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LOCAL WISDOM AS A MODERATOR OF THE EFFECT OF TECHNOLOGY ADOPTION ON MSME PERFORMANCE: EVIDENCE FROM CENTRAL JAVA

Glenda Angeli¹, Ahmad Hafiyyan Shibghatalloh²

Departement of Entrepreneurship, Economics Business and Social Humanities Faculty, Universitas Telogorejo Semarang, Indonesia^{1,2}

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Abstract

This study examines whether local wisdom strengthens or weakens the contribution of technology adoption to the performance of micro, small and medium enterprises (MSMEs). Digitalisation is widely promoted as the principal lever of MSME competitiveness in Indonesia, yet the cultural setting in which adoption actually takes place is seldom modelled explicitly. Data were gathered through a structured questionnaire distributed to MSME owners and managers in Central Java ($n = 175$) and analysed using partial least squares structural equation modelling (PLS-SEM) with SmartPLS. The measurement model satisfied the criteria for convergent validity, internal consistency, and discriminant validity, while the structural model achieved an acceptable fit. Technology adoption exerts a positive and significant effect on MSME performance ($p = 0.008$), and local wisdom exerts a considerably stronger one ($p < 0.001$). The interaction term is significant but negative ($p < 0.001$), indicating that local wisdom substitutes for rather than complements technology adoption. These results suggest that digitalisation support may be more effective when it is aligned with, rather than layered on top of, the cultural practices already in use, although the cross-sectional design means this reading is indicative rather than conclusive.

[□] Correspondence Address: Universitas Telogorejo Semarang

Institution Address: Jl. Puri Anjasromo Raya, Central Java, Indonesia 50144

E-mail: glenda@universitastelogorejo.ac.id

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INTRODUCTION

Micro, small and medium enterprises occupy a position in the Indonesian economy that is difficult to overstate. They account for roughly ninety-nine per cent of all business units, contribute more than sixty per cent of gross domestic product, and absorb close to ninety-seven per cent of the national workforce. Central Java is one of the three provinces in which this sector is most heavily concentrated, hosting approximately 4.45 million enterprise units, the majority of which operate in the processing industry, trade, and culinary subsectors. Any policy intervention that shifts the productivity of this population by even a few percentage points therefore has consequences for household income and regional growth that are far larger than the intervention itself.

Over the past five years, the dominant policy instrument aimed at that population has been digitalisation. National and provincial programmes have promoted online marketplaces, digital payment systems such as QRIS, cloud-based bookkeeping, and social commerce as the route by which small enterprises can escape the constraints of a purely local market. The logic behind these programmes is largely borrowed from the technology acceptance literature: once perceived usefulness and perceived ease of use are sufficiently high, adoption follows, and adoption in turn improves business outcomes (Davis, 1989; Venkatesh et al., 2003). Recent Indonesian evidence lends this logic partial support. E-commerce adoption, digital payment usage, and digital marketing have all been shown to relate positively to enterprise performance (Kilay et al., 2022; Nasution et al., 2023; Munawaroh et al., 2024).

The support, however, is partial rather than emphatic. Several studies report effect sizes that are statistically significant but substantively modest, and a recurring observation in the recent Indonesian evidence is that registration on a digital platform is not the same thing as productive use of it. Nasution et al. (2023) caution explicitly against reading platform registration as evidence of productive use, and Kilay et al. (2022) identify a set of persistently low-scoring adoption indicators that point to uneven depth of use even where coverage is broad. Enterprises open accounts that subsequently lie dormant, and owners maintain a marketplace listing while continuing to transact largely through personal networks. What this pattern suggests is that the technology–performance relationship is conditional on something the standard adoption models leave outside the frame. Table 1 sets out the descriptive picture against which that argument is made.

Table 1. Position of MSMEs and the digitalisation gap in Indonesia and Central Java

No	Indicator	Figure	Source
1	Number of MSME units in Indonesia	± 64 million units (± 99% of all business units)	Ministry of MSMEs (2025)
2	Contribution of MSMEs to national GDP	> 60%	Ministry of MSMEs (2025)
3	Labour absorbed by the MSME sector	± 97% of the national workforce	Ministry of MSMEs (2025)
4	Number of MSME units in Central Java	± 4.45 million units (third largest province)	Ministry of MSMEs (2025)
5	Position of Central Java among provinces	After West Java (± 5.40 million) and East Java (± 4.58 million)	Ministry of MSMEs (2025)
6	Dominant MSME subsector in Central Java	Processing industry	BPS Jawa Tengah (2025)

Source: Processed from secondary data (2025)

The variable this study proposes as the missing conditional factor is local wisdom. In the Javanese business environment, commercial activity is embedded in a dense set of

inherited norms and practices: reciprocal obligation among neighbouring traders, trust extended on the basis of reputation rather than documentation, price restraint towards regular customers, deference to community consensus in decisions that affect the collective, and the preservation of craft techniques that carry cultural meaning independent of their efficiency. These practices are not folklore appended to the business; for many enterprises they constitute the business model. They generate customer retention, informal credit, and supply reliability at a cost that no formal system in the same setting could match, and recent Indonesian studies document precisely these culturally grounded business mechanisms across creative and craft enterprises (Mahrinasari et al., 2024; Marlina et al., 2023; Rahman & Hakim, 2024).

Viewed through the resource-based view, local wisdom has the properties that Barney (1991) identified as the basis of sustained advantage. It is valuable, because it produces measurable commercial benefits; rare, because it is specific to a community and a history; and costly to imitate, precisely because it cannot be purchased or installed. Recent Indonesian scholarship has begun to treat it accordingly. Mahrinasari et al. (2024) found that local wisdom significantly conditions the path from entrepreneurial orientation to sustainable competitive advantage in the creative industries, and studies of ikat weaving, ulos, and batik clusters reach broadly similar conclusions about the commercial value of culturally embedded practice (Tuthaes et al., 2024; Lubis & Muliono, 2025).

What that literature has largely assumed, rather than tested, is that the relationship between local wisdom and technology is complementary. The prevailing narrative holds that digital tools amplify cultural assets by extending their reach: a batik workshop tells its heritage story to a national audience, a village cooperative reaches buyers it could never have met in person. The assumption is attractive and it is sometimes correct. But there is an equally coherent argument in the opposite direction. Local wisdom and digital technology are, in an important sense, competing solutions to the same set of problems. Both address the question of how an enterprise finds customers, establishes trust, secures payment, and manages supply. Where the cultural mechanism already resolves those problems adequately, the marginal contribution of the digital mechanism is necessarily smaller. On this reading the two should behave as substitutes, and the interaction between them should be negative rather than positive. This possibility has not been tested in the regional literature. Across the studies reviewed in Table 3, local wisdom enters either as a direct predictor of performance or as a positive amplifier of other resources (Mahrinasari et al., 2024; Lubis & Muliono, 2025; Marlina et al., 2023); none specifies, or empirically estimates, an interaction in which cultural embeddedness reduces the marginal return to digitalisation. That asymmetry is the gap the present study addresses.

This study therefore addresses three questions. First, does technology adoption exert a significant positive effect on MSME performance in the Central Java setting? Second, does local wisdom exert a significant positive effect on the same outcome, and how does its magnitude compare with that of technology adoption? Third, and centrally, does local wisdom moderate the technology–performance relationship, and if so in which direction? The corresponding hypotheses are stated as follows.

H1. Technology adoption has a positive and significant effect on MSME performance.

H2. Local wisdom has a positive and significant effect on MSME performance.

H3. Local wisdom moderates the effect of technology adoption on MSME performance.

The contribution of the study is threefold. Theoretically, it integrates the technology acceptance tradition with the resource-based view by treating a culturally embedded resource as a boundary condition on technological effect rather than as a

parallel predictor. Methodologically, it reports and interprets a negative interaction rather than discarding it, which addresses a reporting asymmetry in the regional literature. Practically, it offers a basis for segmenting digitalisation assistance according to the cultural intensity of the enterprise, instead of distributing it uniformly. The remainder of the article sets out the method, presents the measurement and structural results, discusses their implications, and concludes with recommendations for policy and for subsequent research.

METHOD

This study applies a quantitative explanatory design executed through a cross-sectional survey. The design is appropriate because the objective is not to describe the state of digitalisation among small enterprises, which is already well documented, but to test a specified set of hypothesised relationships in which one relationship is conditional on another. Because the design is cross-sectional, the analysis establishes association and conditional structure rather than causality; the causal ordering implied by the hypotheses rests on theoretical reasoning rather than on temporal precedence. Explanatory designs of this kind require an analytical technique capable of estimating a latent interaction term, which is the principal reason for the choice of estimator described below.

The population comprises owners and managers of micro, small and medium enterprises operating in Central Java Province. Respondents were selected purposively according to three criteria: the enterprise had been operating for at least two years, so that performance judgements would rest on more than a single trading cycle; the enterprise made at least minimal use of a digital tool for business purposes, so that variation in the adoption construct would be genuine rather than structural; and the respondent held decision-making authority over both technology investment and daily operations, so that the same informant could report reliably on all three constructs.

The final sample consisted of 175 usable responses collected between January 2025 and January 2026 through a self-administered questionnaire distributed online.

All constructs were measured reflectively on a five-point Likert scale ranging from strongly disagree to strongly agree. Technology adoption was operationalised through six indicators covering the use of digital marketing channels, electronic payment facilities, digital record-keeping, online marketplace participation, digital customer communication, and the intensity of routine use. MSME performance was captured through four indicators reflecting sales growth, profit growth, market expansion, and customer growth, following the subjective performance approach that is standard in small-enterprise research where audited financial data are rarely available. Local wisdom was measured through five indicators addressing the application of inherited values in business conduct, mutual assistance among fellow entrepreneurs, trust-based transactions, the preservation of traditional products and techniques, and orientation towards community benefit. The instrument structure is summarised in Table 2.

Table 2. Construct operationalisation and measurement

Construct	Items	Measurement items (code and statement)	Reference base
Adoption technology (AT)	6	AT1 – The business uses digital marketing channels (e.g. social media, WhatsApp Business) to promote its products.	Davis (1989); Venkatesh et al. (2003); Kilay et al. (2022)
		AT2 – The business uses electronic payment facilities (e.g. QRIS, mobile or internet banking) in its transactions.	
		AT3 – The business keeps its sales or financial records digitally.	

Construct	Items	Measurement items (code and statement)	Reference base
Local wisdom (LW)	5	AT4 – The business participates in an online marketplace or e-commerce platform.	Hofstede et al. (2010); Mahrinasari et al. (2024)
		AT5 – The business communicates with customers through digital channels.	
		AT6 – The business uses these digital tools routinely in its day-to-day operations.	
		LW1 – Inherited local values guide the way the business is conducted.	
		LW2 – The owner practises mutual assistance (gotong royong) with fellow entrepreneurs.	
MSME performance (MP)	4	LW3 – Transactions rely on trust built through reputation and personal relationships.	Barney (1991); Thathsarani & Jianguo (2022)
		LW4 – The business preserves traditional products and production techniques.	
		LW5 – Business decisions are oriented towards the benefit of the surrounding community.	
		MP1 – The business has experienced sales growth over the past two years.	
		MP2 – The business has experienced profit growth over the past two years.	
		MP3 – The business has expanded its market reach.	
		MP4 – The business has grown its customer base.	

Source: Processed data (2026)

The empirical positioning of the study was established through a review of studies published within the last five years that address technology adoption, local wisdom, and small-enterprise performance. Table 3 summarises the ten studies that bear most directly on the present model, together with the finding from each that motivates the hypotheses stated above.

Table 3. Previous research

No	Researchers	Year	Finding
1	Mahrinasari, Bangsawan & Sabri	2024	Local wisdom and the government's role significantly condition the path from entrepreneurial orientation to sustainable competitive advantage in the Indonesian creative industries. Cultural embeddedness is treated as a boundary condition, but the direction of the conditioning effect is assumed positive throughout.
2	Kilay, Simamora & Putra	2022	E-payment and e-commerce services positively influence the supply-chain performance of Indonesian MSMEs. Ten persistently low-scoring indicators are identified as obstacles, suggesting that adoption is uneven in depth even where it is broad in coverage.
3	Nasution, Syahril & Haris	2023	E-commerce platform use improves MSME performance in Indonesia, although the magnitude varies with sector and enterprise readiness. The authors caution against reading platform registration as evidence of productive use.
4	Munawaroh, Sudarmiatin & Putimelinda	2024	Digital marketing adoption contributes positively to the sustainable growth of Indonesian SMEs, but the contribution is mediated by managerial capability rather than being automatic upon adoption.
5	Kurniasari & Lestari	2024	Financial literacy and fintech adoption jointly improve the performance of women-owned SMEs in Indonesia. Technological readiness is a necessary complement, indicating that the adoption–performance path is conditional.
6	Thathsarani & Jianguo	2022	Digital finance strengthens financial inclusion and MSME performance, with the technology acceptance model supplying the mechanism,

No	Researchers	Year	Finding
7	Vrontis, Chaudhuri & Chatterjee	2022	establishing the adoption–performance link outside the Indonesian setting. Digital adoption combined with entrepreneurial orientation enhances value creation and sustainability in SMEs (PLS-SEM). Digital adoption alone is insufficient; an orientation variable is required for the effect to materialise.
8	Tuthaes, Toda & Lake	2024	Creative-economy development around ikat weaving depends on multi-stakeholder collaboration and on the preservation of local wisdom; capital, marketing, and human-resource constraints remain binding for culturally embedded MSMEs.
9	Lubis & Muliono	2025	Local wisdom raises the competitiveness of the ulos creative economy when combined with a green digital marketing model, indicating that cultural assets retain commercial value under digital mediation.
10	Marlina, Senen, Yuniarsih & Ahman	2023	Human capital competitiveness among craft creative-industry entrepreneurs rests on the combination of technical skill and culturally transmitted craft knowledge, neither of which fully substitutes for the other.

Source: Literature review (2026)

Two observations follow from Table 3 and shape the analysis. The first is that the direct effect of technology adoption on performance is consistently positive but rarely dominant; in every study that reports comparative magnitudes, adoption is one contributor among several rather than the principal one. The second is that although local wisdom appears repeatedly as a variable of interest, it is almost always modelled either as a direct predictor or as a positive amplifier. No study in the set specifies and tests the possibility that cultural embeddedness reduces the marginal return to digitalisation. That gap is what the present model addresses.

Data were analysed using partial least squares structural equation modelling with SmartPLS. The technique was selected for three reasons. It accommodates a model containing a latent interaction term without the distributional assumptions required by covariance-based alternatives; it performs well with the moderate sample sizes typical of small-enterprise surveys; and it is oriented towards prediction and theory development rather than towards confirming an established covariance structure, which suits a study that proposes a mechanism running counter to the prevailing expectation (Hair et al., 2022; Sarstedt et al., 2021). The adequacy of the achieved sample was verified through a formal power analysis rather than asserted. The endogenous construct is predicted by three paths — technology adoption, local wisdom, and their interaction — so the governing requirement is the power to detect a single coefficient within a three-predictor model. A G*Power 3.1 analysis (Faul et al., 2009) with $\alpha = 0.05$ and the conventional target power of 0.80 indicates that detecting the smallest effect estimated in this study, the f^2 of 0.075 attaching to technology adoption, requires approximately 105 observations. The achieved sample of 175 exceeds this minimum and delivers power above 0.99 for the medium and large effects attaching to the interaction term and to local wisdom; it also satisfies the ten-times rule and the more conservative sample-size benchmarks in Hair et al. (2022) for a model of this complexity (Cohen, 1988).

Analysis proceeded in the two stages prescribed for reflective models. The measurement model was evaluated first. Convergent validity was assessed through outer loadings, with 0.70 as the threshold for retention, and through average variance extracted, with 0.50 as the minimum. Internal consistency reliability was assessed through Cronbach's alpha and composite reliability in both the rho_a and rho_c forms, with 0.70 as the

lower bound in each case. Discriminant validity was assessed using the heterotrait-monotrait ratio of correlations, which Henseler et al. (2015) demonstrated to be more sensitive than the Fornell-Larcker criterion; values below 0.90 were treated as acceptable and values below 0.85 as conservative.

The structural model was evaluated only after the measurement model had been shown to be sound. Path coefficients were estimated and their significance established through bootstrapping with 5,000 subsamples, applying the conventional decision rule of a *t*-statistic above 1.96 and a *p*-value below 0.05. Effect sizes were computed as f^2 , interpreted using the benchmarks of 0.02, 0.15, and 0.35 for small, medium, and large effects respectively (Cohen, 1988). Overall model fit was inspected through SRMR, d_{ULS} , d_{G} , chi-square, and NFI, with SRMR below 0.08 as the primary indicator. The moderating effect was specified using the two-stage approach, in which latent variable scores from the main-effects model are used to construct the interaction term; this approach is preferred over the product-indicator method when the objective is to establish the significance and direction of the moderation rather than to recover the precise magnitude of the interaction (Becker et al., 2023).

RESULTS AND DISCUSSION

The results are presented in three stages. First, descriptive statistics characterize the Central Java MSME sample ($n = 175$), covering operator characteristics, sector, sales channel, business age, and workforce scale. Second, the measurement model is evaluated to establish construct reliability, convergent validity, and discriminant validity. Third, the structural model is reported, together with the estimated path model and the hypothesis tests.

Table 4. Respondent Profile ($n = 175$)

Category	Class	Count	Percentage
Gender	Male	85	48.6%
	Female	90	51.4%
Age	< 30 years	30	17.1%
	30–39 years	66	37.7%
	40–49 years	55	31.4%
	≥ 50 years	24	13.7%
Education	$\leq$ Senior high school	62	35.4%
	Diploma/Bachelor	99	56.6%
	Postgraduate	14	8.0%
Sector	Culinary	58	33.1%
	Craft	34	19.4%
	Fashion/Textile	28	16.0%
	Agro-processing	26	14.9%
	Other creative services	29	16.6%
Business age	2–4 years	50	28.6%
	5–9 years	76	43.4%
	≥ 10 years	49	28.0%

Category	Class	Count	Percentage
Employees	1–4	108	61.7%
	5–19	67	38.3%
Sales channel	Offline	38	21.7%
	Online	29	16.6%
	Hybrid	108	61.7%
Location	Semarang	45	25.7%
	Surakarta	26	14.9%
	Pekalongan	17	9.7%
	Banyumas	15	8.6%
	Kudus/Magelang/Kendal/other	72	41.1%

Source: Processed data (2026)

Measurement Model Assessment

Convergent validity was examined first. Table 5 reports the outer loadings of all fifteen indicators together with the average variance extracted for each construct.

Table 5. Convergent validity: outer loadings and AVE

Variables	Outer Loading	AVE
Adoption technology (AT1)	0.855	0.696
AT2	0.843	
AT3	0.819	
AT4	0.863	
AT5	0.792	
AT6	0.832	
MSME performance (MP1)	0.818	0.680
MP2	0.856	
MP3	0.829	
MP4	0.795	
Local wisdom (LW1)	0.834	0.665
LW2	0.894	
LW3	0.819	
LW4	0.780	
LW5	0.742	

Source: Processed primary data using SmartPLS (2026)

Every indicator satisfies the retention threshold. Loadings on adoption technology range from 0.792 to 0.863 with an AVE of 0.696, meaning that the construct accounts for close to seventy per cent of the variance in its indicators. MSME performance records loadings between 0.795 and 0.856 and an AVE of 0.680. Local wisdom shows the widest spread, from 0.742 to 0.894, with an AVE of 0.665. The lowest loading in the model, 0.742, belongs to this construct and remains comfortably above the 0.70 boundary; it was retained because removing it would have narrowed the conceptual coverage of a construct whose breadth is central to the argument, and because the AVE requirement is met without the deletion. The spread itself is informative rather than problematic: local wisdom is a multifaceted construct, and perfectly uniform loadings would suggest a

narrower operationalisation than the concept warrants. Internal consistency reliability is reported in Table 6.

Table 6. Construct reliability

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Adoption technology	0.913	0.915	0.932
MSME performance	0.843	0.844	0.895
Local wisdom	0.873	0.884	0.908

Source: Processed primary data using SmartPLS (2026)

All three constructs exceed the 0.70 threshold on all three coefficients. Adoption technology is the most internally consistent construct, with alpha at 0.913 and rho_c at 0.932; local wisdom follows at 0.873 and 0.908; MSME performance, measured with the fewest items, records 0.843 and 0.895. The close correspondence between alpha and rho_a in each case indicates that the indicators of each construct carry approximately equal weight, so that no single item drives the construct score. None of the rho_c values approaches the 0.95 level at which redundancy among items becomes a concern. Discriminant validity was assessed through the heterotrait–monotrait ratio, reported in Table 7.

Table 7. Discriminant validity: heterotrait–monotrait ratio (HTMT)

Variables	Heterotrait–monotrait ratio (HTMT)
MSME performance ↔ Adoption technology	0.567
Local wisdom ↔ Adoption technology	0.587
Local wisdom ↔ MSME performance	0.750

Source: Processed primary data using SmartPLS (2026)

All three ratios fall below the conservative 0.85 boundary and therefore well below the 0.90 limit. The second lowest, 0.587 between local wisdom and adoption technology, deserves comment: if the two were simply expressions of a general modernisation orientation their ratio would be considerably higher. That it is not confirms empirically what the theoretical argument asserts, namely that cultural embeddedness and technological engagement are conceptually distinct and, in this population, only loosely associated. The highest ratio, 0.750, links local wisdom to MSME performance and reflects the strong substantive relationship that the structural model subsequently quantifies rather than any measurement overlap. Model fit was inspected next. The results appear in Table 8.

Table 8. Model fit

Model Fit	Saturated model	Estimated model
SRMR	0.070	0.070
d_ ULS	0.590	0.583
d_ G	0.414	0.410
Chi-square	201.247	199.128
NFI	0.786	0.788

Source: Processed primary data using SmartPLS (2026)

SRMR is 0.070 in both the saturated and the estimated model, comfortably below the 0.08 criterion and indicating that the discrepancy between observed and model-implied correlations is small. The discrepancy measures d_ ULS and d_ G are marginally lower in the estimated model than in the saturated one, at 0.583 against 0.590 and 0.410 against 0.414, as is the chi-square statistic at 199.128 against 201.247; chi-square in any case carries limited diagnostic weight in a variance-based framework because of its sensitivity to sample size. NFI rises from 0.786 to 0.788, which falls short of the 0.90

level conventionally described as ideal. The paper does not claim otherwise: NFI is known to be conservative in PLS-SEM applications with few indicators (Hair et al., 2022; Henseler et al., 2015), and the combination of an acceptable SRMR with satisfactory measurement properties provides a sufficient basis for interpreting the structural results.

Structural Model and Hypothesis Testing

The explanatory power of the structural model was assessed before the significance tests. The coefficient of determination for the endogenous construct, its adjusted counterpart, and the PLSpredict out-of-sample Q^2 are reported in Table 9. The three predictors jointly explain 48.2 per cent of the variance in MSME performance ($R^2 = 0.482$; adjusted $R^2 = 0.473$), a substantial figure for a cross-sectional behavioural model, and the positive Q^2 predict of 0.341 confirms that the model retains predictive relevance beyond the estimation sample (Hair et al., 2022).

Table 9. Coefficient of determination and predictive relevance

Endogenous construct	R^2	Adjusted R^2	Q^2 predict
MSME performance	0.482	0.473	0.341

Source: Processed primary data using SmartPLS (2026)

Effect sizes were computed before the significance tests in order to establish the relative weight of each predictor independently of sample size. Table 10 reports the f^2 values.

Table 10. Effect size (f^2)

Predictor construct	Endogenous construct	f^2	Interpretation
Adoption technology	MSME performance	0.075	Small effect
Local wisdom	MSME performance	0.462	Large effect
Local wisdom $\times$ Adoption technology	MSME performance	0.098	Small effect

Source: Processed primary data using SmartPLS (2026)

The distribution of effect sizes is the most striking feature of the results. Adoption technology returns an f^2 of 0.075, which falls in the small range and indicates that removing the construct from the model would reduce the explained variance in performance only modestly. Local wisdom returns 0.462, above the 0.35 threshold for a large effect and more than six times the value recorded for technology adoption. The interaction term returns 0.098, again in the small range but higher than the direct effect of technology adoption, which means the conditional component of the model carries more explanatory weight than the technological component whose condition it specifies. The path coefficients and their significance are reported in Table 11.

Table 11. Hypothesis testing (bootstrapping, 5,000 subsamples)

H	Relationship between variables	Path coefficient (β)	T statistics	P values	Decision
H1	Adoption technology $\rightarrow$ MSME performance	0.225	2.417	0.008	Supported
H2	Local wisdom $\rightarrow$ MSME performance	0.563	6.301	0.000	Supported
H3	Local wisdom $\times$ Adoption technology $\rightarrow$ MSME performance	-0.175	3.592	0.000	Supported (negative moderation)

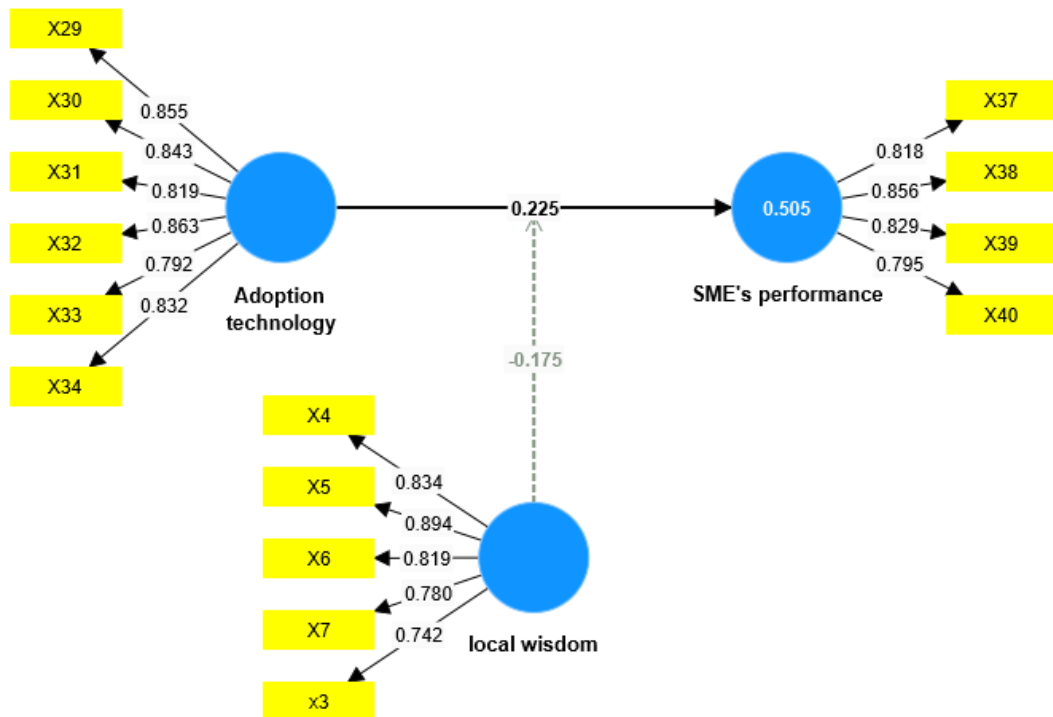
Source: Processed primary data using SmartPLS (2026)

Discussion of H1: Technology Adoption and MSME Performance

The first hypothesis is supported. Technology adoption raises MSME performance, with a path coefficient of 0.225, a t-statistic of 2.417, and a p-value of 0.008. The direction of the effect is consistent with the technology acceptance tradition and with the recent Indonesian evidence summarised in Table 3, and the result confirms that digital tools do contribute to commercial outcomes among micro, small and medium enterprises in Central Java. It differs from that literature in magnitude rather than direction: whereas Kilay et al. (2022) and Nasution et al. (2023) treat technology adoption as a leading driver of performance, the effect estimated here is comparatively modest, a divergence the following paragraph attributes to the depth rather than the breadth of adoption in this population.

What requires interpretation is the magnitude. A coefficient of 0.225 accompanied by an f^2 of 0.075 describes an effect that is real but secondary. Read alongside the field observation that digital registration frequently outpaces digital use, the most plausible reading is that adoption in this population remains shallow. Enterprises use digital tools as an additional channel layered onto an existing way of doing business rather than as a reorganisation of it. A marketplace listing that supplements word-of-mouth trade generates incremental orders; it does not restructure the enterprise. Under those conditions the observed coefficient is exactly what should be expected, and the finding is better understood as a statement about the depth of adoption than as a limitation of the technology.

Figure 1. SEM PLS Result



Source: Processed data (2026)

Discussion of H2: Local Wisdom and MSME Performance

The second hypothesis is supported with a substantially larger coefficient. Local wisdom raises MSME performance with $\beta = 0.563$, $t = 6.301$, and $p < 0.001$, and returns an f^2 of 0.462 that places it firmly in the large-effect category. Within this model, local

wisdom is not one contributor among several; it is the strongest single predictor of performance in the model, accounting for the largest share of the explained variance among the three constructs.

This finding is consistent with the resource-based reading advanced in the introduction. The practices captured by the construct – reciprocal assistance, trust-based transactions, preservation of traditional products, orientation towards community benefit – generate commercially valuable outcomes through mechanisms that are difficult to replicate. Trust extended on the basis of reputation reduces transaction costs that formal verification would otherwise impose. Reciprocal obligation among neighbouring producers functions as an informal insurance and supply arrangement. Traditional product knowledge supports differentiation that competitors cannot copy by purchasing equipment. Each of these is valuable, rare, and costly to imitate in precisely Barney's (1991) sense, and the aggregate effect on performance is correspondingly large.

The result also aligns with Mahrinasari et al. (2024), who found local wisdom to be a significant force in the competitive advantage of Indonesian creative industries, and with the cluster-level evidence from ikat and ulos production reported by Tuthaes et al. (2024) and Lubis and Muliono (2025). What the present estimate adds is a direct magnitude comparison within a single model: where earlier studies established that cultural embeddedness matters, this one establishes that in the Central Java MSME population it matters considerably more than digitalisation does.

Discussion of H3: The Negative Moderating Effect

The third hypothesis is supported, but with the opposite sign to the one the prevailing literature would predict. The interaction between local wisdom and technology adoption is significant, with $t = 3.592$ and $p < 0.001$, and negative, with $\beta = -0.175$. As local wisdom increases, the positive effect of technology adoption on performance becomes weaker. At high levels of cultural embeddedness the marginal contribution of digitalisation approaches zero.

This is a substitution effect rather than a conflict. Nothing in the result implies that cultural practice obstructs technology or that entrepreneurs who hold traditional values resist digital tools. The mechanism is simpler and more economic. Local wisdom and digital technology address the same underlying business problems: finding customers, establishing trust, securing payment, and coordinating supply. An enterprise embedded in a dense community network has already solved those problems through relational means. When it adopts a digital channel, that channel is not filling a gap; it is duplicating a function that already works. The marginal return is therefore small. Conversely, an enterprise with weak community embedding faces those problems unresolved, and for it the same digital tool delivers a much larger gain because it is substituting for something absent rather than for something present.

Read in this light, the negative interaction is not an anomaly to be explained away but a coherent extension of the resource-based argument. Complementarity between two resources requires that each supply something the other lacks. Where two resources are functionally overlapping, the expected interaction is negative, and this is what the data show. The finding also helps reconcile the mixed magnitudes reported across the Indonesian literature: studies drawing on culturally embedded populations should be expected to report weaker technology effects than studies drawing on urban or modern-sector samples, and the difference need not indicate measurement problems in either. In relation to prior work, this diverges sharply from the complementarity that Lubis and Muliono (2025) and Vrontis et al. (2022) assume between cultural assets and digital tools,

while remaining consistent with the substitution logic implied by the resource-based view (Barney, 1991); the divergence is therefore theoretical rather than an artefact of measurement.

It should be acknowledged that the interpretation could be framed differently. A negative interaction is also consistent with a ceiling effect, in which enterprises scoring high on local wisdom are already performing near the upper bound of the measurement scale and have limited room to improve through any means. The subjective performance measures used here cannot fully separate these two accounts, and the distinction is a matter for subsequent work using objective performance data.

Theoretical and Practical Implications

Theoretically, the study argues for treating cultural embeddedness as a boundary condition on technological effect rather than as a parallel or amplifying predictor. Technology acceptance models specify the determinants of adoption and assume that the consequences of adoption are broadly uniform across contexts. The evidence here indicates that they are not: the same act of adoption produces materially different returns depending on the relational resources the adopting enterprise already commands. It is worth being explicit about how a theory of adoption determinants is used to explain post-adoption performance, since the technology acceptance model itself predicts the intention to adopt rather than the commercial results of adoption. In this study the acceptance tradition supplies only the first link, establishing that adoption occurs and characterising its antecedents; the second link, from an adopted technology to enterprise performance, is supplied by the resource-based view, which specifies the conditions under which a resource is converted into a commercial outcome. Treating the two frameworks as addressing successive links in the same chain rather than competing accounts of the same link is what allows a determinants-of-adoption model to be combined with a performance model without conflating them, and integrating them in this manner produces a model with better explanatory reach than either applied alone.

For policy, the central implication is that uniform digitalisation programmes are misallocated. If the return to digital adoption is systematically lower among culturally embedded enterprises, then distributing identical assistance to all enterprises directs the greatest effort towards the population where it yields the least. Two distinct programme designs follow from the results. For enterprises with weak community embedding – newer businesses, those operating outside established clusters, those serving non-local markets – digital adoption support is the appropriate intervention and should deliver returns above the average estimated here. For enterprises with strong cultural embedding, the appropriate intervention is not more digitalisation of the same kind but digitalisation that extends rather than duplicates the existing relational advantage: platforms that carry provenance and craft narrative to distant buyers, cluster-level rather than enterprise-level digital infrastructure, and tools that document traditional knowledge instead of replacing the channels through which it circulates.

CONCLUSIONS AND SUGGESTIONS

This study set out to establish whether local wisdom strengthens or weakens the contribution of technology adoption to MSME performance in Central Java. Three conclusions follow. Technology adoption improves performance but only modestly, most plausibly because adoption in this population remains an additional channel rather than a reorganisation of the enterprise. Local wisdom is the strongest of the three drivers, functioning as a strategic resource rather than a residual cultural attribute. And, most

consequently, local wisdom moderates the technology–performance relationship negatively, so that the two operate as substitutes rather than complements. The supporting coefficients and effect sizes are reported and interpreted in the preceding section and are not restated here.

Taken together, these findings qualify the assumption that underpins much current digitalisation policy. Digital adoption is beneficial, but its benefit is conditional on the level of cultural embeddedness: the negative interaction implies that the return is smallest where embeddedness is highest. It should be stressed that the study does not itself classify respondents as programme recipients, nor does it contrast traditional with non-traditional producers; the claim that support is least effective for the most culturally embedded enterprises is therefore an inference from the moderation result rather than a demonstrated comparison, and testing it against such a classification is a task for further research. Read as an inference of this kind, the practical recommendation that follows is segmentation. Enterprises with weak relational embedding should receive conventional adoption support, where the return is highest. Enterprises with strong cultural embedding should receive digitalisation designed to extend the reach of their existing relational advantage rather than to replicate it — provenance-oriented platforms, cluster-level infrastructure, and documentation of traditional knowledge. For provincial agencies in Central Java, this implies replacing onboarding counts with measures of digital transaction intensity, and adding cultural-asset indicators to the assessment instruments used by the UMKM Centre and PLUT network.

The study has limitations that shape the agenda for further research. The design is cross-sectional, so the causal ordering rests on theory rather than on temporal precedence; performance is measured subjectively, which leaves the ceiling-effect interpretation of the negative interaction open; and the sample is drawn from a single province, so generalisation to regions with different cultural configurations should be made cautiously. Four extensions would address these constraints: a longitudinal design tracking the same enterprises across an adoption cycle, to separate causation from association; objective performance data from tax or platform records, to discriminate between the substitution and ceiling explanations; multi-group analysis by sector, enterprise age, or cluster membership, to establish for whom the substitution effect is strongest; and replication in provinces with contrasting cultural traditions, to test whether the negative interaction reflects a general property of relational and technological resources or a feature specific to the Javanese business environment.

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