



MARKETING PERFORMANCE IMPROVEMENT MODEL THROUGH DIGITAL INNOVATION OF BANKING PRODUCTS: MODERATION ROLE OF DIGITAL LITERACY

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Abstract

This study aims to explore the improvement of marketing performance by digital service quality through digital innovation of banking products, with digital literacy moderation. The design of this study is an explanatory survey of 384 Bank Mandiri customers who use the Livin' by Mandiri application in Region VI/Java 1 under the West Java Regional Office. Data analysis is a descriptive and verification method using Partial Least Square (PLS). The findings are that Bank Mandiri's marketing performance can be implemented well through digital innovation of banking products, which is based on the quality of digital services, strengthened by digital literacy. The novelty is related to placing the Digital Innovation of Banking Product variable as a mediator, and Digital Literacy as a moderation. The implication is that Bank Mandiri needs to elaborate digital innovation of banking products to ensure the products and services align with customer expectations and needs in marketing performance.

Keywords: marketing performance; digital innovation; banking products; digital service quality; digital literacy

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INTRODUCTION

Every company aims to achieve sustained growth and long-term survival. In today's highly competitive and complex global landscape, companies—particularly in the banking sector—must continuously adapt through strategic marketing plans to secure their market position and foster growth. Effective marketing strategies in banking include tailoring services to evolving customer needs, enhancing customer loyalty, and differentiating offerings from competitors. Hendarsih and Harjunawati (2020) further emphasize that as banks grow their market share, they expand company assets, which strengthens their long-term viability. Despite thin profit margins, the banking industry remains profitable due to its extensive market reach; nearly everyone requires financial services. This approach is essential for maintaining growth in an increasingly competitive environment.

Indonesia's four largest banks—BBCA, BBRI, BMRI, BBNI—and the digital bank ARTO account for a quarter of the Indonesia Stock Exchange (IDX) market capitalization, underscoring banking's central role in Indonesia's economy. In contrast, the three major Southeast Asian banks—DBS, UOB, and OCBC—contribute nearly a third (29%) to Singapore's total stock market value of SG\$ 622.59 billion (Hidayah, 2023). Bank Mandiri, a leading state-owned bank, ranks high in Indonesia's banking sector, although the top marketing performance growth is seen in foreign banks. This market presence highlights the competitive landscape, with Bank Mandiri positioned as a strong contender within Indonesia's state-owned banking segment. The one that experienced the lowest growth was the BPD Bank (Regional Development Bank). Competition between banking groups in Indonesia is clearly visible, especially in banking groups whose largest shareholders are the

government and private banks. The competition occurs not only in terms of competing for market share but also in the growth of the number of banks and bank office units from each banking group (Astuti et al., 2022).

The decline in marketing performance is inseparable from weak sales growth, customer growth, and the success of banking products (Al-Hila et al., 2017). The decline in Bank Mandiri's performance from 2018 to 2022, one of which is the Covid-19 pandemic and the lack of digital technology innovation for banking products in developing their marketing so that they lose out to other state-owned banks, especially Bank BRI and private banks such as Bank BCA. The decline in Bank Mandiri's marketing performance compared to other banks (both state-owned and private) during the 2018-2022 period can be caused by a combination of internal and external factors. The banking industry must develop effective marketing strategies to face competition challenges. One way to do this is by building synergy between business and consumers and retail banking to improve marketing performance, expand the business, and focus on attractive economic sectors, regions, and segments to increase third-party funds, healthy credit expansion, and profits (Amin, 2016).

Banking businesses must pay attention to market orientation and marketing capabilities. Market orientation inspires companies to implement innovative methods and provides a competitive advantage in improving company performance (Tutar et al., 2015). However, companies must pay attention to innovation to achieve a competitive balance. It is how companies use new and existing resources to increase their potential. Innovation is distinguished by various standards: administrative and technological innovation, product and process innovation, and radical and incremental innovation (Blichfeldt and Faullant, 2021). Marketing performance is essential for developing new products, starting from knowing what consumers and competitors want and thinking about how to develop new products (Nylén and Holmström, 2015). Innovation is one of the critical factors for a company's long-term success in today's competitive market (Feyen et al., 2020; Sufyani and Cahbana, 2024).

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Adopting digital banking innovations brings significant benefits, including increased operational efficiency and the ability to offer more personalized, relevant services to customers (Dasho et al., 2016). High digital service quality—characterized by efficiency, system availability, fulfillment, and privacy/security—can drive customer satisfaction and trust, further encouraging the adoption of digital innovations and improving a bank's marketing performance (Mir et al., 2022). However, there are also challenges to implementing these innovations. Significant investment and time are often required, and if implementation falls short, banks may face financial losses and damage to their reputation (Scott et al., 2017). Common issues in digital service quality, such as slow access speeds, difficulty in navigating digital platforms, and inconsistent service reliability, have yet to meet customer expectations at Bank Mandiri. Additionally, the personalization of services through customer data is still underutilized, and digital security remains a significant concern for many customers (Mbama and Ezepue, 2018). In theory, the digital service quality should strongly influence the digital innovation of banking products and, by extension, the marketing performance of banks. Empirically, however, improvements are necessary to meet these expectations fully. Enhancing digital literacy among customers could serve as a moderating factor, strengthening the link between digital innovation and marketing performance by increasing customer readiness and confidence in using digital banking products. With greater digital literacy, customers can engage more effectively with digital banking, maximizing the benefits of the innovations introduced (Hidayat-ur-Rehman, 2024).

Based on the previous analysis, several research, empirical, and theoretical gaps emerge. First, in terms of research gaps, there are few studies that specifically examine how digital service quality affects both digital innovation in banking products and overall marketing performance. The relationship is not fully understood, particularly regarding which aspects of digital service quality—such as ease of use or security—have the most influence on driving digital innovation and improving performance. Additionally, studies exploring digital literacy as a moderating factor in this relationship are limited, especially in the context of Indonesian banks. Specifically, there is a notable lack of research focusing on the role of digital literacy in the Indonesian banking sector. While digital literacy could enhance customer engagement with digital banking products, few studies have examined this role (Kabakus et al., 2023), particularly in Bank Mandiri's operations in West Java. This study can significantly contribute to understanding the dynamics between digital service quality, digital innovation, digital literacy, and marketing performance within Bank Mandiri, especially in West Java.

The study of the influence of digital service quality on marketing performance, with digital innovation of banking products as mediation and digital literacy as moderation, can refer to Marketing Management Theory (Keller and Kotler, 2016) as a grand theory. Marketing Management Theory focuses on how companies plan, implement, and control marketing strategies to achieve business goals. This theory covers various aspects such as market segmentation, target market determination, positioning, product development, promotion, distribution, and customer relationship management. In this study, Marketing Management Theory can provide a framework for analyzing how banks manage and optimize their marketing strategies and performance, including digital product innovation. In the context of digital innovation of banking products as mediation, Marketing Management Theory will help explore how this innovation can improve marketing performance through more effective product management and responsiveness to market needs (Csikósová et al., 2016).

The middle-range theories used in this study are the Resource-Based View (RBV) (Barney et al., 2011; Barney and Clark, 2007) and the Technology Acceptance Model (TAM) (Alharbi and Drew, 2014). In this regard, RBV provides an internal perspective highlighting the importance of resources and capabilities owned by banking companies (in this case, Bank Mandiri), such as digital innovation of banking products, as a source of competitive advantage that can improve marketing performance. RBV is a theory that views an organization's internal resources as the main determinants of competitive advantage and company performance. In this context, digital service quality and digital innovation of banking products can be considered strategic resources to improve a company's marketing performance, including in the banking sector. TAM explains how users adopt and use technology, which is influenced by perceived usefulness and perceived ease of use. In the context of this study, TAM can be used to understand how customers receive the quality of digital services and digital innovation of banking products, as well as how they affect marketing performance.

Referring to the applied theories, this study includes Digital Service Quality, Digital Innovation of Banking Products, Digital Literacy, and Marketing Performance. Digital Service Quality is based on theories applied in the digital context. Digital service quality can include reliability, responsiveness, trust, and user experience in interactions through digital platforms (Raza et al., 2020). Digital Innovation of Banking Products is related to innovation in the Diffusion of Innovations theory, which shows how new technologies or unique digital products in banking are adopted by consumers and influence behavior and purchasing decisions (Flejterski and Labun, 2016). Digital Literacy theory refers to consumers' ability to understand, evaluate, and utilize information from digital media effectively, influencing how they utilize digital banking services (Hidayat-ur-Rehman, 2024). Marketing Performance is related to the Marketing Performance theory, which emphasizes measuring the effectiveness of marketing strategies in achieving goals such as increasing market share, sales, and consumer loyalty in a dynamic business environment (Al-Hila et al., 2017; Sutarso et al., 2023; Wasito et al., 2024).

Digital service quality builds on the broader concept of service quality, which reflects customers' perceptions of how well a company's service meets or exceeds their expectations. Service quality is typically assessed using five key dimensions: reliability, responsiveness, assurance, empathy, and tangibles. In banking, reliability refers to the consistency of service, such as accurate transaction processing and dependable online services. Responsiveness involves the speed and willingness of bank staff to assist, such as providing prompt support for account issues. Assurance means creating customer trust through knowledgeable and courteous staff, while empathy reflects the bank's understanding and attentiveness to individual customer needs. Tangibles include the physical aspects, such as the appearance of facilities, ATM access, and user-friendly digital interfaces (Raza et al., 2020). Studies reinforce the importance of these dimensions. AlOmari (2020) found that reliability and assurance significantly boost customer trust in digital banking, while Michalski and Montes-Botella (2021) emphasize that empathy and responsiveness are critical for maintaining satisfaction, particularly in customer support interactions. Raza et al. (2020) demonstrated that tangibles, including digital platform design and ease of navigation, directly impact customer perceptions of service quality in the banking sector. Overall, strong

service quality builds customer satisfaction and loyalty, enhances company performance, and strengthens reputation across various sectors, including banking (AlOmari, 2020; Michalski and Montes-Botella, 2021; Raza et al., 2020).

In addition to SERVQUAL, two other models are often used to measure service quality, namely SERVPERF (Service Performance Model) and ESQUAL (Electronic Service Quality) Model. SERVPERF is a model developed as an alternative to SERVQUAL, focusing on the actual performance of the service rather than comparing it to customer expectations (Torres Frago and Luna Espinoza, 2017). ESQUAL is a model specifically designed to measure the quality of electronic services or services provided through digital platforms. This model includes four main dimensions: efficiency (ease and speed of use of online services), system availability (reliability and availability of the system), fulfillment (compliance with service promises, such as on-time delivery), and privacy/security (data and transaction security) (Zia et al., 2022). ESQUAL is widely used to assess the quality of services provided through digital channels such as websites and mobile applications. Previous studies have stated four dimensions for measuring digital service quality: efficiency, system availability, fulfillment, and privacy/security (Mir et al., 2022; Raza et al., 2020; Zia et al., 2022).

Digital innovation of banking products is one of the developments of product innovation implemented by banking through digitalization. In general, innovation is creating, developing, and implementing new ideas or improvements to existing products, services, or processes to increase value or efficiency. Innovation can appear in various forms, including product, process, business model, or technology innovation. This innovation usually aims to provide better solutions to market needs or increase the company's competitiveness (Walsh et al., 2021). One important innovation is product innovation. Product innovation refers to introducing new products or significant improvements to existing products, either in design, function, or technology (Blichfeldt and Faullant, 2021). Product innovation aims to meet changing consumer needs, improve product performance, or create added value that can increase the attractiveness of products in the market and expand the company's market share. Digital banking product innovation refers to developing and implementing banking products that utilize digital technology to provide more accessible, secure, and responsive services to customers (Flejterski and Labun, 2016). Specifically, this study adopts a digital innovation approach, which is the use of digital technology to create new products, services, or business models that provide more value to customers and companies (Flejterski and Labun, 2016; Scott et al., 2017; Teece, 2017), namely: Feature Innovation, Function Innovation, and Security Innovation.

Marketing performance is a measure of how effectively a company's marketing strategy achieves its goals, using indicators such as market share, customer satisfaction, customer loyalty, and profitability. In banking, marketing performance reflects how well a bank achieves strategic objectives through its marketing efforts, including increasing customer numbers, expanding product offerings, and enhancing customer satisfaction and loyalty (Alhawamdeh et al., 2024). For example, Bank A may grow its customer base by launching a targeted digital campaign for young adults, offering online-only account incentives that drive new account openings. Similarly, Bank B might improve customer satisfaction by introducing 24/7 support through a user-friendly mobile app, which enhances customer convenience and boosts loyalty. These efforts illustrate how banks can successfully leverage marketing to meet specific goals, underscoring the unique characteristics of marketing performance within the banking sector. In the banking sector, marketing performance is also assessed based on the bank's success in adopting digital technology, product innovation, and high-quality services to meet customer needs and create a competitive advantage in the market (Sutarso et al., 2023). Marketing performance can be seen from marketing efficiency and effectiveness, which can lead to financial and customer performance. Non-financial output measurements usually lead to customer satisfaction, customer loyalty, and brand equity (Iglesias et al., 2020). Based on previous relevant research, this marketing performance measurement refers to (1) marketing performance effectiveness, (2) marketing performance efficiency, and (3) customer loyalty (Al-Hila et al., 2017; Gao, 2010; Sutarso et al., 2023).

Marketing performance in the banking sector measures how effectively a bank achieves its strategic objectives through marketing efforts, which may include expanding its customer base, improving customer satisfaction, and boosting profitability. Key indicators such as market share, customer loyalty, and brand image are essential in assessing the success of a bank's marketing strategy (Alhawamdeh et al., 2024). In recent years, the adoption of digital technologies—such as mobile banking apps and online service platforms—has had a transformative impact on marketing performance, allowing banks to reach a broader audience and offer more personalized, convenient services. For instance, the introduction of mobile banking apps has not only increased customer engagement but also strengthened loyalty by providing accessible and seamless financial services. Digital literacy plays a crucial role in optimizing these digital innovations within the banking sector. It is the ability of individuals to use digital technologies effectively and efficiently, encompassing knowledge and skills to access, understand, and communicate through digital tools (Kabakus et al., 2023; Rusliati et al.,

2024). For customers, digital literacy in banking includes (1) Understanding of Digital Banking Technology, (2) Digital Security Awareness, and (3) Navigation and Usage Skills (Hidayat-ur-Rehman, 2024; Panos and Wilson, 2020; Suparno et al., 2023). Higher levels of digital literacy among customers enable them to use banking apps and online services more confidently, which can drive increased customer satisfaction and loyalty, ultimately enhancing marketing performance.

Referring to several relationships between variables based on relevant previous research, a research paradigm can be formulated as in Figure 1.

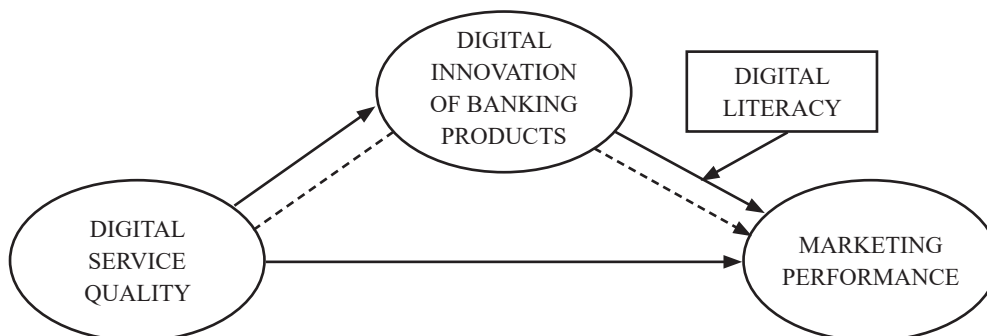


Figure 1. The Graphics Sample Line Should Use a Contrasting Color

Based on this paradigm, the following hypothesis can be formulated:

Hypothesis 1: digital service quality positively affects the digital innovation of banking products

Hypothesis 2: digital service quality positively affects the marketing performance

Hypothesis 3: digital innovation of banking products positively affects the marketing performance

Hypothesis 4: digital innovation of banking products mediates the relationship between digital service quality and marketing performance

Hypothesis 5: digital literacy moderates the relationship between digital innovation of banking products and marketing performance.

METHOD

The subjects of this study are active users of the Livin' by Mandiri app in Region VI/Java 1 under the West Java Regional Office, excluding users in Bekasi, Depok, and Bogor, amounting to 2,986,550 customers. This demographic is relevant to the study's objectives because it captures a wide range of customer experiences and interactions with Mandiri's digital banking services, providing insights into factors influencing the usage and satisfaction with these services in West Java.

To ensure statistically significant results, a minimum sample size of 384 respondents was established, calculated based on a 95% confidence level and a 5% margin of error, sufficient for large population research. Random sampling was employed to enhance the representativeness of the sample, ensuring diverse customer characteristics within the target region are included.

A quantitative approach was applied, using a questionnaire as the primary data collection tool. The survey was designed to evaluate specific aspects of each variable: customer perceptions of digital service quality, digital literacy, and customer satisfaction with the Livin' app. A 9-point interval scale allowed respondents to provide nuanced, subjective assessments for each indicator.

The instrument underwent a pilot test to refine the questionnaire items and ensure clarity and relevance. Validity and reliability tests followed, confirming the robustness of the instrument before full distribution. After data collection and coding, descriptive analysis was conducted to characterize each variable, followed by causal analysis to assess the relationships between variables. Partial Least Squares (PLS) analysis was chosen due to its effectiveness in handling complex models and exploring variable relationships within the study's framework.

RESULTS

Based on the findings from the description of each variable in this study, a recapitulation can be made regarding the achievement value, ideal value, average, standard deviation, percentage, and category. In Table 1, a recapitulation of the description of each variable is presented.

Table 1. Recapitulation of the Description of Each Variable

Variables	Obtained Score	Ideal Score	Mean	S.D.	%	Category
Digital Service Quality (X ₁)	35,248	41,472	7.65	1.23	85.0	High
Digital Innovation of Banking Products(X ₂)	26,580	31,104	7.69	1.20	85.5	High
Marketing Performance (Y)	26,207	31,104	7.58	1.24	84.3	High
Digital Literacy (Mod)	26,341	31,104	7.62	1.26	84.7	High

The mean value of each variable is slightly different, which shows how well the respondents perceive each variable measured in this study. All variables have high mean values, with little difference between them. Although Marketing Performance has the lowest mean, this does not reduce the positive perception that respondents generally hold. The Marketing Performance variable has the lowest mean (7.58) among the variables, suggesting potential challenges in fully optimizing marketing outcomes compared to digital service quality, innovation, and literacy. This could indicate that while digital innovations and service quality are strong, translating these advantages into measurable marketing performance may require additional strategies, such as enhancing customer engagement or brand differentiation.

Based on the research model and the proposed hypothesis, the measurement model estimation is carried out, and the structural model estimation is carried out. The measurement model can be seen from several criteria, namely (1) Indicator Reliability, which reports the loading value of each indicator (or dimension) on each construct (latent variable), with an ideal value above 0.7; (2) Internal Consistency Reliability, namely by referring to Composite Reliability (CR) and Cronbach's Alpha (CA) for each construct and the value must also be more than 0.7; (3) Convergent Validity or Discriminant Validity, namely reporting the Average Variance Extracted (AVE) for each construct whose value is expected to be greater than 0.5; (4) Discriminant Validity using the Fornell-Larcker criterion or Heterotrait-Monotrait ratio (HTMT). These criteria are essential for ensuring the reliability and validity of the measurement model, confirming that constructs are accurately represented, internally consistent, and distinct from one another, ensuring robust analysis.

Outer Path refers to the relationship between latent variables and their indicators (observed variables) in a structural model, indicating how well the indicators represent the latent constructs. Coefficients are numerical values representing the strength and direction of the relationship between variables in a model. A higher coefficient indicates a stronger relationship. Bootstrapping in PLS is a resampling technique used to estimate standard errors and assess the statistical significance of model parameters. The standard deviations (S.D.) measures the variability or dispersion of data points around the mean, indicating data consistency. The t-statistic is a measure used to determine whether a coefficient is significantly different from zero. A higher t-statistic suggests stronger evidence against the null hypothesis (no effect). And p-values: Represents the probability that the observed results occurred by chance. A p-value less than 0.05 typically indicates statistical significance, meaning the results are unlikely to be due to random variation. The notes reveal the significance information that Sig in this context is significant while N/S is not significant. Table 2 presents reliability indicators that show the outer path loadings values for each manifest and latent variable, complete with coefficient values (Coef.) with bootstrap results, standard deviations (S.D.), t-statistics (t-stat), probability values (p-value), and significance information (notes).

Table 2. Indicator Reliability (Outer Path Loadings)

Outer Path	Coef.	Bootstrap	S.D.	t-stat	p-value	Notes
X ₁₁ ← X ₁	0,929	0,929	0,009	103,354	0,000	Sig.
X ₁₂ ← X ₁	0,944	0,943	0,009	105,157	0,000	Sig.
X ₁₃ ← X ₁	0,924	0,923	0,010	88,394	0,000	Sig.
X ₁₄ ← X ₁	0,930	0,929	0,009	101,322	0,000	Sig.
X ₂ *XMod ← Mod. Effect	1,102	1,095	0,064	17,133	0,000	Sig.
X ₂₁ ← X ₂	0,958	0,957	0,006	164,557	0,000	Sig.
X ₂₂ ← X ₂	0,943	0,943	0,008	114,190	0,000	Sig.
X ₂₃ ← X ₂	0,950	0,949	0,007	132,268	0,000	Sig.
Xmod1 ← XMod	0,928	0,927	0,009	99,887	0,000	Sig.
Xmod2 ← XMod	0,876	0,874	0,015	56,705	0,000	Sig.
Xmod3 ← XMod	0,936	0,936	0,007	132,554	0,000	Sig.
Y ₁ ← Y	0,864	0,864	0,020	43,657	0,000	Sig.
Y ₂ ← Y	0,939	0,939	0,008	121,427	0,000	Sig.
Y ₃ ← Y	0,925	0,925	0,009	102,986	0,000	Sig.

Source: Developed from SmartPLS Output (2024)

Table 2 basically shows that all values of the outer path are more than 0.7 (proven by the bootstrapping process resulting in t-stat and p-value that meet the reliability criteria). This indicates that each indicator is able to consistently reflect the construct being measured, as indicated by a significant outer loading value and a p-value below 0.05. The calculation of Internal Consistency Reliability shows the reliability of internal consistency through the estimation of Composite Reliability (CR) and Cronbach's Alpha (CA) for each construct. Having values above 0.7 is important for the study's validity because it ensures that the indicators strongly represent the underlying constructs, which supports the accuracy and consistency of the measurements. This strengthens the analysis by confirming that the model's variables are reliably captured, leading to more credible conclusions. Table 3 presents the results of these calculations.

Table 3. Internal Consistency Reliability

Construct	Cronbach's Alpha	Composite Reliability
Moderating Effect 1	1,000	1,000
X ₁ - Digital Service Quality	0,949	0,963
X ₂ - Digital Innovation of Banking Products	0,946	0,965
XMod - Digital Literacy	0,901	0,938
Y - Marketing Performance	0,896	0,935

Source: Developed from SmartPLS Output (2024)

Table 3 shows that all CR and CA values for each latent variable (construct) are above 0.7, indicating that each construct has good internal reliability and adequate internal consistency. Thus, it can be ascertained that the indicators used to measure the construct have a high correlation. The calculation of convergent validity or discriminant validity here can use the Average Variance Extracted (AVE) criterion for each construct. It is a measure used to assess how much of the variance in a set of indicators (or questions) is explained by the construct (or concept) they are supposed to measure. In simpler terms, it tells us how well the indicators reflect the underlying concept. An AVE value above 0.5 suggests that more than half of the variance in the indicators is explained by the construct, indicating good convergent validity. The calculation of AVE can be shown in Table 4.

Table 4. Convergent Validity (using AVE)

	Mod Eff	X ₁	X ₂	XMod	Y
Mod Eff	1.000				
X ₁	-0.196	0.932			
X ₂	-0.290	0.861	0.950		
Mod	-0.217	0.777	0.837	0.914	
Y	-0.138	0.797	0.804	0.813	0.910

Source: Developed from SmartPLS Output (2024)

Table 4 shows that the AVE value (marked in bold) is greater than each correlation for each variable. Thus, all latent variables have met convergent or determinant validity requirements. This shows that each construct can better explain the variance of its own indicators compared to the shared variance explained by other constructs. The correlation values in Table 4 represent the strength and direction of relationships between pairs of variables. A higher correlation indicates a stronger relationship. For instance, the correlation between X₁ and X₂ (0.861) is very high, suggesting that these two variables are strongly related. This could imply that the factors captured by X₁ and X₂ share significant overlap or that they influence each other in a similar way. Since both have high AVE values (above 0.5), it indicates that they effectively capture the variance in their respective indicators. High correlations between variables like these need to be interpreted carefully to avoid multicollinearity, which could affect model accuracy. Similarly, correlations with the dependent variable (Y) show moderate to strong relationships, meaning that these independent variables may have considerable influence on marketing performance.

After estimating the measurement model, the next step is to estimate the structural model. At least, there are several criteria for evaluating this structural model: (1) Path Coefficients, which report the estimated path coefficients and their significance levels, indicating whether the hypothesis is supported or not supported; (2) R² Values, presenting the R² value for the endogenous construct, indicating the amount of variance explained by the predictor variables; (3) Effect Size (f²) reports the effect size for each predictor variable, indicating the

contribution of each predictor to the R² value of the endogenous construct; (4) Predictive Relevance (Q²), using the Stone-Geisser criterion to report the Q² value, indicating the predictive relevance of the model; and (5) Multicollinearity, namely looking at the Variance Inflation Factor (VIF) value to check for multicollinearity among the predictor variables. The VIF value should be below 5.

Table 5. Path Coefficient and Hypotheses Testing

Direct Effects	Coef.	Bootstrap	S.D.	t-stat	p-value	hypotheses
X ₁ → X ₂	0.424	0.418	0.053	7.858	0.000	Supported
X ₁ → Y	0.171	0.174	0.063	2.772	0.006	Supported
X ₂ → Y	0.161	0.164	0.063	2.590	0.010	Supported
Mod → Y	0.365	0.357	0.050	7.175	0.000	Supported
X ₂ *Mod → Y	0.067	0.067	0.027	2.472	0.014	Supported
Indirect Effects	Coef.	Bootstrap	S.D.	t-stat	p-value	hypotheses
X ₁ → X ₂ → Y	0.068	0.067	0.017	4.025	0.000	Supported

Source: Developed from SmartPLS Output (2024)

Table 5 presents the results of the path coefficient estimates and the testing of hypotheses in the structural equation modeling (SEM) analysis. The path coefficients indicate the strength and direction of the relationships between variables, with positive values signifying a positive relationship. The t-statistics and p-values are used to test the statistical significance of these relationships, where a t-statistic greater than 1.96 and a p-value below 0.05 indicate that the hypothesis is supported. This table is divided into direct effects and indirect effects, showing both the direct impact of independent variables on dependent variables and the mediating effects.

The coefficient of determination (R² or R-Squared Values) is one way to see the goodness of fit or model fit of the proposed model. In other words, this coefficient of determination can be said to be its total influence. Table 6 shows the results of the R² test on this model.

Table 6. Results of Coefficient of Determination (R²)

	R Square	R Square Adjusted
X ₁ – Digital Innovation of Banking Product	0.741	0.740
Y - Marketing Performance	0.742	0.739

Source: SmartPLS Output (2024)

Referring to Table 6, determination coefficient (R²) test results for this research model show that the Digital Innovation of Banking Products has an R² value of 0.788 and an Adjusted R² of 0.741. This means that the independent variables in the model can explain 74.1% of the variation in Digital Innovation of Banking Products. The remaining 25.9% (obtained from $e = 1 - R^2 = 1 - 0.741$) is explained by other factors not included in this model. Furthermore, the Marketing Performance has an R² value of 0.751 and an Adjusted R² of 0.742, indicating that the variables in the model can explain 74.2% of the variation in Marketing Performance. Meanwhile, 25.8% (obtained from $e = 1 - R^2 = 1 - 0.742$) is explained by other factors outside the model used in this study. Referring to the fit model test results, this model can be said to be good (fit) in explaining the relationship between the variables tested. Based on the fit indicators mentioned, this model is classified as good (fit) in explaining the observed data. The SRMR (Standardized Root Mean Square Residual) in the saturation model is 0.034, and in the estimation model is 0.041. An SRMR value smaller than 0.08 indicates that this model has met the criteria for a good fit. Hence, the difference between the observed correlation matrix and the model's predicted correlation matrix is relatively small.

DISCUSSION

The positive influence of Digital Service Quality on Digital Innovation of Banking Products means that users who experience high Digital Service Quality tend to provide feedback that encourages banks to continue innovating. Empirically, at Bank Mandiri in West Java, users who are satisfied with the reliability (84,5%), convenience (85,9%), and speed of digital services (85,2%) will increase their expectations for new and better features and security. This creates pressure for banks to continue innovating in their digital products, such as developing new features (85,3%), improving user interfaces (85,6%), or improving security systems (85,5%).

In this case, good Digital Service Quality serves as a catalyst for innovation, because positive user experiences encourage banks to maintain customer relevance and satisfaction through improving digital products and services (Chauhan et al., 2022). However, maintaining high Digital Service Quality while innovating may strain resources and increase operational risks. Rapid changes can also create gaps in service consistency and security, potentially impacting customer trust and satisfaction. These findings suggest that high Digital Service Quality not only drives innovation within individual banks like Bank Mandiri but could also set industry standards, pushing other banks to elevate their digital offerings to remain competitive. This broader trend may lead to an overall improvement in customer satisfaction and security expectations across the banking sector.

Furthermore, the positive influence of Digital Service Quality on Marketing Performance can be interpreted as superior digital services directly contributing to increasing the effectiveness and efficiency of Bank Mandiri's marketing strategy in West Java. Statistical findings show that good digital service quality, such as response speed, application reliability, and smooth user experience, increases customer loyalty and strengthens marketing results. In practice, when customers are satisfied with Digital Service Quality, they tend to use banking products more often, become active users, and even recommend the service to others. This not only increases the bank's customer base but also reduces customer acquisition costs and increases customer retention, which are key indicators of increased Marketing Performance (Gao, 2010). Thus, the positive relationship between Digital Service Quality and Digital Innovation of Banking Products and Marketing Performance shows that high-quality services play an important role in supporting the sustainability of innovation and achieving optimal marketing results at Bank Mandiri West Java.

According to research findings, digital innovation of banking products can directly affect marketing performance. Innovation in digital products, such as developing new features, improving security, and enhancing user interfaces, significantly improves the effectiveness and efficiency of bank marketing (Ratnamasih et al., 2024; Yeh et al., 2019). Customers who experience improved digital products tend to engage more, increase usage rates, and show greater loyalty to bank services. To apply these insights, Bank Mandiri could prioritize strategies like continuously gathering and analyzing customer feedback to tailor digital improvements, investing in advanced security protocols to build trust, and enhancing user experience through simplified interfaces. These approaches not only strengthen competitiveness and customer retention but also help drive business growth and maximize Marketing Performance through focused, efficient strategies (Iyer et al., 2019).

In addition, the Digital Literacy variable as a moderator also has a significant effect on Marketing Performance. This can mean that the higher the customer's Digital Literacy, the greater the impact on the effectiveness and efficiency of bank marketing. Users who have a deep understanding of digital technology are more likely to respond positively to banking product innovations, such as new features and service updates, which ultimately improve Marketing Performance through stronger customer loyalty and engagement (Arifuddin et al., 2022). Finally, the interaction between Digital Innovation of Banking Products and Digital Literacy also affects Marketing Performance. In other words, Digital Literacy can strengthen the relationship between digital banking product innovation and marketing results. Empirically, this means that customers who are more digitally proficient can utilize product innovations more effectively, which in turn increases product satisfaction and usage, and strengthens the bank's position in the market. High Digital Literacy allows users to better understand and utilize innovations, which helps banks achieve their Marketing Performance goals and increase their competitiveness (Raza et al., 2020).

Digital Innovation of Banking Products plays an important role in mediating the relationship between Digital Service Quality and Marketing Performance at Bank Mandiri. In particular, superior Digital Service Quality, such as speed, reliability, ease of use, and security, creates an environment where banks can continue to innovate to meet the evolving needs of customers (Hanten et al., 2022). When experiencing high Digital Service Quality, customers are more likely to trust the bank and use its digital products more actively, which encourages banks to innovate further.

Previous research in the banking sector supports this idea. Studies have shown that high digital service quality drives innovation, which positively impacts bank marketing performance (Giovanni et al., 2022; Muñoz-Leiva et al., 2017). The previous studies have found that banks that continuously improve digital features and technologies based on customer feedback, such as introducing new payment methods or improving the interface of mobile banking applications, can increase customer engagement and satisfaction. This directly contributes to increased Marketing Performance through higher customer loyalty and greater active user conversion (Iglesias et al., 2020; Tabrani et al., 2018). It can be argued that digital innovation of banking products mediates the relationship between digital service quality and marketing performance by enabling banks to develop and improve their digital services continuously. This also synergizes with increasing customer experience and trust, ultimately strengthening Bank Mandiri's marketing performance.

The moderating role of digital literacy in the influence of digital innovation of banking products on marketing performance shows that digital literacy affects the strength and direction of the relationship between digital innovation and marketing outcomes. The study results show that digital literacy acts as a significant moderator, meaning that the level of customer digital literacy can strengthen or weaken the effect of digital innovation on marketing performance. The moderating role here can include strengthening positive effects. Customers with high digital literacy can better understand and utilize digital innovation more effectively. They are not only faster in adopting new features offered, but are also more likely to use the services optimally. This contributes to increased customer satisfaction and loyalty, strengthening the bank's marketing performance (Chauhan et al., 2022; Mbama and Ezepue, 2018; Sutarso et al., 2023). Good digital literacy allows customers to explore and utilize innovative features more optimally, thereby increasing the positive impact of digital innovation of banking products on marketing performance.

Digital literacy also helps reduce the barriers and risks that customers may face in adopting new technologies (Hidayat-ur-Rehman, 2024; Yu et al., 2017). Customers with high Digital Literacy are more likely to understand and address potential problems or challenges associated with using new digital products, thereby minimizing potential negative effects and ensuring that digital innovation has a positive impact on marketing performance.

This study aims to clarify which constructs best reflect the latent variables, positioning the Digital Innovation of Banking Products as a mediator—a novel approach compared to previous studies, which often treat it as an independent outcome. Unlike prior research that generally overlooks the role of digital literacy in this context, this study introduces Digital Literacy as a moderating variable, enhancing the synergy between Digital Innovation and Marketing Performance. By integrating Digital Service Quality as a foundation for Marketing Performance, this study diverges from traditional models, which typically focus on customer satisfaction alone. Thus, this approach offers a unique perspective by highlighting how digital literacy enriches the relationship between digital innovation and marketing performance.

Every research certainly has limitations. In this study, one key limitation is that it examines only the perceptions of *Livin' by Mandiri* users in Region VI/Java 1 (West Java) across seven branches—Bandung Asia Afrika, Bandung Surapati, Bandung Braga, Cirebon, Karawang, Tasikmalaya, and Sukabumi. This regional focus and sample size may limit the generalizability of the findings to other areas or broader populations. Additionally, this study focuses solely on the *Livin' by Mandiri* application, without considering other digital services provided by Bank Mandiri. Future research could address these limitations by expanding to other regions, allowing for comparative studies across different customer bases, or by including a wider range of Bank Mandiri's digital applications to deepen understanding of digital banking innovation dynamics.

CONCLUSION

Digital Service Quality positively influences both the Digital Innovation of Banking Products and Marketing Performance at Bank Mandiri in West Java. This suggests that higher Digital Service Quality encourages the development of innovative digital banking products, which in turn enhances Marketing Performance and strengthens the bank's competitive position. Improvements in these areas foster not only digital product innovation but also contribute directly to the bank's marketing success and business growth. Digital Innovation of Banking Products acts as a bridge linking Digital Service Quality with Marketing Performance. By serving as a mediator, digital innovation strengthens the positive impact of service quality on marketing outcomes, confirming its role as a critical factor in achieving marketing success. Additionally, customer Digital Literacy moderates the relationship between digital innovation and Marketing Performance. High levels of Digital Literacy enable customers to fully utilize innovative digital features, amplifying the positive impact on Marketing Performance. In contrast, limited Digital Literacy can reduce the effectiveness of these innovations. Therefore, improving customer Digital Literacy is essential for optimizing digital innovation and enhancing marketing success.

This study highlights that Digital Innovation of Banking Products mediates the link between Digital Service Quality and Marketing Performance, emphasizing innovation's crucial role in meeting customer needs and driving performance. It also reveals that Digital Literacy moderates the relationship between digital innovation and marketing performance, shedding light on how customer skills influence technology-based strategies. Theoretically, these findings expand perspectives on the interplay of service quality, innovation, and literacy in marketing. Practically, Bank Mandiri should invest in digital innovations aligned with customer expectations while implementing digital education initiatives to enhance customer interaction with technology, thereby optimizing innovation benefits and boosting Marketing Performance.

Future studies could delve deeper into additional mediators and moderators affecting the relationship between Digital Service Quality and Marketing Performance. For instance, examining variables such as

customer satisfaction, brand loyalty, or technology adoption as mediators could provide a richer understanding of these dynamics. Similarly, moderators like demographic factors or digital engagement levels could reveal how different customer segments experience the impact of digital innovation. Conducting similar studies across other regions or banking institutions would also help to validate these findings in broader contexts. Exploring the long-term effects of digital innovation and Digital Literacy on marketing success could further extend this line of research. Quantitative insights gathered from these directions would provide valuable contributions to the banking sector's innovation strategies and marketing practices.

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