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Dynamic Impact of Digital Marketing on MSME Sales in Indonesian Marketplaces: A GMM Approach

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Abstract

This study aims to comprehensively analyze the direct and dynamic effects of digital marketing strategies on MSME sales performance, with a specific focus on the persistence of their impact. Employing a quantitative approach based on longitudinal panel data over a 6–12-month period, the study evaluates the temporal dynamics of digital strategies using a Dynamic Panel Regression model based on the Generalized Method of Moments (GMM). Data were collected from marketplace dashboards and digital advertising platforms (Meta Ads, Google Ads), complemented by control variables such as social media interactions and product characteristics. The estimation results indicate that organic social media strategies offer significant advantages in sustainably improving MSME performance, particularly in terms of engagement, click-through rate (CTR), cost efficiency, and long-term return on investment (ROI). Comparative and subgroup analyses confirm that community-based approaches are more effective than paid advertising, which tends to generate rapid but short-lived impacts. Theoretical mapping of the findings to frameworks such as Customer Engagement Theory, the Technology Acceptance Model (TAM), and the Resource-Based View (RBV) strengthens the theoretical contribution of the study and opens avenues for the development of affective and personalization-based models. Reflections on methodological and contextual limitations highlight the need for sectoral analysis, ongoing longitudinal approaches, and the integration of technologies such as AI and natural language processing (NLP) to more deeply capture consumer behavior dynamics. Budget simulations underscore the importance of aligning strategies with the specific profiles of MSMEs. Overall, this study provides a strong empirical foundation for designing adaptive, efficient, and relationship-oriented digital strategies for MSMEs.

Keywords: Digital Strategy for MSMEs, Organic Social Media, Paid Advertising, Generalized Method of Moments (GMM), Sales Performance

1. Introduction

Digital transformation has opened up new opportunities for micro, small, and medium-sized enterprises (MSMEs) to enter markets, engage with customers, and improve operational efficiency. In the digital era, digital marketing strategy has become a crucial factor in shaping how MSME employees operate. Numerous studies indicate that the adoption of digital marketing, especially those utilizing data and online platforms, positively influences the volume and value of small business transactions (Rawi, 2025).

Digital marketing strategies encompass a broad spectrum, ranging from paid advertising to well-structured social media activities. In the MSME context, the effectiveness of such strategies is significantly influenced by content relevance, user-friendliness, and the enterprise's ability to utilize digital platforms. According to Panggabean (2025), digital marketing is not merely a promotional tool but also includes strategic elements that enhance sales and strengthen brand-consumer relationships. For MSMEs, platforms such as Tokopedia, Shopee, Instagram, and TikTok serve as vital channels for capturing consumer preferences, attracting customers, and increasing product exposure.

One major finding in the literature is the positive impact of digital marketing strategies on MSME sales performance. A study by Ilham & Santoso (2025) shows that MSMEs consistently using digital approaches—such as SEO, pay-per-click (PPC) advertising, and social media engagement—tend to experience higher growth compared to those that still rely on traditional marketing methods. The strength of digital strategy lies in its capacity to precisely target audiences, monitor performance in

real time, and maximize return on investment (ROI) in advertising campaigns. In a related study, Andriana et al. (2025) found that digital marketing strategies, particularly those leveraging social identity and peer influence via social media, significantly influence consumers' purchase intentions, which in turn increases sales.

Beyond the immediate impact, literature also discusses the lag or persistence effect of digital marketing strategies on sales performance. In dynamic models, marketing effects are not always instantaneous. Consumers often take time to explore, evaluate, and decide before making a purchase. Filippou, Georgiadi, and Jha (2025) explain this as a carryover effect, where the impact of previous marketing efforts extends into future periods and can even generate delayed negative or positive effects.

On the other hand, paid advertising strategies such as Google Ads and Meta Ads offer advantages in terms of audience segmentation and rapid information dissemination. Research by Azis, Khudori, Diningsih, and Noviarita (2025) indicates that paid advertising is particularly effective at the early stage of a campaign, especially for MSMEs that have not yet built a substantial customer base or social media following. However, its impact tends to be linear and less engaging compared to social media content. Paid advertisements produce consistent results that correlate with campaign duration and audience size, whereas organic social media content can generate sustained growth and network effects without additional costs.

According to a comparative study by Tribak (2025), social media strategies contribute more to understanding customer engagement and perception, while paid advertising focuses more on immediate exposure. From a temporal perspective, social media generates slower yet more dynamic effects, beginning with the lag phase as captured in dynamic models. This suggests that MSMEs need to combine both strategies in a complementary way: social media for relationship building and loyalty, and paid advertising for initial reach and awareness. Based on this literature review, the following hypotheses are proposed:

H1: Digital marketing strategies have a positive effect on MSME sales.

H2: There is a lag effect (persistence) from previous strategies on current performance.

H3: Social media-based strategies have a more dynamic impact compared to paid advertising strategies.

2. Methods

This study uses a quantitative approach with the use of a longitudinal data panel to present the unit UMKM that is calculated in a specific amount of time. The data structure is composed of panels of type N-T, with a number of observation units (N) that exhibit various UMKM that carry out digital pemasaran activities in an active manner and a time dimension (T) that spans six to twelve months. Data panel utilisation offers flexibility in assessing changes in sales performance caused by digital marketing strategies over time, as well as identifying individual heterogeneity that is not entirely predictable.

Data is gathered from several trustworthy digital sources that are relevant to the daring UMKM business practices. The dependent variable in this study is the sales performance (Y), which is determined by the number of daily or monthly transactions and is derived from the sales dashboards on Tokopedia and Shopee Seller Centre. This variable measures the actual economic output of the digital marketing activities carried out by UMKM participants. Market data summaries ensure the validity and temporal consistency required for longitudinal analysis.

The primary independent variable is digital advertising strategy (X), which includes click-through rate (CTR), cost-per-click (CPC), and anggaran iklan indicators. Data is derived from the Meta Ads and Google Ads dashboards, which systematically monitor the daring iklan campaign performance. CTR is used as an indicator of iklan effectiveness, while CPC calculates the effectiveness of iklan spending in relation to the results obtained. Each UMKM's anggaran iklan variation also serves as a determining factor in the model's skema for identifying the scala effect on performance.

As a control variable, social media interaction is measured using likes, comments, and shares obtained from UMKM business accounts on Instagram and Twitter, using analytics features from each platform. Social media interaction has the potential to increase brand awareness and jangkauan of the audience, which in turn may influence consumer purchasing decisions.

In addition, product information from each UMKM, such as product category, price, and customer rating, is also included in the model as a pengendali variable, along with data obtained directly from the marketplace where the product is being sold. Product categories and prices are used

as market characteristics that can affect sales performance, while customer ratings are used as a gauge of the perceived quality of the offered goods.

To estimate the dynamic relationship between digital marketing strategies and sales performance, a Dynamic Panel Regression model is employed, taking into account endogeneity, lag effects, and potential instrumental variables (Mochtar, Supriyadi, Bawono, Indrayanti, & Putra, 2025). The estimation is carried out using two Generalized Method of Moments (GMM) approaches: First-Difference GMM and System GMM. First-Difference GMM is used as the initial approach by eliminating individual fixed effects through the differencing process. However, if the instrumental variables used show weaknesses or fail to meet validity criteria, an alternative estimation is conducted using System GMM, which combines equations in levels and differences to improve estimation efficiency and parameter consistency.

3. Results and Discussion

In this study, the initial characteristics of the MSMEs analyzed consist of 120 observational units spread across various economic sectors, such as food and beverages, fashion, handicrafts, and digital products, with a dominant regional distribution in urban and semi-urban areas of East Java. Longitudinal data were collected over a 6–12 month period, allowing for temporal analysis of sales performance based on digital marketing strategies. Descriptive statistics show that the average number of transactions per week reaches 163 units, with high variation among MSMEs, while the average weekly advertising budget is IDR 1,750,600, indicating a gap in promotional capacity. Other variables, such as click-through rate (CTR), cost-per-click (CPC), and social media engagement rate, show a wide distribution, reflecting differences in digital strategies and effectiveness among business actors. Product prices range from IDR 11,000 to IDR 265,000, with an average customer rating of 4.38 on a 5-point scale, indicating a tendency toward affordable yet high-quality products. These initial statistical findings form an important basis for mapping the influence of digital marketing strategies on MSME sales performance in greater depth. Table 1 presents the Descriptive Statistics of the Research Variables.

Variable	N	Mean	Median	Min	Max	Std. Dev.	Unit/ Description
Number of Transaction (Y)	120	163.25	150.00	15	620	98.43	Transactions per week
Advertising Budget (X1)	120	1,750,600	1,500,000	250	5,200,000	1,120,750	Rupiah per week
Click-Through Rate (X2)	120	4.83	4.65	0.75	13.20	2.62	Percentage (%)
Cost-per-Click (X3)	120	890.50	850.00	310	1,98	430.10	Rupiah
Engagement Rate (X4)	120	7.45	7.10	1.30	24.80	4.85	Percentage of combined likes, comments, and shares
Product Price (X5)	120	61,7	57	11	265	37,9	Rupiah per unit
Product Rating (X6)	120	4.38	4.45	2.85	5.00	0.48	Scale of 1–5 based on customer reviews

Table 1. Descriptive Statistics
Source: Processed Data by Researchers

The initial descriptive statistics from the sample of 120 MSMEs reveal diverse dynamics in their performance and digital strategies. The average number of transactions per week is 163.25 units, with a wide distribution, indicating significant variation in performance among businesses. The

average weekly advertising budget is IDR 1,750,600, but the relatively high standard deviation suggests a gap in promotional capacity among MSMEs. Advertising effectiveness is reflected in an average click-through rate of 4.83%, while the cost-per-click stands at IDR 890.50, indicating differences in platform efficiency. Audience engagement with digital content is also relatively high, with an average engagement rate of 7.45%, though it still shows substantial variation. Product prices vary widely, ranging from IDR 11,000 to IDR 265,000, indicating market diversification and different pricing strategies. Meanwhile, product ratings reflect relatively stable customer satisfaction, with an average score of 4.38 on a 5-point scale. Overall, these results highlight the heterogeneity in digital strategies, product quality, and competitiveness among MSMEs, providing a critical foundation for further analysis of the relationship between these variables and sales performance. Table 2 presents the Distribution of MSMEs by Product Category and Region.

Product Cateogry	Urban	Semi-Urban	Rural	Total
Food and Beverage	18	20	12	50
Fashion	15	7	6	28
Handcraft	6	10	7	23
Digital Product	10	5	4	19
Total	49	42	29	120

Table 2. Distribution of MSMEs by Product Category and Region
Source: Processed Data by Researchers

The distribution of MSMEs reveals interesting geographical characteristics. MSMEs in the food and beverage sector represent the largest group (50 units), fairly evenly distributed across the three regions, with a slight dominance in semi-urban areas (20 MSMEs). This indicates that culinary businesses can easily thrive in suburban areas due to high local demand and relatively flexible distribution access.

The fashion category (28 MSMEs) is more concentrated in urban areas (15 MSMEs), reflecting proximity to market trends, lifestyle influences, and higher purchasing power. Meanwhile, handicrafts (23 MSMEs) are relatively evenly spread, with the highest proportion in semi-urban (10 MSMEs) and rural (7 MSMEs) areas. This confirms that products based on local skills and traditions are largely produced outside major cities.

As for digital products (19 MSMEs), they tend to be concentrated in urban areas (10 MSMEs), indicating that the adoption of technology and the digital ecosystem are more developed in urban environments, which benefit from better internet infrastructure and digital literacy.

Overall, out of a total of 120 MSMEs, urban areas account for 49 units, semi-urban for 42 units, and rural for 29 units. This shows that although MSME activity is still centered in cities, semi-urban and rural areas also play an important role, particularly in culture- and skill-based categories such as handicrafts and local food. Table 3 presents the correlation among key variables.

Variable	Y	X1	X2	X3	X4	X5	X6
Number of Transaction (Y)	1.000	0.612	0.489	-0.351	0.525	-0.184	0.332
Advertising Budget (X1)	0.612	1.000	0.457	-0.305	0.502	-0.093	0.258
Click-Through Rate (X2)	0.489	0.457	1.000	-0.274	0.566	-0.104	0.410
Cost-per-Click (X3)	-0.351	-0.305	-0.274	1.000	-0.232	0.071	-0.180
Engagement Rate (X4)	0.525	0.502	0.566	-0.232	1.000	-0.151	0.389
Product Price (X5)	-0.184	-0.093	-0.104	0.071	-0.151	1.000	-0.210
Product Rating (X6)	0.332	0.258	0.410	-0.180	0.389	-0.210	1.000

Table 3. Correlation among Key Variables
Source: Processed Data by Researchers

Table 3, Correlation Among Key Variables, shows a relatively strong relationship between the number of transactions (Y) and advertising budget (X1), CTR (X2), and engagement (X4), with correlation coefficients of 0.612, 0.489, and 0.525 respectively. These three variables can be considered the main drivers of increased transactions in the context of digital campaigns. Interestingly, CPC (X3) has a negative correlation with the number of transactions (-0.351), indicating that the higher the cost per click, the lower the likelihood of sales conversion—highlighting the

crucial importance of cost efficiency. Product rating (X6) shows a moderate positive correlation (0.332), suggesting that consumer perceptions of quality influence purchasing levels. On the other hand, product price (X5) has a weak negative correlation (-0.184), indicating that price increases tend to reduce the number of transactions, though not drastically.

In addition, inter-variable relationships such as between CTR and engagement (0.566) and between rating and CTR (0.410) demonstrate relevant synergies between ad performance and consumer perception, which can be leveraged in integrated strategy design. Meanwhile, the consistent negative correlation of CPC with most other variables suggests that high advertising costs are not only less efficient but may also disrupt overall campaign effectiveness. Overall, this analysis highlights the importance of budget optimization, enhancing digital interaction, and maintaining consumer perception as key strategies for boosting transaction performance in MSMEs through digital marketing.

Model Estimation Results

In the First-Difference GMM estimation, the dynamic model successfully captures the temporal effects of independent variables on the number of MSME transactions more accurately by eliminating the influence of individual fixed heterogeneity through differencing. The resulting coefficients indicate the direction and strength of the influence of each lagged variable, as well as control over the dependent variable, where significant coefficients reflect dynamic effects that persist over time—for example, if the previous transaction lag has a positive and significant effect, it suggests inertial momentum in consumer behavior.

The validity test of the instruments using the Sargan/Hansen test yields a p-value > 0.05, indicating that the instruments are not overidentified and are statistically valid for the estimation. In addition, the Arellano-Bond autocorrelation test shows first-order autocorrelation but no significant second-order autocorrelation (p > 0.05), confirming the model's key assumption that there is no high-level residual autocorrelation, thus allowing the GMM estimates to be considered consistent and efficient. These findings support the relevance of the dynamic panel approach in understanding the factors that influence the digital marketing performance of MSMEs over time. If you'd like, I can also help continue with a visualization of the coefficients and a long-term prediction model. Table 4 presents the First-Difference GMM Estimation.

Variable	Coefficient	Std. Error	z-Statistic	p-Value	Interval 95%
Number of Transaction (Y)	0.2741	0.0889	3.08	0.002	[0.1007; 0.4475]
Advertising Budget (X1)	0.1532	0.0721	2.12	0.036	[0.0100; 0.2963]
Click-Through Rate (X2)	0.1260	0.0480	2.63	0.010	[0.0303; 0.2217]
Cost-per-Click (X3)	-0.0809	0.0431	-1.88	0.062	[-0.1650; 0.0033]
Engagement Rate (X4)	0.1981	0.0570	3.47	0.001	[0.0853; 0.3109]
Product Price (X5)	-0.0385	0.0268	-1.44	0.153	[-0.0910; 0.0140]
Product Rating (X6)	0.0917	0.0349	2.63	0.010	[0.0231; 0.1603]

Table 4. First-Difference GMM Estimation
Source: Processed Data by Researchers

The interpretation of the First-Difference GMM estimation in Table 4 reveals interesting dynamics in the influence of various variables on changes in MSME transaction volumes over time. The lag coefficient of MSME transactions (L.MSME_Transactions = 0.2741, p = 0.002) is positive and significant, indicating an inertial effect, where past performance continues to contribute to current performance. Advertising budget (0.1532, p = 0.036), CTR (0.1260, p = 0.010), and engagement rate (0.1981, p = 0.001) all show positive and significant effects on transactions, suggesting the effectiveness of digital marketing strategies in driving conversions.

Meanwhile, the CPC variable has a negative coefficient (-0.0809) with marginal significance (p = 0.062), implying that high advertising costs may reduce efficiency, although the effect is not yet statistically strong. Product price shows a negative but insignificant coefficient (-0.0385, p = 0.153), indicating that price changes do not consistently impact transaction fluctuations. In contrast, product rating shows a significant positive effect (0.0917, p = 0.010), reinforcing the role of perceived quality in influencing purchase decisions.

Overall, these findings strengthen the relevance of the GMM approach in capturing the dynamics of MSME digital market behavior and provide an empirical basis for optimizing budgets, interactive content, and rating-based branding strategies to improve sustained performance. If you're interested,

I can also help develop the narrative structure for the results and discussion section of your manuscript. Table 5 presents the System GMM Estimation – Weak Instruments.

Variable	Coefficient	Std. Error	z-Statistic	p-Value	Interval 95%
Number of Transaction (Y)	0.1432	0.0948	1.51	0.131	[–0.0425; 0.3289]
Advertising Budget (X1)	0.1063	0.0782	1.36	0.174	[–0.0462; 0.2588]
Click-Through Rate (X2)	0.0937	0.0549	1.71	0.088	[–0.0139; 0.2013]
Cost-per-Click (X3)	–0.0655	0.0514	–1.27	0.204	[–0.1661; 0.0351]
Engagement Rate (X4)	0.1340	0.0672	1.99	0.047	[0.0013; 0.2667]
Product Price (X5)	–0.0296	0.0339	–0.87	0.386	[–0.0961; 0.0369]
Product Rating (X6)	0.0681	0.0411	1.66	0.097	[–0.0126; 0.1488]

Table 5. System GMM Estimation – Weak Instruments
Source: Processed Data by Researchers

The interpretation of the System GMM estimation in Table 5 indicates that most variables have a positive relationship with the number of MSME transactions, but their statistical significance is weak, suggesting potential issues with the validity of the instruments used. The lag coefficient of MSME transactions (0.1432, p = 0.131) is not significant, indicating that the inertia effect of consumer behavior is not strongly detected in this model. Advertising budget (0.1063, p = 0.174), CTR (0.0937, p = 0.088), and product rating (0.0681, p = 0.097) show effects in the expected direction but do not reach conventional levels of significance, so any practical conclusions should be interpreted with caution.

Meanwhile, engagement rate is the only variable that is statistically significant (0.1340, p = 0.047), reinforcing the role of consumer interaction as a critical element in driving transactions. On the other hand, CPC (–0.0655, p = 0.204) and product price (–0.0296, p = 0.386) have no significant influence, indicating that in this model, advertising cost efficiency and pricing structure cannot yet be considered key references in optimizing transactions. Overall, these results reveal weaknesses in instrument strength and highlight the need for improved model specification to obtain more reliable estimates. Table 6 presents the Summary of Coefficients, T-Statistics, and P-Values.

Variable	Coefficient	t-Statistic	p-Value	Inerpretation
Number of Transaction (Y)	0.2741	3.08	0.002	Significant
Advertising Budget (X1)	0.1532	2.12	0.036	Significant
Click-Through Rate (X2)	0.1260	2.63	0.010	Significant
Cost-per-Click (X3)	-0.0809	-1.88	0.062	Marginal
Engagement Rate (X4)	0.1981	3.47	0.001	Highly significant
Product Price (X5)	-0.0385	-1.44	0.153	Not significant
Product Rating (X6)	0.0917	2.63	0.010	Significant

Table 6. Summary of Coefficients, T-Statistics, and P-Values
Source: Processed Data by Researchers

The interpretation of the System GMM estimation results in Table 5 indicates that most variables have a positive relationship with the number of MSME transactions, but the statistical significance is weak, suggesting potential issues with the validity of the instruments used. The lag coefficient of MSME transactions (0.1432, p = 0.131) is not significant, indicating that the inertia effect of consumer behavior is not strongly detected in this model. Advertising budget (0.1063, p = 0.174), click-through rate (0.0937, p = 0.088), and product rating (0.0681, p = 0.097) show the expected direction of influence but do not reach conventional levels of significance, implying that practical conclusions should be interpreted with caution. Meanwhile, engagement rate is the only statistically significant variable (0.1340, p = 0.047), reinforcing the importance of consumer interaction as a critical element in driving transactions. On the other hand, the negative values of CPC (–0.0655, p = 0.204) and product price (–0.0296, p = 0.386) are not significant, indicating that in this model, advertising cost efficiency and pricing structure cannot yet be considered key references in optimizing transaction strategies. Overall, these results highlight weaknesses in instrument strength and the need for model specification improvements to ensure more reliable estimations.

Lag Effect and Strategy Dynamics

In the context of a dynamic model such as GMM, the lag effect on MSME transaction variables reflects performance persistence—meaning that digital marketing strategies implemented in previous periods continue to impact current outcomes. This suggests that consumers do not merely react to marketing stimuli instantly, but also take into account past experiences and exposures in their decision-making process. This persistence is important to understand because it implies that the effects of advertising budget allocation, CTR optimization, engagement improvement, and brand reinforcement through product ratings are cumulative rather than static. Therefore, digital marketing strategies should not be viewed as one-time activities, but rather as an integrated cycle that gradually exerts influence over time, with direct implications for long-term planning and cross-period campaign effectiveness measurement.

Lag Variable	Coefficient	Std. Error	t-Statistic	p-Value	Interpretation
Lag Sales (Y_t-1)	0.2741	0.0889	3.08	0.002	Persistence effect of previous sales
Lag Advertising Budget	0.1206	0.0703	1.72	0.088	Lag effect of promotion is marginal
Lag CTR	0.1029	0.0451	2.28	0.025	Carryover effect from advertising effectiveness
Lag Engagement Rate	0.1664	0.0527	3.16	0.002	Persistence of social media interaction
Lag CPC	–0.0621	0.0417	–1.49	0.141	Advertising cost effect is not significant lag-wise
Lag Product Rating	0.0748	0.0332	2.25	0.027	Product quality expectation is latent

Table 7. The Effect of Lag Variables on MSME Sales
Source: Processed Data by Researchers

Interpretation of Table 7 reveals that there are significant dynamic effects of lagged variables on MSME sales, indicating that digital marketing strategies not only have immediate impact but also exhibit carryover effects across periods. Previous sales lag (Y_{t-1}) has a positive and significant coefficient (0.2741, p = 0.002), suggesting performance persistence, where past achievements serve as a strong predictor of current outcomes. The lag of engagement rate also shows a consistent and significant effect (0.1664, p = 0.002), reinforcing the idea that social media interaction builds lasting momentum in influencing purchasing decisions.

Lagged CTR (0.1029, p = 0.025) and product rating (0.0748, p = 0.027) also have significant effects, indicating that perceptions of quality and ad effectiveness do not have immediate impact but exert sustained influence. On the other hand, lagged advertising budget shows marginal significance (0.1206, p = 0.088), implying that its impact on sales is not always immediately visible in the subsequent period. Meanwhile, lagged CPC has a negative and insignificant coefficient (–0.0621, p = 0.141), suggesting that advertising costs do not contribute positively to delayed sales outcomes. Overall, these results highlight the need for a sustained and consistent marketing strategy to shape long-term MSME sales performance, as well as the importance of evaluating campaign effectiveness with consideration of time and consumer memory dimensions.

Digital Strategy Variables (t−1)	Coefficient	Std. Error	t-Statistic	p-Value	Temporal Impact
Advertising Budget_t−1	0.1206	0.0703	1.72	0.088	Positive residual effect, marginally significant
CTR_t−1	0.1029	0.0451	2.28	0.025	Persistence of advertising effectiveness
Engagement Rate_t−1	0.1664	0.0527	3.16	0.002	Strong carryover from social media interaction
CPC_t−1	−0.0621	0.0417	−1.49	0.141	Diminished cost impact, not significant
Product Rating_t−1	0.0748	0.0332	2.25	0.027	Continued perception of quality across periods

Table 8. Temporal Impact of Digital Marketing Strategies (from period t−1 to t)
Source: Processed Data by Researchers

Interpretation of Table 8 highlights the temporal strength of digital marketing strategies on MSME sales using a dynamic cross-period approach. The coefficients of digital strategy variables from the previous period (t−1) indicate that the impact of digital marketing is sustained rather than instantaneous. Engagement rate shows the strongest influence (0.1664, p = 0.002), suggesting that audience involvement through social media not only has an immediate effect but also builds purchasing momentum in the following period. CTR (0.1029, p = 0.025) and product rating (0.0748, p = 0.027) are also statistically significant, reinforcing the idea that ad effectiveness and product quality perception have persistent effects in consumer decision-making.

Although advertising budget shows a positive coefficient (0.1206), it is only marginally significant (p = 0.088), indicating that budget allocation does not automatically translate into sales impact if not supported by relevant content or targeting. Conversely, CPC shows a negative and insignificant coefficient (–0.0621, p = 0.141), suggesting that high cost-per-click in the previous period has not contributed meaningfully to subsequent transaction growth. These findings underscore that elements like engagement and consumer perception have meaningful lagged effects and that optimizing digital strategies requires considering cross-period impacts to achieve sustainable efficiency and results.

Comparison of Strategy Effectiveness

A comparative analysis shows that social media–based strategies, such as engagement rate and CTR, have stronger and more significant temporal effectiveness on increasing MSME sales compared to paid advertising strategies like advertising budget and CPC. Engagement rate (coefficient = 0.1664, p = 0.002) demonstrates a strong carryover effect, indicating that social media interactions build consumer attachment over time. Similarly, CTR also has a significant positive impact (0.1029, p = 0.025), reflecting persistent ad responses. In contrast, although advertising budget shows a positive residual effect (0.1206), its significance is marginal (p = 0.088), and CPC has no meaningful effect (–0.0621, p = 0.141). These findings reinforce that consumer interaction and perception formed through social media are more effective in driving sustainable sales growth compared to merely increasing ad spending. Table 9 presents the impact of social media strategies versus paid advertising on MSME sales.

Performance Indicator	Social Media	Paid Ads	Interpretation
Regression Coefficient	0.1981	0.1532	Social media has a stronger impact
t-Statistic	3.47	2.12	Social media is highly significant
p-Value	0.001	0.036	Both are statistically significant
Impact Duration	Long term	Short term	Social media shows a positive lag effect
Cost Per Unit Content	Low	High	Social media is more cost-efficient
Average Engagement Rate	7.45%	4.83%	Social media generates more interaction
Persistence Effect	High	Low	Social media is more temporally effective

Potential ROI	High	Moderate	Social media ROI is more sustainable

Table 9. Impact of Social Media Strategies vs. Paid Advertising on MSME Sales
Source: Processed Data by Researchers

Table 9 demonstrates that social media-based strategies are more effective and sustainable than paid advertising in boosting MSME sales. The higher regression coefficient (0.1981) and stronger statistical significance (p = 0.001, t = 3.47) indicate that social media not only positively influences transactions but is also consistently significant within the estimation model. Its long-term impact duration reflects a lag effect and persistence generated by organic user interactions, whereas paid advertising tends to produce quicker but more short-lived effects.

In terms of efficiency, social media requires lower costs per content unit while generating a higher engagement rate (7.45% vs. 4.83%), suggesting that user involvement is more easily cultivated through non-paid strategies. The high persistence effect also implies that social media strategies can cumulatively shape consumer decision-making over time.

On the other hand, although paid advertising remains statistically significant and contributes to sales (coefficient = 0.1532, p = 0.036), its ROI is considered moderate and less impactful in the long run. These findings suggest that MSMEs should allocate their digital strategies more proportionally, considering temporal effectiveness, cost efficiency, and audience engagement levels. Table 10 presents the Subgroup Analysis Based on Digital Strategy Dominance.

Perormance Indicator	Social Media-Dominant Subgroup	Paid Ads-Dominant Subgroup	Interpretation
Number of MSMEs	62	58	Relatively balanced distribution
Average Transactions/Week	172.4	151.8	Social media generates higher volume
Engagement Rate Coefficient	0.217	0.134	Social media has a stronger influence
Ad Budget Coefficient	0.118	0.176	Paid ads require a larger budget
Average CTR	5.10%	4.45%	Click effectiveness is higher on social media
Potential ROI	High	Moderate	Social media is more efficient in the long term

Table 10. Subgroup Analysis Based on Digital Strategy Dominance
Source: Processed Data by Researchers

Table 10 shows that MSMEs with a dominant social media strategy demonstrate superior digital performance compared to those relying on paid advertising. Although the number of MSMEs in both subgroups is relatively balanced, the social media subgroup records higher weekly transaction volumes and a stronger engagement rate (0.217 vs. 0.134), indicating that audience participation has a greater impact on sales. Click effectiveness is also higher in social media-based strategies, with an average CTR of 5.10% compared to 4.45% for paid ads. Moreover, while paid advertising requires a larger budget, it only yields a moderate ROI, whereas social media shows better long-term efficiency. These findings reinforce the argument that an organic, socially interactive approach is not only more cost-effective but also more capable of building sustainable relationships with consumers.

Theoretical Discussion

The results of this study reaffirm the relevance of digital marketing theory, which emphasizes the importance of interaction, valuable content, and consumer engagement as key drivers of online strategy success, as outlined in the Consumer Engagement Theory and Social Media Marketing Framework (Tuten & Solomon, 2017). The dominance of social media strategies—characterized by higher engagement rates, more effective CTRs, and sustained ROI—is consistent with the literature stating that organic content fosters brand intimacy and long-term customer loyalty (Ashley & Tuten, 2015). Meanwhile, although paid advertising contributes to transaction volume, its lower effectiveness and temporal impact reinforce findings from studies such as De Vries et al. (2012), which suggest that the impact of social media is more relational than transactional. Thus, this research not only strengthens empirical understanding of the effectiveness of digital strategies in

MSMEs, but also contributes to the development of theoretical frameworks in contemporary marketing based on community and interactivity. Table 11 presents a summary of related studies in comparison with this study's findings.

Researcher & Year	Object or Focus of Study	Key Findings	Relevance to This Study
Rawi, (2025)	Digital strategy in MSME marketing	Social media is effective in increasing brand awareness	Supports the finding that dominant social media leads to high engagement
Rolando & Mulyono (2025)	Influence of digital advertising on local product sales	Paid ads increase transactions, especially in the early phase	Aligns with the finding that paid ads quickly boost CTR
Kirtiş, & Karahan, (2011).	Cost efficiency of marketing strategies	Social media is more efficient in the long term compared to ads	Reinforces the ROI analysis showing organic strategies are more efficient
Mukherjee, Ananthan, & Manickam, (2025).	Integration of marketing strategies based on NLP	Content segmentation enhances the impact of digital strategies	Encourages development of strategies based on personalization and emotions
Magfirrahtunnisa, & Pusparini, (2025)	MSME perceptions of digitalization	Strong preference for free platforms such as Instagram	Explains the dominance of social media in the study sample

Table 11. Summary of Related Studies in Comparison with This Study's Findings

To strengthen the main findings regarding the effectiveness of digital strategies in MSME marketing, various relevant studies indicate that social media consistently plays a significant role in enhancing engagement and brand awareness (Rawi, 2025), offers long-term cost efficiency compared to paid advertising (Kirtiş & Karahan, 2011), and shows a strong preference for free platforms such as Instagram (Magfirrahtunnisa & Pusparini, 2025). On the other hand, paid digital advertisements have been proven to boost transactions during the early phase of campaigns (Rolando & Mulyono, 2025), while NLP-based approaches enhance the impact of digital strategies through content segmentation and emotional engagement (Mukherjee et al., 2025). Collectively, these studies strengthen the validity of this research's findings and provide both theoretical and practical foundations for the development of more targeted and competitive marketing strategies. Table 12 presents the Mapping of Findings to the Theoretical Framework.

Research Findings	Relevant Theoretical Aspects	Relationship	Theoretical Implications
Social media has a dominant impact on engagement and CTR	Customer Engagement Theory; Media Richness Theory	Social media enables two-way communication and high interactivity	Reinforces the role of interactivity as a trigger for consumer engagement
Paid advertising is effective for short-term transaction increases	Stimulus-Response Theory; Conversion Funnel Model	Ads act as a strong stimulus in the purchase process	Validates that quick response to stimulus confirms the temporary nature of ad effects
Social media ROI is higher than advertising	Resource-Based View (RBV); Efficiency Theory	Social media is a strategic asset with low cost and broad impact	Expands RBV theory in the context of MSME digital marketing
MSME preference for free platforms	Technology Acceptance Model (TAM)	Perceived ease of use and benefits increase digital adoption	Supports perceived usefulness and ease of use factors
Content segmentation based	Persuasive Communication	Emotional content forms personal	Emphasizes the importance of affect in marketing communication strategy

Research Findings	Relevant Theoretical Aspects	Relationship	Theoretical Implications
on emotion and personalization	Theory; Affective Model	connections and drives loyalty	

Table 12. Mapping of Findings to the Theoretical Framework

Table 12 shows that the findings of this study have strong and relevant theoretical links with various frameworks in digital marketing. The dominant impact of social media on engagement and CTR aligns with Customer Engagement Theory and Media Richness Theory, which emphasize the importance of two-way communication and interactivity in building consumer involvement. Meanwhile, the effectiveness of paid advertising in boosting short-term transactions corresponds to Stimulus-Response Theory and the Conversion Funnel Model, which position advertising as a direct trigger for purchasing behavior, albeit temporary in nature.

The finding that social media ROI is higher expands the application of the Resource-Based View (RBV) and Efficiency Theory, by framing social media as a strategic asset with low cost but wide impact for MSMEs. MSMEs' preference for free platforms is consistent with the Technology Acceptance Model (TAM), where perceived ease of use and perceived usefulness are key factors in technology adoption. Additionally, the use of emotionally driven and personalized content supports Persuasive Communication Theory and the Affective Model, highlighting the role of affect in creating personal connections that can foster customer loyalty. Overall, this mapping reinforces the theoretical contribution of the study to the development of a digital marketing framework grounded in community, efficiency, and affectivity. Table 13 presents Strategy Recommendations Based on MSME Profiles.

MSME Profile	Key Characteristics	Recommended Digital Strategy	Reason and Target Effectiveness
Micro MSMEs (<5 employees, limited capital)	Focus on efficiency, limited access to capital and technology	Optimize organic social media (Instagram, TikTok)	Low cost, suitable for building awareness and local community engagement
Small MSMEs (5–20 employees, stable growth)	Already have customer base, open to innovation	Combination of social media and small-scale digital ad campaigns	Expand reach while maintaining engagement
Medium MSMEs (>20 employees, regional expansion)	Adequate HR, budget, and potential for scale-up	Omnichannel strategy: paid ads, SEO, blog content, marketplace	Increase visibility, conversions, and operational scalability
Creative Product MSMEs	Visually dominant content, high interactivity	Focus on visual platforms (Instagram, Pinterest, TikTok), storytelling	Emotion and aesthetics as the main marketing and differentiation tools
Culinary & Local Retail MSMEs	High consumption, impulsive buying behavior	Location-based ads, limited-time promotions, visual content	Increase local visibility and conversion through visual stimuli
Agribusiness & Traditional Product MSMEs	Long production cycles, education is key	Education through videos, blogs, and informative content; community collaboration	Build trust, educate the market, and open new distribution channels

Table 13. Strategy Recommendations Based on MSME Profiles

Table 13 illustrates that effective digital strategies for MSMEs (Micro, Small, and Medium Enterprises) are highly dependent on the structural and operational characteristics of each business profile. Micro enterprises with limited capital and access to technology are advised to optimize organic social media platforms such as Instagram and TikTok due to their low cost and effectiveness in building awareness and local communities. For small enterprises with stable growth and an initial customer base, a combination of social media and small-scale digital advertising can help expand reach while maintaining audience engagement.

Medium-sized enterprises undergoing regional expansion are recommended to implement an omnichannel strategy that includes paid advertising, SEO, blogs, and marketplace platforms to

enhance business visibility and scalability. Creative product-based MSMEs are encouraged to focus on visual storytelling through platforms such as Instagram, Pinterest, and TikTok, so that the aesthetic and emotional value of their products becomes a strong differentiation tool.

Local culinary and retail MSMEs operating in highly competitive environments can maximize the effectiveness of location-based advertising, time-limited promotions, and digital reviews to drive impulsive purchases. Meanwhile, agribusiness and traditional product MSMEs, which have longer production cycles and require market education, are recommended to use video content, blogs, and community collaborations to build trust and expand distribution. These findings affirm that selecting the right digital strategy must take into account the internal context of MSMEs to deliver optimal impact on business growth and sustainability. Table 14 presents a Simulation of Budget Optimization and Engagement Rate.

Budget Scenario	Type of Digital Strategy	Budget Allocation (Rp)	Estimated Engagement Rate (%)	Simulation Description
Minimalist	Organic social media (Instagram, TikTok)	500,000	4.2	Suitable for micro MSMEs, focused on local communities
Moderate	Social media + light boost posts	1,500,000	6.8	Expands reach with controlled costs
Intensive	Paid ads (Facebook Ads, Google Ads)	3,000,000	8.3	Effective for conversions, requires audience segmentation
Omnichannel	Paid ads + SEO + blog content	5,000,000	9.7	Scheme for medium to upper MSMEs looking to scale up
Educational & Community	Video content, live streaming, collaboration	2,000,000	7.4	Storytelling strategy based on value and education

Table 14. Simulation of Budget Optimization and Engagement Rate

Table 14 shows that digital budget optimization significantly influences the engagement rate that MSMEs can achieve, with strategies needing to be tailored according to financial capacity and marketing goals. The minimalist scheme with a budget of Rp500,000 demonstrates adequate effectiveness for micro MSMEs through organic social media such as Instagram and TikTok, generating a 4.2% engagement rate and focusing on building a local community cost-efficiently. The moderate scenario, with an allocation of Rp1,500,000 combining social media and light boosted posts, is capable of expanding reach more broadly, achieving a 6.8% engagement rate, reflecting efficiency in audience growth with controlled spending. For MSMEs aiming for more aggressive conversions, the intensive strategy using paid ads like Facebook Ads and Google Ads requires a budget of Rp3,000,000 and results in 8.3% engagement, although it demands proper audience segmentation. Meanwhile, the omnichannel strategy is the most comprehensive option for upper-medium MSMEs aiming to scale up, with a Rp5,000,000 allocation generating the highest engagement (9.7%) through a combination of advertising, SEO, and blog content. Lastly, the educational and community-based approach using video content, live streaming, and community collaborations, with a Rp2,000,000 budget, yields a 7.4% engagement rate—suitable for MSMEs aiming to build emotional value, education, and long-term social connections. This simulation clarifies that the effectiveness of digital strategies is not solely determined by the size of the budget but by the alignment between the approach, objectives, and the targeted audience profile.

Limitations and Future Research Recommendations

Reflections on the limitations of this study encompass several methodological and contextual aspects that should be considered in future model development. This study employed a quantitative approach focusing on measurable digital indicators, thus not fully capturing qualitative dimensions such as consumer perceptions, emotional dynamics, and socio-cultural factors that influence the effectiveness of digital marketing strategies. Additionally, limitations in geographic scope and the diverse characteristics of MSMEs may affect the generalizability of the findings. On the other hand,

there is considerable potential for future model development, including the integration of Natural Language Processing (NLP) analysis to understand audience sentiment, as well as the application of dynamic panel methods or machine learning to map temporal and predictive shifts in consumer behavior. Further development may also incorporate psychographic variables and build an adaptive framework that is more responsive to market segmentation, content preferences, and cross-temporal and geographical platform effectiveness. Table 15 presents the Aspects Not Yet Covered by This Study.

Aspects Yet to Be Explored	Reasons for Not Being Covered	Future Research Potential	Additional Notes
Impact of digital strategies based on MSME industry sectors	Segmented data is not yet available in granular form	Cross-sector comparative studies (culinary, fashion, agribusiness, etc.)	Can reveal the effectiveness of sector-specific strategies
Role of non-conventional platforms (e.g., Shopee Live, TikTok Shop)	The study only focused on mainstream social media and advertising	Effectiveness analysis of these platforms in terms of conversion and engagement	Relevant to changing digital consumer behavior
Integration of AI and automation in MSME strategies	Not yet a common practice in the field	Exploratory study on AI potential for personalization and efficiency	Closely related to digital transformation trends
Psychographic variables of MSME actors	Research still based on demographic and business variables	Psychographic surveys: values, risk perception, motivation for using digital	Enhances strategy segmentation accuracy
Long-term effects of digital strategy usage	Study focused on short-term impact	Longitudinal study on ROI and customer loyalty	Suitable for understanding MSME growth cycles
Interaction between digital strategies and local policies	No data available on local policies related to MSMEs	Contextual study on the interaction between strategy and regulatory support	Important for evidence-based policy design

Table 15. Aspects Not Yet Covered by This Study

Table 15 highlights several strategic and contextual aspects of MSME digital marketing that were not covered in this study but hold strong potential for further exploration. The lack of granular data based on industry sectors hinders the analysis of sector-specific digital strategy effectiveness, despite the opportunity to gain sharper insights into market behaviors in sectors such as culinary, fashion, or agribusiness. Additionally, with the evolving landscape of digital consumers, the role of non-conventional platforms like Shopee Live or TikTok Shop has yet to be thoroughly examined, even though their presence is increasingly relevant in shaping conversion and engagement patterns. The integration of AI and automation is also not yet a common practice among MSMEs, though it offers great promise for efficient strategy personalization, especially amidst the current wave of digital transformation. This study also does not delve into the psychographic variables of MSME actors, such as values, risk perception, and motivation which could enhance content effectiveness and strategy segmentation accuracy. From a temporal perspective, the long-term impact of digital strategies is not yet addressed, whereas longitudinal research is crucial to mapping sustainable ROI and customer loyalty. Lastly, the interaction between digital strategies and local policies remains unexplored due to limited regulatory data, indicating that policy-based studies could serve as an important foundation for more evidence-based and contextualized intervention designs. Table 16 presents Recommendations for Model Development and Additional Variables.

Development Component	Description	Analytical Objective	Potential Academic Contribution
Moderation of demographic variables	Including business age, actor's education, and location as moderators	To test whether the effect of digital strategy depends on actor characteristics	Strengthens understanding of socio-economic context in MSME digitalization
Customer behavior mediation	Mediation variables such as trust, perceived value, and satisfaction	To explain the mechanism of the relationship between strategy and sales	Opens new avenues for understanding digital consumer behavior
Multi-year panel data	Adding a longer time dimension (2–3 years)	To examine the long-term effects and growth dynamics	Supports business cycle theories and sustainability of digital strategies
Local competition variable	Metrics such as number of competitors, competitor intensity, and share of voice	To control external factors affecting ad effectiveness	Provides an evaluation framework based on market environment
Consumer sentiment analysis	Using NLP for reviews, comments, and online feedback analysis	To measure the quality of consumer perceptions textually	Integrates quantitative and linguistic approaches for result validation
Nonlinear interaction model	U-shape interaction testing or threshold models	To evaluate saturation points in strategies (e.g., budget vs ROI)	Introduces a more dynamic and theoretically complex framework

Table 16. Recommendations for Model Development and Additional Variables

Table 16 recommends a more comprehensive and adaptive direction for developing MSME digital strategy models by incorporating theoretical, temporal, and behavioral dimensions that have not been fully addressed in previous studies. The inclusion of demographic moderation variables such as business age, entrepreneur's education, and location will enrich the understanding of the socio-economic context of MSME digitalization, while customer behavior mediation through trust, perceived value, and satisfaction can explain the psychological mechanisms linking strategy to sales outcomes. The addition of multi-year panel data is also crucial to capture long-term dynamics and support business cycle theory. In the external context, measuring the intensity of local competition through the number of competitors and share of voice offers a realistic, market-based evaluative framework. On the other hand, the use of NLP for consumer sentiment analysis allows for textual validation that strengthens quantitative data. Testing nonlinear moderation models such as U-shape interactions or threshold models is also important in identifying saturation points in strategy effectiveness regarding budget or ROI. Finally, incorporating platform-specific variables such as the intensity of Instagram, Facebook, or TikTok use enables more prescriptive strategy differentiation tailored to the characteristics of each digital channel. Overall, these recommendations provide opportunities for academic contributions toward developing more contextual, dynamic, and behavior-based digital marketing models for MSMEs over time.

4. Conclusion

Social media-based digital strategies offer significant advantages in improving MSME performance, particularly in terms of engagement, CTR, cost efficiency, and long-term ROI. Through comparative and subgroup analyses, it was found that organic and community-based approaches tend to be more effective and sustainable than paid advertising, which may have immediate but temporary impact. Theoretical mapping reinforces the relevance of these findings within the frameworks of Customer Engagement Theory, TAM, and RBV, while also opening opportunities for integrating affective and personalization-based models. Reflections on the study's limitations reveal the need for sectoral analysis, longitudinal approaches, and the integration of technologies such as AI and NLP to better capture consumer sentiment and the dynamics of digital behavior. Budget optimization simulations highlight the importance of aligning strategies with MSME profiles, both in terms of financial capacity and business objectives. Future model development recommendations include the addition of psychographic variables, local competition, and the application of nonlinear

interaction models to capture the complexity of digital strategies more holistically. Overall, this study provides a strong empirical and conceptual foundation for designing adaptive, efficient, and relationship-oriented digital marketing strategies for MSMEs.

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