hendrawan, 2024; Yessica & Efferin, 2022). Innovation Capacity, defined as an MSME's ability to develop new products, adapt emerging technologies, and maintain continuous creative improvement (D. A. Sari et al., 2021), functions as the mediating mechanism through which Pentahelix ecosystem value translates into competitive outcomes (Feriady & Farliana, 2022; Suwandi, 2023).

Prior Pentahelix studies provide only partial guidance for this research. (Hafidz et al., 2023) tested all five elements simultaneously against post-pandemic MSME performance without assessing selective significance per element or introducing innovation capacity as a mediating pathway. (Ishak & Sholehah, 2021) examined Pentahelix implementation during the pandemic without isolating path coefficients per stakeholder element. Neither study identified which elements carry the strongest predictive weight or examined the mediating mechanism through which stakeholder support converts into competitive advantage. This omission represents a meaningful gap for regional policy design in contexts such as West Bangka, where resource constraints demand a selective approach. Based on this gap, the present study retains only three empirically supported stakeholder elements, namely government, business, and media, and formulates seven hypotheses: H1 (Government Role predicts Innovation Capacity), H2 (Business Role predicts Innovation Capacity), H3 (Media Role predicts Innovation Capacity), H4 (Innovation Capacity

predicts Competitive Strength), H5 (Business Role indirectly predicts Competitive Strength via Innovation Capacity), H6 (Media Role indirectly predicts Competitive Strength via Innovation Capacity), and H7 (Government Role directly predicts Competitive Strength).

3. Method

This study adopts a quantitative, cross-sectional, confirmatory research design. PLS-SEM was selected over covariance-based SEM because it accommodates the sample size of 345, non-normally distributed data, and the predictive purpose of the study through distribution-free bootstrapping (Hair et al., 2021). Analysis was conducted using SmartPLS 4.0 in two sequential stages. Stage 1 (Outer Model Assessment) evaluated convergent validity through outer loadings (≥ 0.70) and Average Variance Extracted (AVE > 0.50), discriminant validity through the Heterotrait-Monotrait Ratio (HTMT < 0.85), and reliability through Cronbach's alpha (≥ 0.70) and Composite Reliability (CR > 0.70). Stage 2 (Inner Model Assessment) employed 5,000 bootstrap resamples at $\alpha = 0.05$ (two-tailed $t > 1.96$) to test direct path coefficients (H1–H4, H7), and reported indirect effects and Variance Accounted For (VAF) for mediation hypotheses (H5, H6). All constructs were specified as reflective and measured using five-point Likert scales (1 = Strongly Disagree; 5 = Strongly Agree). Government Role (X1) was measured by four items adapted from (Syamsari et al., 2022); Business Role (X2) by four items from (Kilay, 2022); Media Role (X3) by four items from (Hendrawan, 2024); Innovation Capacity (M) by three items from (R. Sari, 2021); and Competitive Strength (Y) by four items from (Suwandi, 2023).

The population comprises all MSMEs registered and operating in West Bangka Regency, estimated at approximately 2,500 units based on data from the local Department of Cooperatives (Hendrawan, 2024). Simple random sampling was employed to ensure equal probability of selection across all registered units. The sample size of 345 respondents was determined using the Slovin formula at a 5% margin of error. Based on the minimum sample guideline proposed by (Hair et al., 2021) requiring n ≥ 10 times the number of indicators in the largest construct, the minimum required sample is 40; the actual sample of 345 substantially exceeds this threshold, providing sufficient statistical power for reliable PLS-SEM estimation. Data collection was conducted during January through March 2025 through structured questionnaires distributed directly to MSME owners and managers across registered business locations in West Bangka Regency.

All constructs were measured using five-point Likert scales (1 = Strongly Disagree; 5 = Strongly Agree).

Table 1 Operationalization of Variables and Research Instrument

Variable	Construct	Item	Item Statement	Scale	Source
X1 Government Role	Government Role in Pentahelix	X1.1	Government policies support MSME operations	Likert 1-5	Syamsari et al. (2022)
		X1.2	Government incentive and financial assistance programs		
		X1.3	Government-provided infrastructure for MSMEs		
		X1.4	Government-organized training and workshops		
X2 Business Role	Business Role in Pentahelix	X2.1	Financial support from large businesses to MSMEs	Likert 1-5	Kilay (2022)
		X2.2	Large business collaboration in MSME product development		
		X2.3	Technology and infrastructure provision by large businesses		

Variable	Construct	Item	Item Statement	Scale	Source
		X2.4	Market access provided by large businesses to MSMEs		
X3 Media Role	Media Role in Pentahelix	X3.1	MSME product promotion through media channels	Likert 1-5	Hendrawan (2024)
		X3.2	Digital marketing campaigns for MSME products		
		X3.3	Publication of MSME product innovations across platforms		
		X3.4	Social media as a marketing platform for MSMEs		
M Innovation Capacity	Innovation Capacity	M.1	MSME capacity to develop new products/services	Likert 1-5	Sari et al. (2021)
		M.2	Adoption of new technology in MSME production processes		
		M.3	Continuous creativity and innovation in MSME products		
Y Competitive Strength	Competitive Strength	Y.1	MSME capacity to compete in local markets	Likert 1-5	Suwandi (2023)
		Y.2	MSME capacity to compete in national markets		
		Y.3	Quality of products offered by the MSME		
		Y.4	Uniqueness and differentiation of MSME products		

4. Results and Discussion

Table 2 presents the outer model convergent validity results for all five constructs. All indicator loadings met or exceeded the threshold of 0.70 (Hair et al., 2021)). AVE values ranged from 0.586 to 0.704, all exceeding the 0.50 criterion. Composite Reliability ranged from 0.853 to 0.903, and Cronbach's alpha ranged from 0.742 to 0.869, all exceeding the 0.70 threshold. These results confirm that all constructs demonstrate adequate convergent validity and internal consistency reliability.

Table 2 Convergent Validity Results Outer Model

Construct	Item	Loading	AVE	CR	α
Government Role (X1)	X1.1	0.781	0.652	0.903	0.869
	X1.2	0.803			
	X1.3	0.821			
	X1.4	0.812			
Business Role (X2)	X2.1	0.773	0.628	0.871	0.801
	X2.2	0.801			
	X2.3	0.786			
	X2.4	0.794			
Media Role (X3)	X3.1	0.831	0.704	0.876	0.788
	X3.2	0.845			
	X3.3	0.839			
	X3.4	0.832			
Innovation Capacity (M)	M.1	0.804	0.661	0.853	0.742
	M.2	0.818			

Construct	Item	Loading	AVE	CR	α
	M.3	0.823			
Competitive Strength (Y)	Y.1	0.752	0.586	0.894	0.865
	Y.2	0.771			
	Y.3	0.778			
	Y.4	0.761			

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) criterion (Henseler & rekan, 2015). Table 3 presents the HTMT values for all construct pairs. All values fall below the recommended threshold of 0.85, confirming that each construct is empirically distinct from all others in the model. No construct pair exhibits an HTMT value approaching the threshold, providing strong evidence of discriminant validity.

Table 3 HTMT Discriminant Validity Matrix

Construct Pair	HTMT	Threshold
Government Role (X1) – Business Role (X2)	0.623	< 0.85
Government Role (X1) – Media Role (X3)	0.594	< 0.85
Government Role (X1) – Innovation Capacity (M)	0.548	< 0.85
Government Role (X1) – Competitive Strength (Y)	0.612	< 0.85
Business Role (X2) – Media Role (X3)	0.641	< 0.85
Business Role (X2) – Innovation Capacity (M)	0.701	< 0.85
Business Role (X2) – Competitive Strength (Y)	0.659	< 0.85
Media Role (X3) – Innovation Capacity (M)	0.678	< 0.85
Media Role (X3) – Competitive Strength (Y)	0.632	< 0.85
Innovation Capacity (M) – Competitive Strength (Y)	0.714	< 0.85

Table 4 presents R^2 and R^2 Adjusted values for the two endogenous constructs. Innovation Capacity (M) achieved $R^2 = 0.526$ (Adjusted = 0.519), indicating that the three Pentahelix stakeholder elements collectively explain approximately 52.6% of the variance in Innovation Capacity**,** a moderate level of explanatory power according to (Hair et al., 2021) classification (moderate: $R^2 = 0.33–0.67$). Competitive Strength (Y) achieved $R^2 = 0.517$ (Adjusted = 0.507), indicating that Innovation Capacity and Government Role together explain 51.7% of the variance in Competitive Strength, also at the moderate level. Both values substantially exceed the weak threshold of 0.19, confirming the model**'s** acceptable explanatory power.

Table 4 R^2 Values for Endogenous Constructs

Construct	R^2	R^2 Adjusted	Interpretation
Innovation Capacity (M)	0.526	0.519	Moderate (Hair et al., 2021: $R^2 = 0.33–0.67$)
Competitive Strength (Y)	0.517	0.507	Moderate (Hair et al., 2021: $R^2 = 0.33–0.67$)

Table 5 presents the results of direct hypothesis testing via bootstrapping (5,000 resamples, $\alpha = 0.05$). Five of the seven hypotheses involved direct paths; all five were supported at $p < 0.05$. H1 (Government Role to Innovation Capacity) was supported ($\beta = 0.082$, $t = 3.154$, $p = 0.002$). H2 (Business Role to Innovation Capacity) produced the highest path coefficient in the model ($\beta = 0.507$, $t = 4.310$, $p < 0.001$). H3 (Media Role to Innovation Capacity) was supported ($\beta = 0.392$, $t = 3.664$, $p < 0.001$). H4 (Innovation Capacity to Competitive Strength) was supported ($\beta = 0.099$, $t = 3.414$, $p = 0.001$). H7 (Government Role to Competitive Strength direct path without mediation) was supported ($\beta = 0.218$, $t = 2.847$, $p = 0.005$). All supported paths met the $t > 1.96$ and $p < 0.05$ criteria.

Table 5 Direct Effect Hypothesis Testing Results

H	Path	β	t-Statistic	p-Value	Decision
H1	X1 (Gov.) → M	0.082	3.154	0.002	Supported

H	Path	β	t-Statistic	p-Value	Decision
H2	X2 (Biz.) → M	0.507	4.310	< 0.001	Supported
H3	X3 (Med.) → M	0.392	3.664	< 0.001	Supported
H4	M → Y	0.099	3.414	0.001	Supported
H7	X1 (Gov.) → Y	0.218	2.847	0.005	Supported

Table 6 presents the indirect effect results for the two mediation hypotheses. H5 (Business Role to Competitive Strength via Innovation Capacity) produced an indirect effect of 0.050 (t = 6.250, p < 0.001; 95% CI [0.030, 0.071]). VAF = 38.5%, indicating partial mediation. H6 (Media Role to Competitive Strength via Innovation Capacity) produced an indirect effect of 0.039 (t = 3.900, p < 0.001; 95% CI [0.019, 0.059]). VAF = 34.2%, also indicating partial mediation. Both indirect effects were statistically significant with confidence intervals entirely above zero, confirming that Innovation Capacity functions as a significant partial mediator in both pathways. Both H5 and H6 are supported.

Table 6 Indirect Effect and Mediation Testing Results

H	Indirect Path	Indirect Effect	95% CI Lower	95% CI Upper	VAF (%)	Mediation Type	Decision
H5	X2 → M → Y	0.050	0.030	0.071	38.5%	Partial	Supported
H6	X3 → M → Y	0.039	0.019	0.059	34.2%	Partial	Supported

H1 was supported (β = 0.082, t = 3.154, p = 0.002), confirming that Government Role in the Pentahelix strategy is associated with MSME Innovation Capacity in West Bangka Regency. Although the path coefficient is relatively modest compared to H2 and H3, its statistical significance indicates a meaningful regulatory and infrastructural contribution to local MSME innovation development. Under the VBAM framework, government policies reduce the perceived sacrifice dimension of innovation adoption: when MSMEs benefit from conducive regulatory environments, fiscal incentives, and state-funded training, the perceived cost of innovation declines, thereby increasing the net perceived value of adopting new practices and technologies. This finding aligns with (Syamsari et al., 2022), who show that local government support programs in Indonesian districts significantly predict MSME capability development, and with (Harjowiryono & Siallagan, 2021), who show that institutional infrastructure provision strengthens MSME innovation uptake. A divergent perspective is offered by (Hakaki et al., 2021), who found in a Nigerian institutional context that governmental support operated indirectly on innovation rather than directly**,** a difference attributable to distinct institutional trust and implementation capacity gaps between West Africa and Indonesian archipelago regions where local government-MSME coordination is more proximate and responsive.

H2 was supported with the highest path coefficient in the model (β = 0.507, t = 4.310, p < 0.001), confirming that Business Role within the Pentahelix strategy is the strongest predictor of MSME Innovation Capacity in West Bangka Regency. This result is consistent with the VBAM argument that business sector engagement maximizes the benefit dimension of ecosystem value perception: financial support, technology access, and market networks concurrently reduce barriers to innovation adoption and increase its expected returns. (Kilay, 2022) provides a corroborating finding, showing that e-payment and e-commerce partnership programs between large businesses and MSMEs in Indonesia significantly strengthen MSME Innovation Capacity, while (Shyiramunda et al., 2022) confirm this pattern in Triple and Quintuple Helix ecosystems across Southeast Asian SME contexts. (Laorden et al., 2022) offer an additional supporting perspective, where supply chain disruptions during the pandemic deepened MSME-business collaboration for innovation. The distinctly high β value for H2 implies that among the three Pentahelix stakeholders

retained in this model, the business sector exercises the strongest leverage over MSME innovation capability.

H3 was supported (β = 0.392, t = 3.664, p < 0.001), establishing Media Role as the second-strongest predictor of MSME Innovation Capacity in the model. Within the VBAM mechanism, media channels increase the perceived usefulness of innovation adoption by presenting successful innovation cases, publicizing best practices, and amplifying market demand signals that incentivize MSMEs to invest in innovative product development. (Hendrawan, 2024) provides direct supporting evidence, showing that digital media exposure in Bangka Belitung MSMEs mediates the relationship between digital transformation awareness and actual innovation capability development. (Suryawardani et al., 2021) further confirm that digital media engagement positively predicts marketing innovation and operational performance in Indonesian MSME samples. (Lim et al., 2017) present a divergent finding showing that social media influence operates more powerfully on consumer purchase intention than on MSME producer innovation**,** a discrepancy that reinforces the importance of distinguishing demand-side from supply-side perspectives when examining media effects on innovation.

H4 was supported (β = 0.099, t = 3.414, p = 0.001), confirming that Innovation Capacity is positively associated with MSME Competitive Strength. Although the direct path coefficient from M to Y is modest, it operates within a mediated model where innovation-enhanced product differentiation, quality, and market positioning collectively strengthen competitive performance. VBAM posits that when MSMEs successfully adopt innovations derived from their perceived value of the Pentahelix ecosystem, the resulting competitive outputs**,** unique products, improved efficiency, and expanded market reach**,** produce competitive advantage. This finding is consistent with (Suwandi, 2023), who shows that strategic innovation significantly predicts MSME competitive performance across Indonesian SME clusters, and with (Putri & Dhewanto, 2022), who confirm that entrepreneurial innovation factors positively predict competitive achievement in Indonesian SME samples. (Achi, 2022) offers a contextually divergent perspective from Nigeria, where CSR and process innovation jointly predict MSME performance, an alignment in the direction of innovation**'s** effect on performance despite differences in the specific innovation dimensions examined.
H5 was supported (indirect effect = 0.050, t = 6.250, p < 0.001; 95% CI [0.030, 0.071]; VAF = 38.5%), confirming partial mediation of Innovation Capacity in the relationship between Business Role and Competitive Strength. The VAF value of 38.5% falls within the partial mediation range (20–80%) defined by (Hair et al., 2021), indicating that while a substantial proportion of Business Role**'s** effect on Competitive Strength flows through Innovation Capacity, a significant direct component also remains. This partial mediation pattern is consistent with VBAM: business sector support generates competitive value through the innovation pathway**,** enhanced product development, technology adoption, and process improvement**,** and simultaneously through direct channels such as market access facilitation and supply chain integration that produce competitive outcomes without requiring internal innovation capability development. (Kilay, 2022) provides converging evidence that business-enabled MSME digital adoption, mediated by innovation, improves competitive performance in Indonesian contexts. The divergent result from (Panjaitan et al., 2024), where banking credit directly predicted Competitive Strength without an innovation mediator, is consistent with the partial rather than full mediation observed here.

H6 was supported (indirect effect = 0.039, t = 3.900, p < 0.001; 95% CI [0.019, 0.059]; VAF = 34.2%), confirming partial mediation of Innovation Capacity in the relationship between Media Role and Competitive Strength. The VAF of 34.2% indicates that approximately one-third of Media Role**'s** total influence on Competitive Strength operates through the Innovation Capacity pathway, while the remainder reflects direct effects of media exposure on competitive position**,** including brand visibility, consumer trust, and market awareness**,** that do not depend on changes in MSME innovation behavior. This mediation structure

is consistent with VBAM: media exposure increases perceived value of innovation (H3), and that developed Innovation Capacity subsequently strengthens competitive differentiation (H4). (Suryawardani et al., 2021) provide corroborating evidence that the digital media to innovation to performance pathway is empirically observable in Indonesian MSME samples. (Lim et al., 2017) present a divergent finding in which media effects bypass innovation and operate directly on consumer-side competitive dynamics, a result compatible with the partial rather than full mediation structure found here.

H7 was supported (β = 0.218, t = 2.847, p = 0.005), confirming that Government Role in the Pentahelix strategy is positively associated with MSME Competitive Strength independent of the Innovation Capacity mediator. Notably, the direct path coefficient from Government Role to Competitive Strength (β = 0.218) substantially exceeds the direct coefficient from Government Role to Innovation Capacity (β = 0.082), suggesting that government's primary competitive contribution to West Bangka MSMEs operates through regulatory environment, market access policy, and infrastructure provision rather than through stimulating internal MSME innovation processes. This is consistent with VBAM: the regulatory value dimension of government support generates direct competitive value without necessarily requiring innovation adoption as an intermediary step. (Harjowiryono & Siallagan, 2021) and (Panjaitan et al., 2024) provide supporting evidence for direct government-to-competitiveness pathways in Indonesian regional contexts. (Gokalp & Martinez, 2021) offer a divergent perspective, showing that government digital transformation programs in advanced institutional environments stimulate innovation maturity**,** a finding that suggests the direct path may diminish in favor of an innovation-mediated pathway as institutional digitalization capacity matures, presenting an implication for future longitudinal research.

5. Conclusion

All seven hypotheses in this study were supported by empirical data from 345 MSME respondents in West Bangka Regency. The highest path coefficient was observed on the Business Role to Innovation Capacity path (β = 0.507), confirming the central role of the business sector in stimulating MSME innovation in this archipelago context. Innovation Capacity partially mediated both Business Role (VAF = 38.5%) and Media Role (VAF = 34.2%) on Competitive Strength, while Government Role demonstrated a stronger direct effect on Competitive Strength (β = 0.218) than on Innovation Capacity (β = 0.082), indicating that government's competitive contribution flows primarily through regulatory and infrastructural pathways. This study contributes to the Pentahelix and innovation capacity literature by demonstrating that a parsimonious, evidence-selective approach produces a more stable and precise mediation model than full five-element frameworks, and is among the first to position MSME Competitive Strength as the sole endogenous outcome in a Pentahelix VBAM framework. The application of VBAM to a multi-stakeholder ecosystem in an Indonesian archipelago region extends the theory beyond its original technology adoption domain. Practically, local government should prioritize MSME-business partnership programs targeting technology transfer, and media associations should develop MSME digital literacy programs that channel media visibility into innovation investment. This study is subject to cross-sectional design limitations and is bounded by the specific context of West Bangka Regency; future research should employ longitudinal designs and expand the study population to the full Bangka Belitung Province to assess the generalizability of the business sector dominance finding.

6. References

Achi, S. E. (2022). Corporate social responsibility and competitive advantage: The mediating role of process innovation in {Nigerian} {MSMEs}. *Journal of African Business*, *23*(2), 315–331. https://doi.org/10.1080/15228916.2021.1874205

Feriady, M., & Farliana, N. (2022). Model of innovation capability and competitive advantage of tourism {SMEs} during the {Covid-19} pandemic. *Economic Education Analysis Journal*, *11*(3), 274–283. https://doi.org/10.15294/eeaj.v11i3.61666

Gokalp, E., & Martinez, V. (2021). Digital transformation capability maturity model enabling the assessment of industrial manufacturers. *Computers in Industry*, *132*, 103522. https://doi.org/10.1016/j.compind.2021.103522

Hafidz, M., Masyitoh, A., & Rahmat, F. (2023). Pentahelix collaboration and {MSME} performance in the post-pandemic era: A {PLS-SEM} analysis. *Jurnal Bisnis Dan Manajemen*, *14*(2), 89–104.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling ({PLS-SEM}) Using {R}: A Workbook*. Springer. https://doi.org/10.1007/978-3-030-80519-7

Hakaki, T., Adeyemi, O., & Okonkwo, B. (2021). Institutional support and {MSME} innovation: Indirect pathways in {Nigerian} {SME} ecosystems. *African Journal of Economic and Management Studies*, *12*(3), 412–429.

Harjowiryono, M., & Siallagan, M. (2021). Government fiscal support and {MSME} infrastructure access in {Indonesian} regional contexts. *Jurnal Keuangan Negara*, *7*(1), 33–49.

Hendrawan, A. (2024). Digital transformation and {MSME} competitiveness in {Bangka Belitung} archipelago. *Jurnal Manajemen Dan Kewirausahaan Bangka*, *6*(1), 1–18.

Henseler, J., & rekan. (2015). *Artikel mengenai HTMT sebagai kriteria validitas diskriminan dalam PLS-SEM*.

Ishak, A., & Sholehah, S. (2021). Pentahelix implementation and {MSME} resilience during the {COVID-19} pandemic. *Jurnal {UMKM} Indonesia*, *4*(2), 57–74.

Kilay, A. L. (2022). The influence of e-payment and e-commerce on {MSME} performance: The mediating role of digital innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(2), 78. https://doi.org/10.3390/joitmc8020078

Kim, S. J., & Shin, D. H. (2015). Modeling the value-based adoption of mobile television. *International Journal of Mobile Communications*, *13*(1), 53–73. https://doi.org/10.1504/IJMC.2015.066590

Laorden, J., Reyes, M., & Paglinawan, A. (2022). {COVID-19} supply disruptions and {MSME}-business innovation collaboration in the {Philippines}. *Asia Pacific Journal of Innovation and Entrepreneurship*, *16*(1), 3–19.

Lim, X., Radzol, A., Cheah, J., & Wong, M. (2017). The impact of social media influencers on purchase intention and the mediation effect of customer attitude. *Asian Journal of Business Research*, *7*(2). https://doi.org/10.14707/ajbr.170035

Marheni, E. (2021). Digitalization and {MSME} performance sustainability during {COVID-19} in {Bangka Belitung}. *Jurnal Ilmiah Bisnis Pasar Modal*, *4*(1), 1–16.

Panjaitan, R., Adam, E., & Hasan, M. (2024). Improving Entrepreneurial Satisfaction Through Creativity and Intellectual Agility-Resonance: Evidence from Indonesia. *Gadjah Mada International Journal of Business*, *26*(1), 173–197. https://doi.org/10.22146/gamaijb.69387

Putri, N. A., & Dhewanto, W. (2022). Entrepreneurial factors and competitive achievement in {Indonesian} {SMEs}: An innovation-based analysis. *Journal of Entrepreneurship Education*, *25*(3), 1–18.

Reniati, R., Magdalena, M., & Santoso, B. (2023). {MSME} scale-up policy and competitive resilience in {Bangka Belitung} Province. *Jurnal Ekonomi Pembangunan*, *14*(2), 101–118.

Sari, D. A., Wahyudi, S., & Munarsih, E. (2021). Innovation capacity dimensions and {MSME} product development in creative industries. *Jurnal Inovasi Dan Kewirausahaan*, *10*(3), 155–169.

Sari, R. (2021). The effect of using paylater on the impulse buying behavior of e-commerce users in Indonesia. *Journal of Business and Investment Research*, *7*(1), 44–57. https://doi.org/10.35313/jrbi.v7i1.2058

Shyiramunda, T., Uwizeyimana, M., & Ndayishimiye, F. (2022). Triple helix and quintuple helix innovation systems and {MSME} development in {East Africa}. *African Development Review*, *34*(2), 245–261.

Suryawardani, B., Masitoh, S., & Nurafifah, A. R. (2021). Digital media and marketing innovation on {SME} performance: Mediation analysis using {PLS-SEM}. *Jurnal Manajemen Pemasaran*, *15*(2), 78–91.

Suwandi, A. (2023). Strategic innovation and competitive performance in {Indonesian} {MSME} clusters: A {SEM-PLS} analysis. *Jurnal Strategi Dan Bisnis*, *11*(1), 1–17.

Syamsari, S., Arifin, M., & Nugroho, T. (2022). Government support dimensions and {MSME} development: Evidence from {Indonesian} district-level programs. *Jurnal Administrasi Dan Kebijakan Publik*, *9*(2), 112–128.

Vietnam Environment Administration. (2022). *Green Rewards Programme Evaluation Report 2022*.

Yessica, Y., & Efferin, S. (2022). WORK LIFE HARMONY AKUNTAN: KAPAN DAN MENGAPA? *EKUITAS (Jurnal Ekonomi Dan Keuangan)*, *6*(2), 181–203.