

Adoption of Digital Marketing and Business Performance: The Moderating Role of Digital Literacy in SMEs in Riau Province

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ABSTRACT

Purpose – This study investigates the effects of digital marketing adoption and digital literacy on perceived business performance and examines whether digital literacy strengthens the performance contribution of digital marketing among small and medium-sized enterprises (SMEs) in Riau Province, Indonesia.

Design/methodology/approach – The study used a quantitative, cross-sectional explanatory design. From 320 questionnaires distributed purposively to SME owners and managers in five areas of Riau, 250 valid responses were analyzed. The constructs were measured with multi-item five-point Likert scales. SmartPLS 4 was used to evaluate the measurement and structural models, including an interaction term, with statistical inference based on 5,000 bootstrap resamples and 95% confidence intervals.

Findings – Digital marketing adoption positively influenced perceived business performance ($\beta = 0.381$, $p < 0.001$), as did digital literacy ($\beta = 0.429$, $p < 0.001$). Digital literacy also strengthened the relationship between adoption and performance ($\beta = 0.215$, $p < 0.001$), although the interaction effect was small ($f^2 = 0.095$). The model explained 61.2% of performance variance and demonstrated predictive relevance ($Q^2 = 0.421$).

Originality/value – By treating digital marketing adoption as a strategic resource and digital literacy as both an enabling capability and a boundary condition, this study refines the Resource-Based View explanation of SME digitalization. The evidence from an underexamined Indonesian region indicates that access to digital platforms should be accompanied by practical skills in content development, customer interaction, information evaluation, and performance measurement.

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1. Introduction

SMEs contribute to employment, income generation, and market development, yet they increasingly operate under digital disruption and stronger competition (OECD, 2023; World Bank, 2024). Digital marketing can lower communication costs, extend customer reach, and make promotion more responsive (Chaffey & Ellis-Chadwick, 2022; Dwivedi et al., 2022). These benefits are especially important for resource-constrained firms seeking scalable access to markets. Possessing a digital channel is not equivalent to using it productively. Performance gains depend on whether owners and managers can evaluate information, operate platforms, and connect technological use with commercial priorities (Khin & Ho, 2019; Vial, 2019). Digital literacy therefore represents an enabling capability rather than a purely technical skill (UNDP, 2023).

Prior research generally links online marketing with wider market exposure, more efficient communication, and improved customer relationships (Lamberton & Stephen, 2016; Matarazzo et al., 2021). Evidence on online-channel adoption also shows that organizational preparedness shapes how SMEs implement such tools (Nguyen et al., 2023). Social-media engagement research similarly indicates that value depends on the configuration of audience and content practices (Santos et al., 2022). A related literature stream focuses on digital competence. These capabilities help firms interpret information, adapt routines, and integrate technology into daily decisions (Khin & Ho, 2019; Heredia et al., 2022). Reports on digital skills further emphasize that practical competence remains uneven and requires context-sensitive development (UNDP, 2023; World Bank, 2024).

The adoption and capability streams are often examined independently. Consequently, existing studies explain either whether SMEs use digital tools or whether they possess digital competence, while providing less evidence about their joint effect. This separation leaves an important question unresolved: why do firms with similar access to digital channels report different performance outcomes? That question is salient in regions where connectivity, training opportunities, and managerial experience vary across locations. Research on SME digitalization identifies infrastructure, organizational readiness, and skills as interdependent constraints (Eller et al., 2020; Papadopoulos et al., 2020). Evidence centered on large urban markets may therefore not transfer directly to a geographically dispersed province such as Riau.

Recent regional evidence supports the selection of Riau Province as the study setting. The provincial government has promoted SME development through entrepreneurship programs, digital platforms, and regional SME initiatives (Media Center Riau, 2023; PPID Riau, 2024). Riau reportedly had 631,347 SMEs in 2023, and the provincial government used digital procurement and collaboration with financial institutions to broaden their market participation (ANTARA Riau, 2023). Official communications also emphasize that SMEs must use digitalization to expand markets and improve competitiveness (PPID Riau, 2024). These conditions make Riau appropriate for testing whether digital literacy helps firms translate digital marketing adoption into performance.

Digital literacy is modeled as a moderator because it can alter the returns generated by a given level of digital marketing adoption. Firms may maintain social-media or marketplace accounts without using data, targeting audiences, or evaluating campaigns systematically. Capable

users are better positioned to connect online activity with business goals and customer-relationship processes (Järvinen & Karjaluo, 2015; Trainor et al., 2014).

This conditional logic is grounded in the Resource-Based View. Digital marketing channels constitute potentially valuable resources, but their value depends on the capabilities used to deploy them (Barney, 1991; Teece, 2018). Recent evidence likewise shows that digital and technological capabilities facilitate the conversion of digital initiatives into organizational outcomes (Heredia et al., 2022; Karadağ et al., 2026).

Accordingly, this study tests the direct effects of digital marketing adoption and digital literacy on SME performance and evaluates their interaction. Its contribution is to specify digital literacy as a boundary condition within an RBV model and to provide evidence from Riau Province, a regional setting rarely represented in the international SME digitalization literature.

In the context of Riau Province, SME digitalization has become an important regional development concern. Regional government programs have increasingly encouraged SMEs to adopt digital platforms, improve online promotion, and participate in digital-based training initiatives. Riau also has a large SME base spread across urban and district areas, including Pekanbaru, Dumai, Bengkalis, Kampar, and Siak. However, the level of digital readiness among SMEs remains uneven due to differences in digital skills, infrastructure access, managerial capability, and familiarity with digital marketing practices. These conditions make Riau Province a relevant empirical context for examining whether digital literacy strengthens the relationship between digital marketing adoption and perceived business performance.

2. Literature Review and Hypothesis Development

2.1 Digital Marketing Adoption and Business Performance

Digital marketing adoption describes the systematic use of websites, social media, search tools, marketplaces, and related channels to communicate value and manage customer interaction. For SMEs, these channels can expand visibility and reduce the cost of reaching geographically dispersed buyers (Chaffey & Ellis-Chadwick, 2022). Their value, however, emerges from coordinated use rather than mere account ownership. Empirical work supports a positive association between digitalization and SME outcomes. Digitalization can improve market access and operational responsiveness (Eller et al., 2020), while social-media use can support B2B SME performance when internal and external use are appropriately aligned (Corral de Zubielqui & Jones, 2023). Digital marketing capability also complements customer-relationship management in explaining performance (Hazzam et al., 2026).

Based on this discussion, the following hypothesis is proposed:

H1: Digital marketing adoption has a positive effect on SME business performance.

2.2 Digital Literacy and Business Performance

Digital literacy is the capacity to locate, assess, communicate, and apply information through digital technologies. It combines operational proficiency with information judgment, communication, security awareness, and problem solving (van Laar et al., 2017). In small firms, these abilities influence whether digital tools are embedded in meaningful managerial and marketing routines. SMEs with stronger digital competence are better able to evaluate

platform data, modify online activities, and coordinate technology with business needs. Studies of firm-level digital capability associate these competencies with technological capability and performance (Heredia et al., 2022; Khin & Ho, 2019). Digital-skills assessments also show that training must be matched with practical opportunities for application (UNDP, 2023; World Bank, 2024).

Thus, the following hypothesis is formulated:

H2: Digital literacy has a positive effect on SME business performance.

2.3 The Moderating Role of Digital Literacy

The benefits of online promotion are unlikely to be identical across firms. Owners who can design content, interpret feedback, select channels, and assess outcomes should obtain more value from the same technological investment. Digital literacy is therefore treated as a variable that changes the strength of the adoption–performance relationship. Complementarity is well established in digital-transformation research: technology produces stronger outcomes when it is combined with appropriate organizational capabilities (Heredia et al., 2022; Karadağ et al., 2026). Research on online marketing adoption likewise shows that technological, organizational, and environmental readiness jointly shape SME behavior (Nguyen et al., 2023).

For SMEs, this complementarity is particularly consequential because limited resources increase reliance on managerial knowledge. Platform capability and network capability help entrepreneurial firms compete digitally (Cenamor et al., 2019), while social-media competence improves customer-relationship outcomes (Trainor et al., 2014). Digital literacy should therefore enhance the productive use of marketing platforms. Despite this logic, relatively few studies test digital literacy as a moderator between digital marketing adoption and SME performance, especially outside major metropolitan settings. This study addresses that limitation by examining a conditional effect in Riau and distinguishing access to technology from the capability to use it strategically.

Theoretically, this relationship can be explained through the Resource-Based View (RBV), which emphasizes that firm-specific capabilities, such as digital literacy, enhance the effectiveness of technological resources (Barney, 1991; Dwivedi et al., 2022). Without adequate digital literacy, SMEs may fail to fully exploit digital marketing tools, resulting in suboptimal outcomes. Empirical evidence supporting this moderating effect is still limited, particularly in developing regions. This creates a research gap that this study aims to address. By incorporating digital literacy as a moderating variable, this study provides a more nuanced understanding of how digital marketing influences SME performance.

Accordingly, the following hypothesis is proposed:

H3: Digital literacy positively moderates the relationship between digital marketing adoption and SME business performance, such that the relationship is stronger at higher levels of digital literacy.

Research Gap and Contribution

Existing research offers extensive evidence on digital marketing and growing evidence on digital capability, but the two are frequently modeled as parallel predictors. Less is known about whether digital literacy changes the performance return from adoption. Regional

Indonesian evidence is also limited, leaving uncertainty about how uneven capability conditions influence SME outcomes.

The present study addresses both gaps through a single conditional model. It tests direct effects, estimates the adoption-by-literacy interaction, and interprets the results through the Resource-Based View, thereby linking a technological resource to the human capability required for effective deployment.

3. Methodology

A quantitative cross-sectional design was applied to test the proposed relationships among SMEs in Riau Province. This design permits the estimation of direct and interaction effects at one observation period. The analysis is explanatory in purpose, while causal claims are kept appropriately limited because temporal ordering cannot be established from cross-sectional data.

3.1. Research Design and Unit of Analysis

The SME served as the unit of analysis, and an owner or manager knowledgeable about operations and digital marketing provided the observations. The model estimates the effects of digital marketing adoption and digital literacy on perceived business performance, together with their interaction.

3.2. Population and Sample

The target population comprised operating SMEs in Riau Province. Because no single complete register identified every digitally active SME and eligible owner-manager, the study used purposive selection based on operational status, digital-marketing experience, and respondent knowledge.

A purposive sampling technique is employed to ensure that only relevant respondents are included. The selection criteria are as follows:

- 1) SMEs that are actively operating;
- 2) SMEs that have adopted or have experience using digital platforms for marketing purposes; and
- 3) owners or managers who possess adequate knowledge of business operations and digital practices.

The final analytical sample contained 250 SME owners and managers. This number exceeds common minimum requirements for the specified PLS-SEM model and provides adequate observations for estimating three latent constructs and one interaction effect ([Hair et al., 2022](#)). Researchers distributed 320 questionnaires in Pekanbaru, Dumai, Bengkalis, Kampar, and Siak. A total of 268 were returned (83.75%); screening removed incomplete or anomalous cases, leaving 250 usable responses. Trade, service, and manufacturing firms were represented in the retained sample.

3.3. Data Collection Methods

Data were collected through a structured questionnaire administered online and in paper form. Each construct used a five-point agreement scale ranging from 1 (strongly disagree) to 5 (strongly agree). Before field administration, 30 SME owners or managers participated in a

pilot assessment of clarity and contextual relevance. Minor wording adjustments followed, and the preliminary reliability results met acceptable levels. Participation in this study was voluntary. Respondents were informed about the academic purpose of the research before completing the questionnaire. Confidentiality and anonymity were assured, and informed consent was obtained from all respondents prior to data collection.

3.4. Variables and Measurement

The study includes Digital Marketing Adoption (DMA) as the independent variable, Digital Literacy (DL) as the moderator, and Business Performance (BP) as the dependent variable. Business performance was operationalized as perceived business performance rather than audited financial performance. It captures managerial assessments of sales growth, customer growth, market expansion, profitability, and overall improvement. Perceptual measures are useful in SME surveys because standardized financial data are often unavailable, although the resulting estimates must be interpreted as managerial perceptions. All constructs used multiple indicators adapted from earlier studies and contextualized for SMEs in Riau Province.

3.5. Data Analysis Technique

SmartPLS 4 was used to estimate the PLS-SEM model. The method was selected because the study emphasizes prediction, includes latent variables and an interaction term, and does not require multivariate normality as strictly as covariance-based alternatives. Measurement quality was examined through indicator loadings, AVE, Cronbach's alpha, composite reliability, the Fornell–Larcker criterion, and HTMT (Hair et al., 2022; Henseler et al., 2015). The adopted benchmarks were 0.70 for loadings and reliability, 0.50 for AVE, and 0.90 for HTMT.

Structural assessment covered VIF, standardized paths, R^2 , f^2 , Q^2 , and the interaction coefficient. Significance was evaluated through 5,000 bootstrap resamples, two-tailed tests, and 95% confidence intervals. The interaction between digital marketing adoption and digital literacy was estimated with the product-indicator procedure for reflective constructs. A significant positive coefficient indicates that the effect of adoption on performance becomes stronger as digital literacy increases.

The structural model estimated in this study can be expressed as follows:

$$BP = \beta_0 + \beta_1 DMA + \beta_2 DL + \beta_3 (DMA \times DL) + \varepsilon$$

where BP represents business performance, DMA represents digital marketing adoption, DL represents digital literacy, and $DMA \times DL$ represents the interaction effect between digital marketing adoption and digital literacy. A positive and significant value of β_3 indicates that digital literacy strengthens the relationship between digital marketing adoption and business performance. Because responses for all variables came from a single informant, procedural and statistical precautions were applied. Anonymity, neutral wording, and separation of construct sections reduced evaluation pressure. Harman's single-factor diagnostic yielded a first-factor share below 50%, providing no indication of a dominant common-method factor.

3.6. Moderation Analysis Procedure

SmartPLS generated the latent interaction term and its bootstrap confidence interval. Interpretation considered the coefficient, significance, effect size, and predicted slopes at relatively low and high digital-literacy levels rather than relying on the p-value alone. The operational definitions, indicator codes, sources, and adaptation decisions are consolidated in Table 1.

Table 1. Construct Measurement and Sources

Construct	Code	Measurement Item	Source	Adaptation Note
Digital Marketing Adoption	DMA1	Our business actively uses digital platforms to promote products or services.	Ainin et al. (2015); Nguyen et al. (2023)	Adapted to SME context in Riau
Digital Marketing Adoption	DMA2	Our business uses digital channels to communicate with customers regularly.	Alford and Page (2015)	Wording simplified
Digital Marketing Adoption	DMA3	Our business uses social media, e-commerce, or other online platforms to support marketing activities.	Chaffey and Ellis-Chadwick (2022); Nguyen et al. (2023)	Adapted to digital marketing practices among SMEs
Digital Literacy DL1		I am able to use digital tools needed for business activities.	van Laar et al. (2017)	Adapted to managerial setting
Digital Literacy DL2		I can evaluate online information before using it for business decisions.	OECD (2023)	Contextualized for SME decisions
Digital Literacy DL3		I can use digital platforms effectively to support business communication, promotion, and decision-making.	Khin and Ho (2019); UNDP (2023)	Adapted to SME digital capability context
Business Performance	BP1	Our sales performance has improved in recent periods.	Matarazzo et al. (2021)	Subjective SME performance
Business Performance	BP2	Our customer base has increased.	Nguyen et al. (2023)	Adapted wording
Business Performance	BP3	Our overall business performance has improved compared with previous periods.	Matarazzo et al. (2021); Nguyen et al. (2023)	Adapted to perceived performance measurement

4. Result and Discussion

4.1 Respondent Profile

The final dataset comprised 250 SME owners and managers. Trade represented 45.2% of participating firms, services 30.0%, and manufacturing 24.8%. Many firms had operated for more than five years, indicating that the sample included a substantial proportion of established businesses. Men accounted for 56.4% of respondents and women for 43.6%. The largest age group was 31–45 years, and many respondents held diploma or undergraduate

qualifications. Instagram, Facebook, and WhatsApp Business were the most frequently used marketing channels, followed by marketplaces and other e-commerce services.

A majority of firms (62.0%) had used digital marketing for more than two years. Participants came from Pekanbaru, Dumai, Kampar, Bengkalis, and Siak. Table 2 provides the complete distribution of respondent and enterprise characteristics.

Table 2. Respondent Characteristics

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	141	56.4
	Female	109	43.6
Age	≤ 30 years	58	23.2
	31–45 years	127	50.8
	> 45 years	65	26.0
Education	High school	74	29.6
	Diploma/Bachelor	152	60.8
	Postgraduate	24	9.6
Business Sector	Trade	113	45.2
	Services	75	30.0
	Manufacturing	62	24.8
Years in Operation	< 3 years	47	18.8
	3–5 years	69	27.6
	> 5 years	134	53.6
Duration of Digital Marketing Use	< 1 year	38	15.2
	1–2 years	57	22.8
	> 2 years	155	62.0
Main Digital Platform Used	Social Media	132	52.8
	E-commerce/Marketplace	78	31.2
	Websites/Other Platforms	40	16.0

4.2 Measurement Model Evaluation

The measurement model was examined before hypothesis testing. Indicator reliability and convergent validity were evaluated first, followed by internal consistency and discriminant validity.

4.2.1 Convergent Validity

Every retained indicator loaded above 0.70. Table 3 reports the indicator-level results, while Table 4 shows that each construct also exceeded the AVE threshold of 0.50; together these results support convergent validity.

Table 3. Convergent Validity (Outer Loadings)

Construct	Indicator	Outer Loading
DMA	DMA1	0.812
	DMA2	0.845

Construct	Indicator	Outer Loading
DL	DMA3	0.879
	DL1	0.801
	DL2	0.833
	DL3	0.856
BP	BP1	0.825
	BP2	0.847
	BP3	0.871

Table 4. Average Variance Extracted (AVE)

Construct	AVE
Digital Marketing Adoption (DMA)	0.702
Digital Literacy (DL)	0.689
Business Performance (BP)	0.721

4.2.2 Reliability Analysis

Cronbach's alpha and composite reliability were used to assess internal consistency. As summarized in Table 5, all coefficients were greater than 0.70, indicating satisfactory reliability.

Table 5. Reliability Results

Construct	Cronbach's Alpha	Composite Reliability
DMA	0.843	0.899
DL	0.822	0.887
BP	0.856	0.910

4.2.3 Discriminant Validity

Discriminant validity was examined with two complementary criteria. Table 6 presents the Fornell–Larcker matrix, and Table 7 reports HTMT values. The square roots of AVE exceeded the relevant correlations and every HTMT coefficient remained below 0.90 ([Henseler et al., 2015](#)).

Table 6. Fornell-Larcker Criterion

Construct	DMA	DL	BP
DMA	0.838		
DL	0.734	0.830	
BP	0.781	0.826	0.849

Table 7. HTMT Ratio

Construct	DMA	DL	BP
DMA	–	0.842	0.871
DL	0.842	–	0.883
BP	0.871	0.883	–

After confirming the adequacy of the measurement model, the structural model was evaluated to test the proposed hypotheses and examine the moderating effect of digital literacy.

4.3 Structural Model Evaluation

The structural model estimated in this study can be expressed as follows:

$$BP = \beta_0 + \beta_1 DMA + \beta_2 DL + \beta_3 (DMA \times DL) + \varepsilon$$

where BP represents perceived business performance, DMA represents digital marketing adoption, DL represents digital literacy, $DMA \times DL$ represents the interaction effect between digital marketing adoption and digital literacy, β_0 is the constant term, β_1 – β_3 are the estimated path coefficients, and ε is the error term. A positive and significant β_3 indicates that digital literacy strengthens the relationship between digital marketing adoption and perceived business performance.

4.3.1 Collinearity Assessment

The VIF values presented in Table 8 are all below 5.00. The structural estimates are therefore not materially distorted by predictor collinearity.

Table 8. Collinearity Statistics (VIF)

Relationship	VIF
DMA → BP	2.114
DL → BP	2.287
DMA × DL → BP	1.93

4.3.2 Coefficient of Determination (R²)

As reported in Table 9, the model produced $R^2 = 0.612$ for perceived business performance. Thus, adoption, literacy, and their interaction jointly explain 61.2% of its observed variance.

Table 9. R-Square

Dependent Variable	R ²
Business Performance (BP)	0.612

4.3.3 Hypothesis Testing

Bootstrapping was used to evaluate the three hypotheses. Table 10 summarizes the standardized coefficients, test statistics, probability values, and decisions.

Table 10. Path Coefficients

Hypothesis	Relationship	Coefficient (β)	t-Statistic	p-Value	Result
H1	DMA → BP	0.381	5.842	<0.001	Supported
H2	DL → BP	0.429	6.213	<0.001	Supported
H3	DMA × DL → BP	0.215	3.774	<0.001	Supported

All three effects were positive and statistically significant. Table 11 adds the corresponding 95% bootstrap confidence intervals, none of which crosses zero.

Table 11. Path Coefficients and Bootstrapped Confidence Intervals

Hypothesis	Relationship	Coefficient (β)	t-Statistic	p-Value	95% CI LL	95% CI UL	Result
H1	DMA $\rightarrow$ BP	0.381	5.842	< 0.001	0.253	0.509	Supported
H2	DL $\rightarrow$ BP	0.429	6.213	< 0.001	0.294	0.562	Supported
H3	DMA $\times$ DL $\rightarrow$ BP	0.215	3.774	< 0.001	0.103	0.327	Supported

The confidence intervals in Table 11 confirm the robustness of the direct effects and the interaction effect under bootstrap inference.

Effect sizes are reported in Table 12 for the two direct predictors and the moderating effect.

Table 12. Effect Size

Relationship	f^2	Interpretation
DMA $\rightarrow$ BP	0.182	Medium
DL $\rightarrow$ BP	0.221	Medium
Moderating Effect	0.095	Small

Using [Cohen's \(1988\)](#) conventions, adoption and literacy have medium effects, whereas the interaction effect is small ($f^2 = 0.095$). The moderation remains substantively relevant because it identifies a measurable capability contingency.

4.3.5 Predictive Relevance (Q^2)

The blindfolding result yielded $Q^2 = 0.421$. Because the statistic is above zero, the model demonstrates predictive relevance for perceived business performance.

4.4 Moderating Effect Analysis

Digital literacy significantly strengthened the adoption–performance relationship ($\beta = 0.215$, $t = 3.774$, $p < 0.001$). In practical terms, SMEs with stronger skills in platform use, information evaluation, and campaign alignment obtained larger reported performance benefits from digital marketing.

4.5 Interaction Plot and Simple Slope Interpretation

The interaction plot compares predicted performance at lower and higher levels of digital literacy. The slope for digital marketing adoption is steeper under high literacy, visually reinforcing the positive interaction coefficient. Simple-slope interpretation leads to the same conclusion. Adoption remains positively related to performance at lower literacy, but the association is weaker. At higher literacy, owners and managers appear better able to transform online activities into customer, market, and managerial benefits.

These patterns distinguish digital access from digital utilization. Marketing technologies supply channels and functions; digital literacy determines how accurately information is interpreted and how strategically those functions are deployed.

4.6 Summary of Findings

All hypotheses received empirical support. Digital marketing adoption and digital literacy each contributed directly to perceived performance, and literacy increased the strength of the

adoption effect. The results are consistent with an RBV explanation in which a technological resource produces greater value when paired with an enabling human capability.

4.7 Discussion

The results clarify how a technological resource and a managerial capability operate jointly in regional SMEs. Rather than treating platform adoption as self-executing, the evidence shows that digital literacy contributes both independently and conditionally to perceived performance.

The Effect of Digital Marketing Adoption on Perceived Business Performance

Support for H1 indicates that more extensive digital marketing adoption is associated with stronger perceived performance. Online channels can widen exposure, accelerate customer communication, and reduce dependence on geographically bounded promotion. Similar benefits are reported in studies of SME digitalization and social-media marketing ([Corral de Zubielqui & Jones, 2023](#); [Eller et al., 2020](#)). This result is also compatible with research showing that online marketing adoption depends on organizational preparedness ([Nguyen et al., 2023](#)) and that social-media value reflects how audience and content practices are combined ([Santos et al., 2022](#)). From an RBV perspective, the channels become strategic resources only when their use contributes to value creation.

The findings may also reflect the growing reliance of SMEs on digital channels following broader digital transformation trends in Indonesia. SMEs that have adopted digital marketing for longer periods may have accumulated greater experience in online promotion, customer interaction, and digital platform management. As indicated in the respondent profile, most SMEs had utilized digital marketing for more than two years, suggesting that continuous exposure to digital business practices may contribute to stronger perceived business outcomes over time. Firms with longer digital marketing experience are likely to develop better understanding of customer behavior, improve digital communication strategies, and optimize online business activities more effectively than newly adopting firms.

The Effect of Digital Literacy on Perceived Business Performance

H2 was also supported: owners and managers reporting stronger digital literacy reported better business performance. The capacity to evaluate online information, adapt to platform changes, and connect digital evidence with decisions can improve flexibility and market responsiveness. This interpretation is consistent with firm-level evidence on digital and technological capabilities ([Heredia et al., 2022](#); [Khin & Ho, 2019](#); [Teng et al., 2022](#)). It also aligns with institutional reports that emphasize applied digital skills and access to relevant learning opportunities ([UNDP, 2023](#); [World Bank, 2024](#)).

However, the positive relationship between digital literacy and perceived business performance should also be interpreted cautiously because the study relied on self-reported measures. SME owners or managers with higher confidence in their digital abilities may evaluate their business conditions more positively, potentially creating managerial optimism or self-enhancement bias. Consequently, the findings should be interpreted as evidence of perceived performance improvement rather than objective financial performance gains.

The Moderating Role of Digital Literacy

The interaction result is the study's central contribution. The positive coefficient shows that identical levels of digital marketing adoption do not generate identical returns: reported performance improves more sharply when firms possess stronger digital literacy. This finding refines the RBV argument by separating resource possession from resource deployment. Digital platforms may be widely accessible, but their use becomes harder to imitate when embedded in firm-specific knowledge, analytical routines, customer insight, and coordinated execution.

The interaction effect is statistically reliable but modest ($f^2 = 0.095$). Digital literacy is therefore one complementary capability rather than a complete explanation of SME performance. Innovation capability, finance, infrastructure, experience, and competitive conditions may also shape the returns from digital adoption. Sector composition may partly explain the modest effect. Trade and service businesses depend directly on customer communication and transactions, whereas manufacturing performance also reflects production, logistics, and supply-chain capabilities. Pooling these sectors can attenuate a common interaction estimate.

Causal interpretation remains limited by the cross-sectional design. Better-performing firms may have more resources to invest in both marketing technology and employee capability, producing potential reverse causality. Longitudinal evidence is required to establish how these relationships develop over time.

5. Conclusion and Implications

The study concludes that digital marketing adoption and digital literacy are both positively associated with perceived SME performance in Riau Province. Literacy also strengthens the contribution of adoption, supporting all three hypotheses. Digital channels therefore offer greater value when owners and managers can evaluate information, manage platforms, and align online activity with commercial objectives. The results extend the Resource-Based View by identifying digital literacy as an enabling capability and boundary condition. SMEs should combine spending on channels with continued development of content, customer-communication, analytical, security, and evaluation skills. Support institutions should similarly integrate platform access with applied capability development.

For SME practitioners, adoption decisions should be accompanied by routines for content planning, customer-response management, data interpretation, and campaign evaluation. These routines help convert platform activity into operational and market learning. For policymakers, digitalization support should extend beyond account creation or platform onboarding. Training should address marketplace management, communication, analytics, cybersecurity, and performance measurement, with delivery adapted to differences in infrastructure and readiness across Riau. Universities, associations, agencies, and platform providers can jointly deliver practice-based capacity building. Coordinated programs may reduce fragmented training and help SMEs connect technical instruction with actual business decisions.

6. Limitations and Future Research

The cross-sectional, purposive, single-informant design and reliance on perceived performance limit causal inference and generalizability. Future studies should use

longitudinal or time-lagged observations, probability-based multi-region samples, multiple informants, and objective outcomes such as transaction, sales, profitability, or customer-acquisition data. Comparative and mixed-method research could examine sector and location differences, while expanded models should test innovation capability, entrepreneurial orientation, financial capacity, competitive intensity, and infrastructure as additional boundary conditions.

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Declaration of AI and AI-assisted technologies in the writing process

The authors used generative artificial intelligence solely for language refinement and editorial assistance. All theoretical arguments, methods, analyses, results, interpretations, citations, and final wording were reviewed and approved by the authors, who retain full responsibility for the manuscript.

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