

## **Digital Marketing Implementation and The Impact on Micro and Small Enterprises (MSEs) Agribusiness Performance in Indonesia**

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### **ABSTRACT**

Micro and small enterprises (MSEs) in the agribusiness sector play an important role in employment generation in Indonesia, yet their marketing capacity remains limited, particularly in non-food subsectors. Although digital marketing is expected to support market expansion, its utilization among agribusiness MSEs is still relatively low. This study aims to analyze the factors influencing digital marketing implementation and to evaluate its impact on business performance among non-food agribusiness MSEs in Indonesia. The analysis uses secondary data from the 2021 Micro and Small Industry Survey (VIMK) conducted by Statistics Indonesia (BPS). Logistic regression is applied to identify the determinants of digital marketing implementation, while Propensity Score Matching (PSM) is employed to estimate its impact on turnover, profit, and market reach. The results indicate that innovation, education, labor size, business legality, and participation in marketing training significantly increase the likelihood of digital marketing implementation, whereas the age of entrepreneurs and business age have a negative effect. The impact estimation shows that digital marketing adoption has a positive and statistically significant effect on market reach, while its effects on turnover and profit are positive but not statistically significant. These findings suggest that digital marketing in non-food agribusiness MSEs primarily contributes to market expansion rather than immediate financial outcomes. The study implies that policy support should focus on improving digital capabilities and platform utilization in accordance with product characteristics and the structural conditions of agribusiness MSEs.

**Keywords:** *business performance; digital marketing; impact analysis; market reach; propensity score matching*

### **BACKGROUND**

Micro and Small Enterprises (MSEs) constitute a fundamental pillar of the Indonesian economy, primarily due to their labor-intensive nature which enables substantial employment absorption. Data from the Central Statistics Agency (BPS) indicate that in 2023, MSEs accounted for the employment of 9.84 million workers (BPS, 2023). Furthermore, the sector has demonstrated consistent growth over the past decade, with an average annual increase of 2.8 percent in the number of enterprises. Nevertheless, the significant role of MSEs in generating employment has not been accompanied by a proportional contribution to the national Gross

Domestic Product (GDP). In 2018, MSEs contributed 29 percent to the GDP. This share declined markedly to 18 percent in 2019 and has remained stagnant in subsequent years (Kemenkopukm, 2022).

The low contribution of MSEs to national GDP is due to several obstacles that hinder the growth of this sector. Difficulty marketing their products is the second largest obstacle faced by MSEs, accounting for 21 percent of the total. This is because MSEs are focused on producing goods and services. Furthermore, MSEs generally lack the resources to find, develop, or expand markets (Tambunan, 2022). In the post-COVID-19 pandemic phase, everything businesses and consumers do has also changed, with a reduction in face-to-face interactions and an increase in digital activity (Purba *et al.*, 2021). Therefore, marketing practices are needed that facilitate MSEs in marketing their products or services by expanding their market reach.

Agribusiness MSEs are labor-intensive businesses that involve a large labor in every stage of their activities. Widely distributed across both rural and urban areas, agribusiness MSEs serve as a mainstay for the local community. Agribusiness MSEs are the largest MSEs in Indonesia, with a total of 2,789,486 businesses, representing 61.98 percent (BPS, 2023). However, micro-enterprises still dominate the agribusiness MSEs, accounting for 92.5 percent (BPS, 2023). This indicates that agribusiness MSE productivity remains low. Nevertheless, MSEs in the agribusiness sector play a significant role in absorbing 6,312,524 people out of 9,843,840, or 64.13 percent of labor (BPS, 2023).

Digital marketing involves the application of technology to promote products, services, information, and ideas through online platforms, digital advertising, and other electronic media (Pradhan *et al.*, 2018). According to the Indonesian Internet Service Providers Association (APJII, 2024), internet penetration in Indonesia has reached 79.5 percent, equivalent to 221,563,479 users, and this number has continued to grow since 2018. Moreover, Indonesians spend an average of 7 hours and 38 minutes online each day (WeAreSocial Agency, 2024). The rapid advancement of digital technologies in the globalization era has significantly influenced various aspects of life, including consumer shopping behavior (Thaha *et al.*, 2021). These conditions reflect the increasingly significant role of digital platforms in market penetration. Digital marketing has been shown to enhance commercial communication, broaden market reach, and improve business effectiveness and efficiency, ultimately contributing to customer expansion and higher sales volumes through increased productivity (Ouaida & El Hajjar, 2018). Nevertheless, the potential of digital marketing has not been fully optimized by agribusiness MSEs, as only 942.848 units or only 33.8 percent have used internet-based marketing strategies (BPS, 2023). Consequently, the use of the internet as a marketing medium in this sector remains limited.

The lack implementation of digital marketing among Micro and Small Enterprises (MSEs) in the digital era poses significant constraints on their business productivity. Insufficient utilization of digital platforms prevents MSEs from fully exploiting their potential to expand market access, increase sales, optimize operational efficiency through reduced transaction costs, and address information asymmetries in product marketing (Rosiana, 2021). Extensive research on the utilization of digital marketing by Micro and Small Enterprises (MSEs) in developing countries has consistently demonstrated its positive implications for business performance (Yusgiantoro *et al.*, 2019; Kimathi *et al.*, 2019). Empirical studies in the Indonesian context likewise confirm that digital marketing positively influences MSE performance under both normal economic conditions (Afifah *et al.*, 2018) and during periods of crisis, such as the Covid-19 pandemic (Purba *et al.*, 2021). Notwithstanding these contributions, prior research has not specifically examined the agribusiness sector. To address this gap, the present study undertakes an analysis of digital marketing implementation that focused on non-food subsectors. The objectives are to identify the

determinants influencing the implementation of digital marketing among agribusiness MSEs in Indonesia, and to evaluate the impact of the business performance.

## RESEARCH METHODS

This research used secondary data sourced from the Central Statistics Agency (BPS), specifically the 2021 Micro and Small Industry Survey (VIMK 2021). This study employs the 2021 BPS dataset because it reflects a post-shock stabilization period following the disruptions of the COVID-19 pandemic, allowing the analysis to capture conditions that are more stable and representative of the structural characteristics of MSE agribusiness and the availability of data that can be accessed by the author. The dataset comprises cross-sectional information collected from MSEs across Indonesia. For the purposes of this research, the analysis is confined to MSEs engaged in the agribusiness sector, with a particular emphasis on non-food subsectors as delineated in the Indonesian Standard Industrial Classification (KBLI) at the two-digit level: Tobacco Processing (12), Wood, Wood Products, Cork, and Rattan (16), and Paper and Paper Products (17). The final sample consists of 12,247 agribusiness MSEs. These enterprises are subsequently classified into two categories: those adopting digital marketing (1,862 units) and those not adopting digital marketing (10,385 units). This study used Microsoft Excel for data cleaning procedures, while STATA-17 was used to perform descriptive statistics and impact analysis measurements.

### Data Analysis

#### Logistic Regression

Logistic regression is employed in this study to analyze the determinants of digital marketing application among micro and small agribusiness enterprises. The dependent variable reflects a binary decision indicating whether an enterprise applies digital marketing, making logistic regression an appropriate method for modeling the probability of this application. According to May and Hosmer (2003), logistic regression represents an analytical approach for assessing the relationship between a binary outcome variable ( $y$ ) and one or multiple predictor variables ( $x$ ). Within this study, it is utilized to explore the determinants influencing agribusiness MSMEs' adoption of digital marketing. The dependent variable is coded in binary form: 1 for businesses adopting digital marketing and 0 for those that do not.

The independent variables are organized to reflect internal firm characteristics and external environmental conditions that are expected to influence digital marketing implementation. Internal factors include entrepreneur and enterprise attributes such as innovation, education, age of the entrepreneur, labor size, business age, capital, and legal status. External factors are represented by variables related to the institutional and relational environment, namely participation in business associations or communities, engagement in partnerships, and receipt of government assistance. This classification enables the analysis to assess the relative importance of internal firm conditions and selected external support mechanisms in shaping digital marketing implementation among agribusiness MSEs. Accordingly, the logistic regression model employed in this study can be specified as follows:

$$P_i = \ln \left[ \frac{P_i}{1-P_i} \right] = \beta_0 + \beta_1 x_{1i} + \dots + \beta_{12} x_{12i} + \varepsilon$$

where  $P_i$  is a binary variable indicating the decision of business actors to implement digital marketing. The model includes 12 independent variables that are hypothesized to influence this decision, namely: variable **X1** (innovation, expressed as a quantitative indicator). variables **X2**

(formal education, measured in years), **X3** (age of the business actor, measured in years), **X4** (Labor, measured as the number of employees), **X5** (access to credit, specified as a dummy variable with 1 = received credit), **X6** (enterprise age, measured in years), **X7** (own capital, expressed as a percentage), **X8** (legal status of the enterprise, specified as a dummy variable with 1 = registered as a legal entity), and **X9** (participation in marketing training, specified as a dummy variable with 1 = attended). Finally, the *environmental dimension* consists of variables **X10** (partnership, specified as a dummy variable with 1 = engaged in partnership), **X11** (membership in a business association or community, specified as a dummy variable with 1 = member), and **X12** (government assistance, specified as a dummy variable with 1 = received).

### Impact Analysis with Propensity Score Matching (PSM)

To assess the impact of digital marketing application on business performance, this study applies Propensity Score Matching (PSM). The application of digital marketing is not randomly assigned across enterprises and is likely influenced by observable characteristics, which may lead to selection bias if conventional regression methods are applied. PSM addresses this issue by constructing a counterfactual scenario through matching enterprises that apply digital marketing with comparable non-applying enterprises based on similar observable characteristics. By balancing the distribution of covariates between the treatment and control groups, PSM enables a more credible estimation of the causal effects of digital marketing application on performance outcomes.

Propensity Score Matching (PSM) is a statistical technique commonly applied in impact evaluation to mitigate selection bias when assessing the effects of an intervention or treatment in observational studies. The method involves pairing units in the treatment group with comparable units in the control group based on their propensity scores, which are derived from confounding variables. A propensity score is defined as the estimated probability of an individual or unit receiving the treatment, conditional on observable characteristics, and is typically obtained through participation regression. By aligning treated and untreated units with similar propensity scores, PSM facilitates more reliable causal inference.

In the context of this study, the treatment group consists of Micro and Small Enterprises (MSEs) that adopt digital marketing, while the control group comprises MSEs that do not. The estimation is conducted using the Average Treatment Effect on the Treated (ATT) framework, which evaluates the impact of digital marketing implementation on selected performance outcomes. Specifically, the outcomes under consideration are **Y1** (turnover), **Y2** (profit), and **Y3** (market reach). The ATT model is formally expressed as follows:

$$ATT = E [Y_1(1) - Y_1(0) | D=1]$$

$Y_1(1)$  = Potential outcomes of MSMEs in Agribusiness that use digital marketing include turnover, profit and market reach.

$Y_1(0)$  = Potential outcomes of MSMEs in Agribusiness that do not use digital marketing include turnover, profit and market reach.

Turnover is defined as the total annual sales revenue of an enterprise prior to the deduction of costs. Profit is defined as the residual value obtained by subtracting total costs from turnover, serving as an indicator of the firm's efficiency in cost management and its capacity to generate net earnings. The market reach variable is quantified through a weighted scoring methodology, in which the geographic scope of marketing activities is assigned incremental values: local/district = 1, outside the city = 2, outside the province = 3, and international = 4. These weighted scores are subsequently aggregated to construct a composite index that reflects the respondent's overall market expansion

capability, with the weighting scheme designed to account for both the complexity of distribution and the firm’s ability to penetrate broader markets.

**RESULT AND DISCUSSION**

Comparative analysis indicates that enterprises adopting digital marketing outperform non-adopters across multiple performance indicators. Adopting enterprises reported higher mean turnover, amounting to Rp 16,900,000, compared to Rp 16,000,000 for non-adopters, and higher mean profit, totalling Rp 5,480,238 relative to Rp 4,772,613. They also demonstrated broader market reach, with an average index of 1.564 compared to 1.487, and innovation implementation, averaging 0.127 relative to 0.022. In terms of organizational characteristics, enterprises utilizing digital marketing were generally younger, with a mean age of 45.31 years compared to 50.38 years among non-adopters, and maintained larger labor, averaging 2.35 employees in contrast to 1.65 employees. These differences suggest that adopting enterprises have greater potential for operational scale and organizational capacity.

**Table 1.** Statistics descriptive of Micro dan Small Enterprise Agribusiness Non-Food

Variables	Total Sample		Non-Digital Marketing		Digital Marketing	
	Mean	Sd.Dev	Mean	Sd.Dev	Mean	Sd.Dev
Turnover (Rp)	16,000,000	108,000,000	16,000,000	114,000,000	16,900,000	56,500,000
Profit (Rp)	4,880,198	20,300,000	4,772,613	19,500,000	5,480,238	24,100,000
Market reach (indeks)	1.498	1.664	1.487	1.058	1.564	0.998
Innovation (dummy)	0.074	0.250	0.022	0.145	0.127	0.476
Education (years)	6.297	6.327	8.576	6.140	6.841	7.963
Age of entrepreneur (years)	49.611	11.656	50.383	11.796	45.312	9.785
Credit (dummy)	0.145	0.353	0.144	0.351	0.153	0.360
Labor (person)	1.760	1.668	1.649	1.570	2.354	1.302
Business age (years)	21.989	20.819	22.855	24.835	17.160	9.991
Capital (percent)	93.309	20.095	93.370	20.052	92.080	20.329
Marketing Training (dummy)	0.005	0.072	0.003	0.058	0.015	0.122
Business status (dummy)	0.088	0.285	0.066	0.248	0.022	0.147
Partnership (dummy)	0.082	0.274	0.078	0.268	0.046	0.210
Business association (dummy)	0.014	0.119	0.013	0.114	0.019	0.136
Government assistance (dummy)	0.042	0.201	0.046	0.197	0.049	0.217

Source: Primary data processed, 2025

Most micro and small enterprises operate at relatively low levels of turnover or profit while a small number of firms report substantially higher values. This pattern is typical for economic and firm-level data and does not indicate a statistical problem, but rather reflects the inherent heterogeneity of the sector (Wooldridge, 2010). Such a right-skewed distribution naturally produces a standard deviation that is larger than the mean, as the presence of a few high-value observations increases the overall dispersion of the data. Furthermore, enterprises that implemented digital marketing exhibited higher engagement in marketing training, partnerships, business associations, and receipt of government assistance, although these differences were relatively modest. Collectively, these findings underscore digital marketing as a pivotal determinant of competitiveness, market expansion, innovation adoption, and integration within the business ecosystem among micro and small enterprises in the non-food agribusiness sector.

**Factors Influencing the Implementation of Digital Marketing in Micro and Small Enterprises (MSEs) in the Non-Food Agribusiness**

This section presents an analysis of the factors influencing the implementation of digital marketing within the non-food agribusiness MSE sector. Table 2 summarizes the main statistical diagnostics of the logistic regression model. The results of the logistic regression indicate that the model is statistically significant overall (LR  $\chi^2 = 1,133.47$ ;  $p < 0.001$ ). The pseudo  $R^2$  value of 0.1086 indicates that although the model is significant, the proportion of variation in the probability of digital marketing implementation that can be explained by all independent variables is still relatively limited. In the context of logit or probit models, the pseudo- $R^2$  value is generally lower than the  $R^2$  in linear regression and can still be considered meaningful in socio-economic behavioral analysis (Greene, 2018; Menard, 2001). The Pearson goodness-of-fit test does not provide evidence of substantial model misfit ( $p = 0.0988$ ), while the Hosmer–Lemeshow test indicates a marginal lack of fit ( $p = 0.0498$ ); however, this result should be interpreted cautiously due to the known sensitivity of the test to large sample sizes (Hosmer Jr *et al.*, 2013). The model’s discriminatory performance, evaluated using the Receiver Operating Characteristic curve, yields an Area Under the Curve (AUC) of 0.7309, indicating an acceptable level of discrimination outcomes (Austin & Steyerberg, 2012). Overall, these diagnostic results suggest that the estimated model performs adequately for inferential purposes in an applied socio-economic setting.

**Table 2.** Summary Statistics of the Logistic Regression Model

No.	Statistics	Value
1.	Observasi (N)	12,247
2.	Log-likelihood	-4653.26
3.	Likelihood Ratio $\chi^2$ (12)	1133.47 ( $p < 0.001$ )
4.	Pseudo $R^2$	0.1086
5.	Area Under ROC (AUC)	0.7309
6.	Pearson GOF $\chi^2$	10144.32 ( $p = 0.0988$ )
7.	Hosmer-Lemeshow $\chi^2$	1314.86 ( $p = 0.0498$ )

Source: Primary data processed, 2025

Based on the estimation results reported in Table 3, several factors showed a statistically significant effect on the decision of business actors to implement digital marketing. Among these, the innovation variable exhibits the strongest effect, with an odds ratio of 2.6048 and statistical significance at the 1 percent level ( $p < 0.01$ ). This finding indicates that business actors who

demonstrate higher levels of innovation are more likely to impement digital marketing compared to their counterparts with lower levels of innovation.

Innovation encompasses the implementation of changes aimed at enhancing efficiency and improving various organizational processes (Chau *et al.*, 2020). Within an organizational context, innovation is critical for achieving and sustaining competitive advantage. Prior studies have shown that the capacity for innovation strongly influences the implementation of digital marketing (Ullah *et al.*, 2023; Dahnil *et al.*, 2014), as business actors who innovate possess the adaptability required to navigate the rapidly evolving digital environment. Moreover, enterprises with greater innovative capacity are more inclined to integrate technology into their operations, given the dynamic nature of digital marketing, which is inherently driven by innovation. Investments in technology often translate into the digitalization of business processes and functions (Molla *et al.*, 2010). Consequently, innovation serves as a key indicator of an organization’s readiness to implement and leverage new technological solutions, including digital marketing.

**Table 3.** Estimation Results of Factors Influencing Non-Food Agribusiness MSEs in Implementing Digital Marketing

Variabel	Odds Ratio	z	P> z
Innovation (dummy)	2.6048	11.02	0.000***
Education (years)	1.1390	17.12	0.000***
Age of entrepreneur (years)	0.9893	-3.73	0.000***
Credit (dummy)	1.1166	0.86	0.388
Labor (person)	1.1349	9.36	0.000***
Business age (years)	0.9758	-8.38	0.000***
Capital (percent)	1.0001	0.08	0.935
Marketing Training (dummy)	2.1869	2.68	0.007***
Business status (dummy)	1.5180	1.80	0.072*
Partnership (dummy)	1.0956	0.98	0.328
Business association (dummy)	0.8887	0.55	0.583
Government assistance (dummy)	1.0929	0.70	0.484
Konstanta	0.1309	-7.42	0.000***

Note: \*significant at p<0.1, \*\*significant at p<0.05, \*\*\*significant at p<0.01

Source: Primary data processed, 2025

The variable of formal education was found to have a positive and statistically significant effect at the at the 1 percent level ( $p < 0.01$ ), with an odds ratio of 1.1390, indicating that the higher the level of formal education attained by business actors, the greater the likelihood of adopting digital marketing. Conversely, the age of the entrepreneur exhibited a negative and statistically significant effect at the 1 percent level ( $p < 0.01$ ), with an odds ratio of 0.9893, suggesting that older business actors are less likely to adopt digital marketing. These findings are consistent with previous studies (Eze *et al.*, 2021; Dlodlo & Dhurup, 2013), which indicate that higher educational attainment positively influences the implementation of digital marketing. Entrepreneurs with higher education levels and aged below 39 tend to be more open to digital technology implementation and possess greater insights and knowledge regarding value creation, thereby fostering innovation.

The labor variable exhibited a positive and statistically significant effect at the 1 percent level ( $p < 0.01$ ), with an odds ratio of 1.1349. This finding indicates that enterprises with a larger labor force demonstrate a greater propensity to adopt digital marketing strategies compared to those with fewer employees. Business experience was also identified as a significant determinant. Enterprise size functions represent the capacity to allocate resources toward digital marketing implementation.

Previous studies by Pollák & Markovič (2021) and Eze *et al.* (2021) conceptualized enterprise size within the framework of micro, small, and medium enterprises, whereas the present study operationalizes firm size through the number of employees, consistent with the classification adopted by the Central Statistics Agency. Smaller-scale enterprises frequently encounter constraints in terms of human resource availability and technological capacity (Molla *et al.*, 2010).

Business age was found to have a negative and statistically significant effect at the 1 percent level ( $p < 0.01$ ). This finding indicates that younger enterprises are more likely to adopt digital marketing compared to older firms. The findings underscore the importance of digital marketing as a key factor influencing enterprise performance, especially during the initial phases of business growth when firms encounter limited resources and lack offline retail facilities. This is in line with Afifah *et al.*, (2018), who highlight the significant contribution of digital marketing in enhancing the performance of newly established businesses.

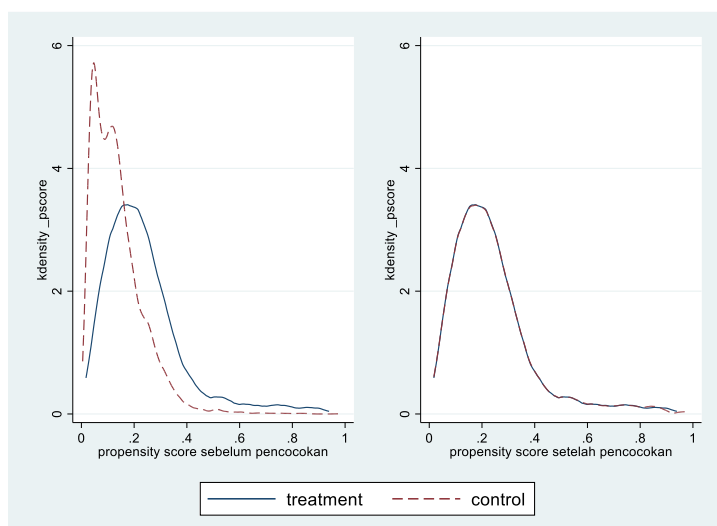
Marketing training has a positive and statistically significant effect at the 1 percent level, with an odds ratio of 2.1869. This finding indicates that business actors with trained workers are more likely to adopt digital marketing strategies. Skilled workers in utilizing technology contribute to optimizing the use of digital marketing, particularly for export-oriented purposes, as evidenced by the study of Hagsten and Kotnik (2017). Such knowledge is acquired through entrepreneurs' initiatives to keep up with business developments. Accordingly, training attended by MSME actors serves as an essential channel for knowledge transfer, supporting the implementation of new technologies and transforming entrepreneurs' mindsets toward technological change. In line with this, Dahnil *et al.* (2014) emphasize that training can be a key factor influencing the use of digital marketing media.

The variables of credit, own capital, partnerships, associations/communities, and government assistance were found to have no statistically significant effect on the implementation of digital marketing, with  $p$ -values exceeding the 0.1 threshold. Financial variables such as access to credit and equity do not influence entrepreneurs' decisions to use digital marketing because the use of digital platforms by MSEs is largely limited to instant messaging and social media, with free features, making them relatively flexible and affordable. This is because many MSEs struggle to measure the return on investment in marketing technology with paid features, leading to hesitation in adopting technology with unquantifiable benefits (Ocloo *et al.*, 2025). The partnership variable does not have a significant effect on the application of digital marketing, as partnerships among non-food agribusiness enterprises are mainly oriented toward raw material supply and capital goods procurement (BPS, 2021). These arrangements primarily support production-related activities rather than marketing functions and therefore do not directly encourage the application of digital marketing practices.

Business associations do not have a significant influence on the implementation of digital marketing, as their activities are primarily focused on improving product quality, standardization, and compliance. For instance, the Indonesian Tobacco Farmers Association (APTI) emphasizes collective marketing to large-scale industries, while associations such as the Indonesian Furniture and Handicraft Industry Association (ASMINDO) concentrate on product standardization, quality enhancement, and the dissemination of information related to raw materials. This emphasis on production and quality enhancement constrains the capacity of business associations to directly promote the application of digital marketing practices. A comparable orientation is also evident in government support for non-food agribusiness enterprises, which predominantly prioritizes production inputs and quality improvement rather than initiatives aimed at strengthening digital marketing activities.

**The Impact of Digital Marketing on the Performance of Micro and Small Enterprises in Non-Food Agribusiness**

Business performance can be understood as the extent to which a company is able to accomplish its objectives within a specific time frame. According to Talaja *et al.* (2021), it can be assessed through financial measures such as sales, sales growth, and profitability, as well as non-financial aspects including market share and its growth. Evaluating performance provides a foundation for analyzing the efficiency and effectiveness of business operations. In this study, the performance indicators for micro and small enterprises (MSEs) are adapted from prior national-level research (Irwandi *et al.*, 2025 and Silaban *et al.*, 2024)) with financial performance assessed through turnover and profit, and non-financial performance evaluated based on market reach that contextually relevant framework for analyzing MSEs outcomes in Indonesia. The impact of digital marketing on business performance was measured using propensity score matching (PSM) analysis. Figure 1 shows a balance plot in the process of matching the participant group with the control group. This condition indicates that initially, these groups were not well-matched for comparison. Using PSM analysis, the matching process was carried out to ensure that both groups were equal and suitable for comparison. This allows conclusions about the measured outcomes to be accurate, as it has been proven to reduce bias in data distribution.



**Figure 1.** Balance plot before and after the matching process.

Source: Primary data processed, 2025

The results of this matching are confirmed by the common support results in Table 4 which show that there is no data distribution outside the support area indicated by zero respondents in off support so that the data can be used to explain the PSM impact analysis model.

**Table 4.** Common support covariates in the matching process

Treatment	On Support	Off Support	Total
Without Digital Marketing (treated)	10.385	0	10.385
With Digital Marketing (control)	1.862	0	1.862
Number of covariates	12.247	0	12.247

Source: Primary data processed, 2025

The assessment of covariate balance after the implementation of Propensity Score Matching (PSM) as reported in Tables 5 suggests an improvement in the comparability between the treated and control groups. At the individual covariate level, most variables exhibit standardized mean differences below 10 percent, a threshold commonly used to indicate adequate balance in observational studies (Caliendo & Kopeinig, 2008). Although small residual differences remain for a limited number of covariates, such as access to credit and business capital, the magnitude of these imbalances is relatively modest and within ranges frequently observed in empirical PSM applications.

**Table 5.** Covariate Balance after Propensity Score Matching

Variable	Mean Treated	Mean Control	Std. Bias (%)	Note
Innovation	0.127	0.11	4.8	Balanced
Education	8.641	8.658	0.4	Balanced
Age of entrepreneur	45.312	45.049	2.4	Balanced
Credit	0.153	0.129	6.5	Slightly imbalanced
Labor	2.355	2.431	4.1	Balanced
Business age	17.16	16.861	2.6	Balanced
Capital	92.971	94.319	6.7	Slightly imbalanced
Marketing Training	0.015	0.013	2.3	Balanced
Business status	0.022	0.018	3.2	Balanced
Partnership	0.103	0.114	3.9	Balanced
Business association	0.019	0.013	4.7	Balanced
Government assistance	0.049	0.044	2.6	Balanced

Source: Primary data processed, 2025

At the aggregate level showed in Table 6, the post-matching mean and median bias are 3.7 percent and 3.6 percent. This result indicates a substantial reduction in overall imbalance compared to the pre-matching sample (Rubin, 2001). In addition, the low pseudo R<sup>2</sup> and the non-significant likelihood ratio test imply that the covariates have limited explanatory power for treatment assignment after matching. The values of Rubin’s B is 12.6 percent not more than 25 percent and Rubin’s R is 1.33 also fall within the recommended ranges (0.5; 2). It provides a reasonable basis for proceeding with the estimation of treatment effects using the matched sample (Caliendo & Kopeinig, 2008; Rubin, 2001).

**Table 6.** Balance Diagnostics after Matching Process

No	Statistics	Value
1.	Pseudo R-squared	0.003
2.	LR chi-square (p-value)	14.75 (0.255)
3.	Mean Bias (%)	3.7
4.	Median Bias (%)	3.6
5.	Rubin’s B (%)	12.6
6.	Rubin’s R	1.33

Source: Primary data processed, 2025

The results of the analysis on the impact of digital marketing implementation on business performance are presented in Table 7. Business performance is assessed using three outcome measures: turnover, profit, and market reach. Turnover is calculated as the total sales volume multiplied by the product price. Based on the Average Treatment Effect on the Treated (ATT) estimated through the Nearest Neighbor Matching approach, digital marketing implementation is

associated with an increase in turnover of Rp 1,884,715. Although the effect is positive, it is not statistically significant at the 10 percent level (T-stat = 0.68). These findings suggest that non-food agribusiness MSMEs adopting digital marketing strategies achieve, on average Rp 1,884,715 higher turnover compared to their enterprise that do not adopt digital marketing.

**Table 7.** Estimation Results of the Impact of Digital Marketing Implementation on the Business Performance

Variables	Sample	Treated	Controls	Difference	T-stat
Turnover	Unmatched	16,854,418.8	16,003,163.2	2,706,446.94	0.31
	ATT	16,854.418,8	15,578,892.6	1,884,715.21	0.68
Profit	Unmatched	5,480,238.34	4,772,613.02	511,074.09	1.38
	ATT	5,480,238.34	4,763,222.11	654,123.61	1.10
Market reach	Unmatched	1.564446	1.48656716	0.081540	2.91***
	ATT	1.564446	1.43513514	0.132972	2.40**

Note: \*significant at  $\alpha=10\%$ ,  $|t| \geq 1.65$  \*\*significant at  $\alpha=5\%$ ,  $|t| \geq 1.96$  \*\*\*significant at  $\alpha=1\%$ ,  $|t| \geq 2.58$

Source: Primary data processing, 2025

Business profit is defined as turnover net of operating costs. As presented in Table 7, the ATT estimation indicates that digital marketing implementation has a positive, yet statistically insignificant, effect on business profit, amounting to Rp 654,123 at the 10 percent significance level (T-stat = 1.10). This finding implies that agribusiness MSMEs adopting digital marketing achieve, on average, Rp 654,123 higher profit compared to those not adopting such strategies. This is supported by the research results of Fajri & Suryantini (2023) who conducted research on ornamental plant MSEs which are non-food products that the use of internet marketing has a low influence on business performance because the use of digital media is still limited with low intensity. The absence of statistical significance may be explained by the influence of multiple confounding factors on turnover and profit, as well as the potential omission of relevant explanatory variables from the model specification (Lee, 2020).

Market reach is assessed through a weighted index reflecting the extent of geographical coverage, with the highest weight assigned to foreign sales (4 points). Thus, a higher score corresponds to a broader and more extensive market coverage by the firm. As reported in Table 7, the ATT estimation indicates that digital marketing implementation positively influences market expansion, with a difference of 0.132972 (equivalent to a 0–1 level increase in market reach) compared to businesses that do not adopt digital marketing. This effect is statistically significant at the 5 percent level (T-stat = 2.40). The effectiveness of using digital marketing depends on the suitability of the product for online sales and the organization's ability to manage logistical challenges (Salah and Ayyash, 2024). In non-food agribusiness, product categories such as tobacco products (KBLI 12) which are subject to strict health regulations, and wood-based products including woven bamboo and rattan (KBLI 16), which involve higher logistics and packaging costs tend to experience longer consumer decision-making processes than food products. As a result, although digital marketing can enhance product visibility and information accessibility, its direct contribution to sales turnover is likely to be limited, particularly in the short term. This limitation is reinforced by the dominant use of instant messaging applications and social media platforms among non-food enterprises, which mainly facilitate communication rather than transaction execution (BPS, 2021). Consistent with Fajri and Suryantini (2023), the low intensity and restricted functional use of digital media reduce the impact of internet marketing on business performance in non-food sectors, while Hagsten and Kotnik (2017) similarly find that the absence of a dedicated website is associated with negligible effects on transaction intensity. Taken together, these findings suggest that digital

marketing in non-food agribusiness primarily functions as a tool for expanding market reach and product exposure, with its effects on turnover emerging more gradually over time.

This finding is consistent with the study by Salonen et al. (2024), which demonstrates that digital marketing in business markets exerts a strong influence at the early stages of the customer journey, particularly in enhancing awareness, increasing product visibility, and expanding market reach. However, it does not directly lead to higher sales or revenue. The study emphasizes that digital marketing's limited direct impact on sales performance is not due to ineffectiveness, but rather to the characteristics of business purchasing processes, which are typically lengthy, involve collective decision-making among multiple stakeholders, and often result in conversions occurring outside digital channels. This interpretation also aligns with previous studies showing that digital marketing mainly supports market expansion rather than immediate sales growth. Sujana and Rosiana (2025) demonstrate that improved digital marketing practices enhance marketing performance among small entrepreneurs in Lampung, particularly through wider market reach while Cassetta *et al.*, (2020) find that online sales and website utilization facilitate access to international markets by enabling firms to identify partners with relatively low capital requirements. However, Hagsten and Kotnik (2017) report that online sales without website support do not significantly increase export intensity, highlighting the importance of selecting digital platforms that are appropriate for the target market. In the Indonesian context, most non-food agribusiness MSMEs remain unable to penetrate international markets because they rely primarily on basic communication tools such as instant messaging applications, have low internet usage intensity, and show limited adoption of advanced platforms such as websites or international marketplaces. Furthermore, the absence of significant effects from credit, capital, partnerships, associations, and government assistance (Table 3) indicates that digital marketing implementation is not sufficiently supported by a strong business ecosystem. The regression results also show that digital marketing adopters tend to be younger and less experienced entrepreneurs, which may constrain their ability to manage digital strategies effectively and, consequently, limit the potential of digital marketing to generate substantial improvements in turnover and profitability.

## CONCLUSION AND SUGGESTION

The findings conclude that innovations, human resource characteristics such as years of education, number of employees, and business status, and marketing training also positively influence digital marketing implementation. Entrepreneurial age and business experience, by contrast, negatively and significantly affect the likelihood of implementation. External factors, positively influence the decision to implement digital marketing, indicating that external support plays a vital role in enhancing digital exposure and skills among business actors. The empirical results further demonstrate that digital marketing implementation positively affects business performance, particularly in terms of market expansion. Digital marketing enables agribusiness MSMEs to reach broader markets. Although no statistically significant effect is observed on turnover and profit, market expansion is expected to strengthen efficiency and create long-term growth opportunities for non-food agribusiness MSEs.

To support a faster implementation of digital marketing among non-food agribusiness MSMEs, policy efforts may benefit from a more targeted orientation toward business profiles that exhibit higher readiness for digital practices. The empirical results suggest that education, innovation, labor size, and participation in marketing training are positively associated with the likelihood of digital marketing implementation, while younger entrepreneurs and newer businesses tend to display greater adaptability to digital strategies. In this context, acceleration-oriented initiatives could place greater

emphasis on marketing training and digital mentoring for young and newly established entrepreneurs who demonstrate commitment to business development, as indicated by formal business status. Focusing interventions on these segments may contribute to a more rapid implementation process and support earlier gains in market reach.

This study relies on cross-sectional data and therefore cannot capture the dynamic effects of digital marketing application on business performance over time. In addition, digital marketing is measured as a binary variable, which does not fully reflect differences in intensity or platform usage. Future research is recommended to employ panel data and more comprehensive measures of digital marketing to provide deeper insights, particularly for non-food agribusiness micro and small enterprises.

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