

The Role of Digital Readiness in Moderating the Influence of Electronic Customer Relationship Management (E-CRM) on MSME Business Performance

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Abstract. *This study aims to analyze the influence of Electronic Customer Relationship Management (e-CRM) on MSME business performance and examine the role of digital readiness as a moderating variable in this relationship. The background of the study is based on the still low level of adoption and utilization of digital technology by MSMEs, especially in customer relationship management, which has the potential to impact business performance sustainably. This study uses a quantitative approach with a survey method of 161 MSMEs in Central Java Province who have implemented digital marketing. Data were collected through questionnaires and analyzed using the Partial Least Squares– Structural Equation Modeling (PLS-SEM) method with the help of SmartPLS 4.0 software. The results of the study indicate that e-CRM has a positive and significant effect on MSME business performance. In addition, digital readiness has also been shown to have a positive and significant effect on business performance. The results of the moderation test revealed that digital readiness can strengthen the influence of e-CRM on business performance, which indicates that the implementation of e-CRM will provide more optimal results if supported by adequate digital readiness. These findings provide theoretical contributions in clarifying the inconsistencies in previous research results and provide practical implications for MSME actors and policy makers in designing strategies to strengthen digital transformation to improve MSME business performance sustainably.*

Keywords: *Business; Digital; Performance; Readiness.*

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of the Indonesian economy, contributing 61% to Gross Domestic Product (GDP) and absorbing 97% of the national workforce. However, in an era of increasingly fierce digital competition, MSMEs face significant challenges, ranging from limited market access, low technological skills, to suboptimal entrepreneurial capacity. In Central Java, data from the Cooperatives and SMEs Office shows that 70% of MSMEs are not yet digitally literate, while only 30% utilize digital technology in their business activities.

One strategy that is believed to be able to improve business performance is the implementation of Electronic Customer Relationship Management (e-CRM), namely the use of digital technology to build and manage relationships with customers more effectively.

However, previous research has shown inconsistent findings regarding the relationship between e-CRM and business performance. Research conducted by Hariyanto and Soelaiman (2021) found that CRM implementation significantly impacts MSME business performance. Conversely, research conducted by Suprianto et al. (2025) showed that e-CRM did not have a positive and significant impact on business performance. These discrepancies indicate a research gap regarding the role of e-CRM in MSME business performance, as well as the possibility of other factors influencing this relationship.

In the current context of digital transformation, digital readiness is becoming an increasingly important factor. Digital readiness encompasses the extent to which MSMEs possess the technological infrastructure, digital skills, and mental readiness to adopt new technologies. MSMEs with a high level of digital readiness tend to be better able to utilize e-CRM to improve their business performance. Research by Sadeghi Baloe et al. (2024) shows that digital readiness can significantly improve organizational performance. Therefore, this study proposes "Digital Readiness" as a moderating variable that moderates the influence of e-CRM on MSME business performance.

2. Research Methods

Based on the research objectives and the formulated conceptual framework, this study uses a quantitative approach with an associative research strategy. The quantitative approach was chosen because this study aims to examine the relationship between variables through statistically processed numerical data analysis. An associative strategy is a research approach used to identify and analyze the relationship or influence between two or more variables in a phenomenon being studied. In this study, there are three types of variables used: independent variables, dependent variables, and moderating variables. The independent variable consists of electronic Customer Relationship Management (e-CRM), while the dependent variable is business performance. Digital readiness acts as a moderating variable that strengthens the relationship between the independent and dependent variables. The main objective of this study is to analyze the effect of e-CRM on business performance, both directly and through the moderating role of digital readiness. To achieve this objective, this study uses a survey method as a data collection method. The survey method is a technique carried out by distributing research instruments in the form of questionnaires to respondents selected as a sample from a population, with the aim of obtaining relevant and representative empirical data on the phenomenon being studied.

3. Results and Discussion

3.1. Description of Research Results

This chapter will present the data collection and processing methods used in this study. The results obtained will serve as the basis for analysis and help answer the hypotheses proposed in this study. The data analysis technique used Smart Partial Least Squares (PLS) 4.0 software.

Sugiyono (2017) argues that a population is a generalized area consisting of objects or subjects with certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn. According to Sekaran and Bougie (2016), a population is the entire group of people, objects, events, or interesting things that the researcher wants to investigate. The population in this study was 197,539 MSMEs in Central Java (data: website of the Central Java Cooperatives and MSMEs Office).

This study used purposive sampling, a technique that involves taking samples based on specific considerations or criteria aligned with the research objectives, and is expected to answer the research questions (Sekaran and Bougie, 2016).

The following are the characteristics of respondents in this study:

- 1) Business actors or MSMEs operating in Central Java Province.
- 2) Has actively used CRM (Customer Relationship Management) in managing customer relationships, both application-based and social media; and
- 3) Consistently utilize digital marketing in sales and product promotion activities.

Sampling was conducted using a questionnaire distributed via Google Forms. Respondents could select answers from the provided options. The questionnaire was completed over a one-month period, from January 15, 2026, to February 14, 2026, with a total sample of 161 respondents collected. The 161 respondents were further classified based on their business domicile, turnover, and type of business.

The following is the classification data for respondents based on business domicile, according to data from 161 questionnaires that have been collected:

Table Classification Based on Business Domicile

Business Domicile	Frequency	Percentage (%)
Banjarnegara Regency	88	54.66
Sukoharjo Regency	14	8.70
Semarang City	9	5.59
Cilacap Regency	8	4.97
Purbalingga Regency	6	3.73
Kebumen Regency	6	3.73
Jepara Regency	4	2.48
Tegal Regency	4	2.48

Purworejo Regency	3	1.86
Banyumas Regency	3	1.86
Temanggung Regency	3	1.86
Magelang Regency	2	1.24
Boyolali Regency	2	1.24
Pemalang Regency	2	1.24
Pekalongan City	2	1.24
Demak Regency	2	1.24
Pati Regency	1	0.62
Karanganyar Regency	1	0.62
Blora Regency	1	0.62
Total	161	100%

Based on the data processing results in Table, it is known that the majority of respondents in this study came from Banjarnegara Regency, with a total of 88 respondents, or 54.66%. This indicates that this study was dominated by business actors located in that area. Next, Sukoharjo Regency came in second with 14 respondents (8.70%), followed by Semarang City with 9 respondents (5.59%), and Cilacap Regency with 8 respondents (4.97%).

Other regions, such as Purbalingga and Kebumen Regencies, each contributed 6 respondents (3.73%). Meanwhile, respondents from other regions, such as Jepara, Tegal, Purworejo, Banyumas, Temanggung, and several smaller regencies, showed a fairly diverse distribution, albeit in relatively low proportions.

Thus, the distribution of respondents' business domiciles reflects variations in regional characteristics that can enrich research analysis, particularly in understanding the dynamics of e-CRM implementation, digital readiness, and business performance in various regional contexts.

The following is the respondent classification data based on business type, according to 161 questionnaire data that have been collected:

Table Classification Based on Business Type

Type of business	Frequency	Percentage (%)
Service	57	35.40
Culinary	42	26.09
Fashion	22	13.66
General Trading	21	13.04
Craft	5	3.11
Other	14	8.70
Total	161	100%

Based on Table regarding the respondents' business types, it is known that the majority of respondents are engaged in the service sector, namely 57 businesses, or 35.40 percent of the total respondents. This finding indicates that the service sector remains the dominant sector in this study, reflecting the high role of service-based activities in the dynamics of respondents' businesses.

The culinary business sector came in second with 42 businesses, representing 26.09 percent. The high proportion of culinary businesses indicates that this sector plays a significant role in the respondents' business structure, reflecting the relatively adaptable nature of MSMEs to market needs and digital developments.

Fashion businesses accounted for 22 businesses, or 13.66 percent, followed by general trade businesses, at 21, or 13.04 percent. Both sectors played a significant role in supporting respondents' economic activity, particularly in marketing and customer relations.

Meanwhile, craft businesses accounted for only 5 businesses, or 3.11 percent, and other business categories accounted for 14 businesses, or 8.70 percent. Despite their relatively small numbers, these sectors still provide a variety of business characteristics that enrich the research analysis.

Overall, the distribution of respondents' business types indicates that this study covers a diverse range of business sectors, with a predominance in the service and culinary sectors. This situation suggests that e-CRM implementation and digital readiness are highly relevant for analysis in supporting improved business performance across various business types.

The following is data on respondent characteristics based on business turnover, according to 161 questionnaires that have been collected:

Table Classification Based on Business Turnover

Annual Turnover	Frequency	Percentage (%)
0 – 2 Billion	128	79.50
2 – 15 Billion	29	18.01
Over 15 Billion	4	2.48
Total	161	100%

Based on Table regarding respondents' business turnover data, it is known that the majority of respondents have business turnover in the range of 0 to 2 billion rupiah per year, namely 128 businesses or 79.50 percent of the total respondents. This finding indicates that the majority of respondents are in the micro and small business category, which is a dominant characteristic in the structure of MSMEs in Indonesia.

Furthermore, 29 businesses, or 18.01 percent, had a turnover of between 2 and 15 billion rupiah. This group reflects businesses that have grown to a medium scale, with relatively more stable business capacity and a higher potential for digital technology adoption. Meanwhile, four businesses, or 2.48 percent, had a turnover of over 15 billion rupiah. Although a relatively small proportion, this group demonstrates the representation of larger-scale businesses in this study.

Overall, the distribution of respondents' business turnover indicates that this study is dominated by micro and small businesses. This situation is relevant to the research objectives, particularly in analyzing the role of e-CRM and digital readiness in improving MSME business performance.

The following is data on respondent characteristics based on age, according to data from 161 questionnaires that have been collected:

Table Classification Based on Age

Age	Amount	Percentage (%)
30–39 years	90	55.90
40–49 years	41	25.47
20–29 years	24	14.91
Over 50 years old	6	3.73
Total	161	100.00

Based on Table, the results of the respondent age classification, the majority of MSMEs who participated in this study were in the 30–39 year age range, with a total of 90 respondents, or 55.90% of the total respondents. This finding indicates that most business actors are in the productive age category, possessing adaptability, business experience, and relatively good readiness to utilize digital technology to support business activities. This age group generally has the characteristics of being more active in developing their businesses, open to innovation, and having a higher business growth orientation compared to other age groups.

Furthermore, 41 respondents, or 25.47%, were aged 40–49. This percentage indicates that middle-aged entrepreneurs also contributed significantly to this study. This age group generally has more mature business experience, enabling them to maintain business stability, although in some circumstances, their level of adaptation to digital technology may be lower than that of younger age groups.

Meanwhile, 24 respondents, or 14.91%, were aged 20–29. This number indicates that young entrepreneurs are beginning to participate in digital-based MSME development. Younger age groups tend to be quicker to embrace technological change, possess high creativity, and are more responsive to the implementation of digital systems such as electronic customer relationship management (eCRM) in business activities.

Respondents aged 50 and over were the smallest group, representing 6 people (3.73%). The low number of respondents in this category indicates that older entrepreneurs are relatively less involved in the use of digital technology or developing e-businesses. This could be influenced by limited technological adaptation, a preference for conventional business systems, or differences in business management patterns.

Overall, the age distribution of respondents in this study indicates a predominance of MSMEs in the productive age group, particularly those aged 30–39. This indicates that the majority of respondents have considerable potential to support eCRM implementation and digital readiness to improve MSME business performance.

Descriptive analysis provides an overview or description of data seen from the average (mean), median, standard deviation, maximum, minimum values (Ghozali, 2014).

Based on the results of descriptive statistical data processing, the table shows the mean, median, minimum value (observed min), maximum value (observed max), and standard deviation of each indicator in the research variables, namely e-CRM (CRM), Business Performance (KB), and Digital Readiness (KD).

Overall, all indicators had a mean score above 4.00, indicating that respondents' perceptions of all statements were high. This suggests that respondents tended to give positive assessments of e-CRM implementation, digital readiness, and business performance.

The following is the design and output of the structural model from the research data processed using SmartPLS 4.0:

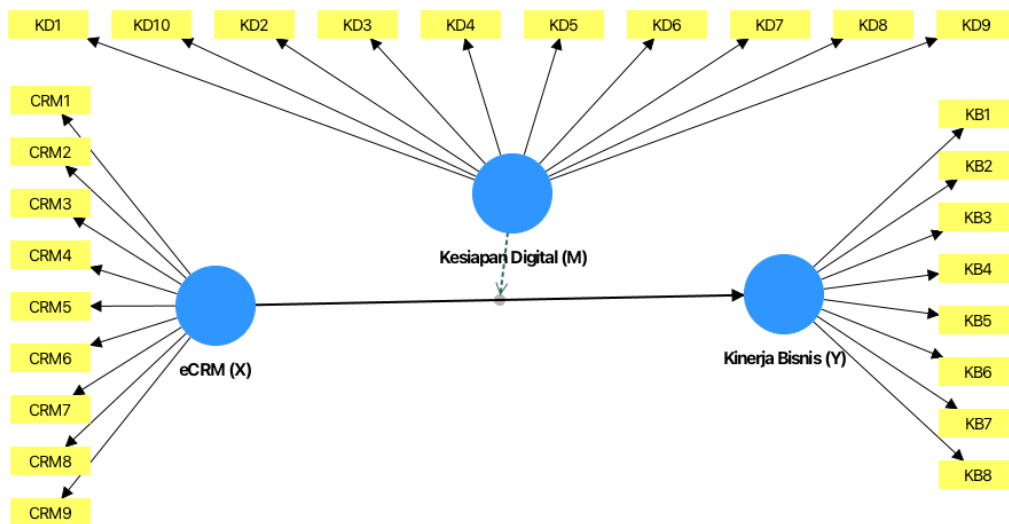


Figure Structural Model Design

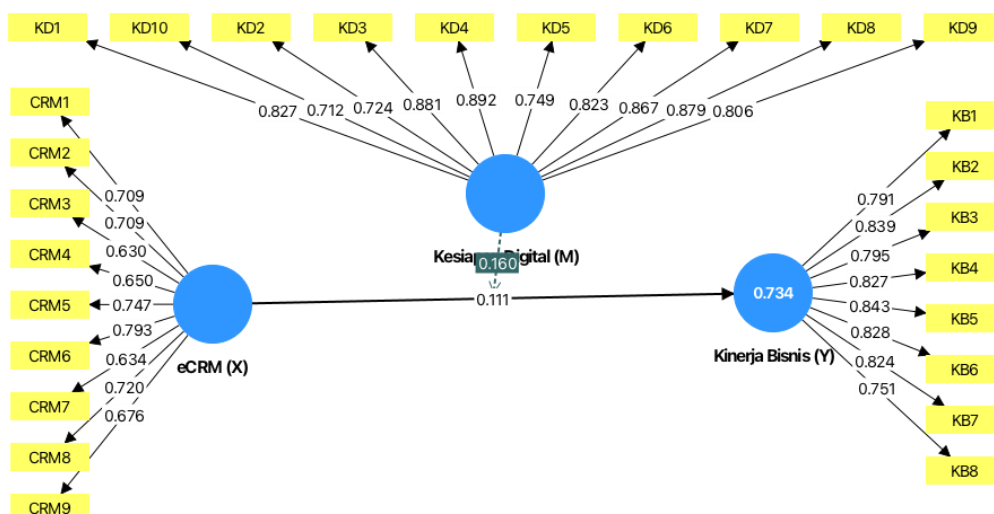


Figure Structural Model Output

1) Test of the Coefficient of Determination (R²)

According to Sugiyono (2017), the coefficient of determination (R²) is used to determine the extent to which the independent variable can explain the dependent variable. The coefficient of determination value is in the range of zero (0) and one (1).

- a. If the R² value = 0, then there is no influence given between the independent variable and the moderating variable or there is no influence given between the moderating variable and the dependent variable.
- b. If the R² value = 1, then there is a full influence given between the independent variable and the moderating variable or there is a full influence given between the moderating variable and the dependent variable.

Table Results of the Determination Coefficient Test

	R-square	R-square adjusted
Business Performance (Y)	0.734	0.729

Based on the results of the determination coefficient test in Table 4.9, an R square value of 0.734 was obtained, indicating that 73.4% of the variation in Business Performance (Y) can be explained by the independent variables used in the research model. The Adjusted R-square value of 0.729 indicates that after adjusting for the number of variables and research samples, 72.9% of changes in Business Performance can still be explained by the model. Thus, referring to Sugiyono's (2017) criteria, an R value approaching 1 indicates that the model has strong explanatory power, while the remaining 27.1% is influenced by other variables outside the research model.

According to Ghozali (2016), F-square is a test used to determine the quality of a model. It measures the change in R-squared value when a particular construct is used. F-squared values of 0.02 (small), 0.15 (medium), and 0.35 (large) can be interpreted to determine whether the predictor variable has a weak, medium, or large structural influence:

Table F Square test results

	f-square	Information
eCRM (X) -> Business Performance (Y)	0.031	Small
Digital Readiness (M) -> Business Performance (Y)	1,617	Big
Digital Readiness (M) x eCRM (X) -> Business Performance (Y)	0.072	Small

The f-square value for the relationship between e-CRM and business performance was 0.031, which falls into the small effect category. This result indicates that although e-CRM has a significant influence on business performance, its practical contribution is relatively limited compared to other variables in the model. Thus, e-CRM plays a supporting role in improving business performance, but not as a primary factor.

The relationship between Digital Readiness and Business Performance has an f-square value of 1.617, which falls into the large effect category. This value indicates that digital readiness

makes a very dominant contribution in explaining variations in business performance. In other words, changes in the level of digital readiness will have a significant and substantial impact on improving or deteriorating business performance.

The f-square value for the relationship between Digital Readiness and e-CRM on Business Performance is 0.072, which is categorized as a small effect. This result indicates that although the moderating effect of digital readiness is statistically significant, its practical strength is relatively small. This means that digital readiness acts as a factor that strengthens the relationship between e-CRM and business performance, but its moderating contribution is not as large as the direct influence of digital readiness on business performance.

The Q-Square test can measure how well the observation values generated by the model and also its parameter estimates (Ghozali, 2016). The Q-square value has the same meaning as the coefficient of determination (R-square) in regression analysis, where a Q-square value greater than 0 (zero) indicates that the model has predictive relevance. Meanwhile, if the Q-square value is less than 0 (zero), then the model has little or no predictive relevance (Chin, 1998).

Table Q Square Test Results

	Q²predict	RMSE	MAE
Business Performance (Y)	0.712	0.542	0.429

Based on the Q-Square test results in Table, the Q²predict value was 0.712 for the Business Performance (Y) variable. This value is greater than zero, thus concluding that the research model has good predictive ability and is relevant in explaining Business Performance. Furthermore, the RMSE value of 0.542 and MAE of 0.429 indicate a relatively low level of prediction error, thus strengthening the conclusion that the model has adequate predictive accuracy.

Standardized Root Mean Square Residual (SRMR) is an absolute measure of model fit that describes the average difference between the empirical correlation matrix and the correlation matrix predicted by the model. In the context of SEM-PLS, SRMR is used as a global fit indicator to evaluate the extent to which the overall model is able to represent the empirical data. SRMR characteristics:

- c. The smaller the SRMR value → the better the model fit
- d. Does not depend on sample size
- e. Suitable for variance-based SEM (PLS-SEM)

Table Correlation of Hypothesis with Data Analysis Results

Hypothesis	Coefficient	T Statistics	P Values	Decision

H1: e-CRM has a positive and significant effect on performance Business	0.111	2,120	0.034	Accepted
H2: Digital Readiness moderates The influence of e-CRM on business performance	0.160	3,575	0.000	Accepted

3.2. Results and Discussion

1) The Impact of e-CRM on Business Performance

Hypothesis testing results indicate that electronic Customer Relationship Management (e-CRM) has a positive and significant impact on MSME business performance. This confirms that utilizing digital technology to manage customer relationships can improve business performance, although the magnitude of the effect is relatively small.

Based on the research instrument, e-CRM is measured using CRM1–CRM9 indicators, which reflect the operational and strategic dimensions of digital-based customer management. These indicators include:

- a. digital customer service accessibility (CRM1),
- b. speed and accuracy of response to customers (CRM2),
- c. ease of service process (CRM3),
- d. utilizing customer data to understand needs and behavior (CRM4–CRM5),
- e. digital-based internal coordination (CRM6),
- f. external collaboration through digital platforms (CRM7),
- g. use of various digital channels (CRM8), as well as
- h. consistency of customer experience across channels (CRM9).

In the context of MSMEs, these indicators illustrate that the implementation of e-CRM is not only limited to the use of social media or marketplaces, but also includes the ability to manage customer data, build ongoing interactions, and create consistent customer experiences.

However, the relatively small coefficient indicates that most MSME respondents are likely still at the operational stage of e-CRM utilization, having not yet reached strategic stages such as in-depth customer data analysis or optimal cross-platform integration. Therefore, while e-CRM has been shown to improve business performance, its impact has not been maximized.

2) The Role of Digital Readiness in Moderating the Relationship between e-CRM and Business Performance

The results of the study indicate that digital readiness acts as a moderating variable that strengthens the relationship between e-CRM and business performance. This means that the effectiveness of e-CRM in improving business performance is greatly influenced by the level of digital readiness of MSMEs. Based on the research instrument, digital readiness is measured through KD1–KD10, which conceptually reflect three main dimensions:

a. Digital Infrastructure

a) Availability of digital devices (KD1)

b) Internet connection quality (KD2)

3) Digital Competence

a. Ability to operate digital applications (KD3)

b. Ability to use technology for sales (KD4)

c. Adaptability to digital systems in business operations (KD6–KD8)

4) Organizational Attitude and Readiness

a. Belief in the benefits of technology (KD5)

b. Readiness to adopt digital transformation (KD9–KD10)

This moderating role demonstrates that e-CRM will have a much greater impact when supported by strong digital readiness. MSMEs with adequate equipment, stable connections, and strong digital skills and mindsets will be better able to:

a. make optimal use of customer data,

b. integrating various digital platforms,

c. and consistently improve the quality of customer service.

Conversely, in MSMEs with low digital readiness, e-CRM implementation tends to be limited and insignificant. This is because the technology is only partially used without adequate competency and system support. Therefore, digital readiness serves as a strengthening variable that determines the success of e-CRM in improving business performance.

4. Conclusion

Based on the results of the data analysis and discussion that has been carried out, it can be concluded that several conclusions were drawn as follows: The results of the study show that e-CRM has a positive and significant impact on business performance. This finding indicates that digital technology-based customer relationship management is capable increase marketing effectiveness, customer loyalty, and performance achievements business as a

whole. Digital readiness has been shown to have a positive and significant impact on performance. business. This shows that the business's ability to prepare digital infrastructure, human resources, and business processes based on technology is a key factor in improving competitiveness and performance business. The results of the moderation test show that digital readiness is capable of strengthen the influence of e-CRM on business performance. In other words, implementing e-CRM will provide a more optimal impact if supported by an adequate level of digital readiness. The coefficient of determination (R-square) value obtained shows that the research model has strong explanatory power, so that the e-CRM variables and digital readiness simultaneously explain substantial variations in business performance. Overall, the research results confirm that business performance is not is determined not only by the adoption of technology alone, but also by readiness organizations in managing and utilizing the technology effectively. effective.

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