

Analysis of The Influence of Customer Relationship Management, Service Quality, and Technology Innovation on the Marketing Performance of PT Pln (Persero) UID Aceh With Customer Satisfaction As A Mediation Variable

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Abstract: Using customer satisfaction as a mediating variable, this study looks at how customer relationship management, service quality, and technological innovation affect marketing performance. All of the participants in this study were PT PLN UID Aceh clients. The number of indicators in this study was multiplied by 10, yielding a sample size of 230. The structural equation modeling (SEM) approach was applied in this study's data analysis. The findings demonstrated that PT PLN (Persero) UID Aceh has good customer relationship management, service quality, technical innovation, customer satisfaction, and marketing performance. Customer satisfaction was impacted by technological innovation, customer relationship management, and service quality. Marketing performance was impacted by customer satisfaction, customer relationship management, and service quality. However, marketing performance was unaffected by technical progress. Additionally, the client.

Keywords: Customer Relationship Management, Service Quality, Technological Innovation, Customer Satisfaction, Marketing Performance

1. Introduction

The increasingly complex and competitive business environment demands that every organization, including state-owned enterprises (SOEs), continuously improve its performance. Companies are no longer required to perform operational functions alone but must also implement effective marketing strategies to ensure business sustainability and provide quality service to the public. Within the national electricity sector, PT PLN (Persero) plays a strategic role as the primary provider of electrical energy, supporting social, economic, and developmental activities across various regions, including Aceh Province.

As a company fulfilling a public service obligation (PSO), PT PLN (Persero) possesses distinct characteristics compared to typical private companies. PLN's focus is not solely on generating profit but also on ensuring equitable access to electricity, maintaining supply reliability, and delivering high-quality service to customers. Therefore, PLN's marketing performance can be evaluated not only by the volume of electricity sales but also by its ability to acquire new customers, increase consumption among existing customers, expand services, and foster long-term relationships with the community as service users.

In recent years, PT PLN (Persero) has consistently implemented various strategic initiatives to enhance its marketing and service performance. Digital transformation through the development of the PLN Mobile application, accelerated new connection services, targeted subsidy programs, and diverse campaigns such as electrifying lifestyle, electrifying agriculture, electrifying marine, and de-dieselization are all integral components of the company's comprehensive marketing strategy. These efforts aim to increase the value of services while reinforcing PLN's image as a modern, customer-focused energy company.

PT PLN (Persero) demonstrated strong performance in 2023, as reflected in the significant growth of national electricity sales compared to the previous year. The electricity sales volume reached 288.44 terawatt-hours (TWh), representing a 5.36% increase over 2022. This growth in volume drove electricity sales revenue to Rp333.19 trillion, an increase of Rp22.13 trillion from the prior year. These achievements contributed to PLN's net profit of Rp22.07 trillion, the highest in the company's history.

In terms of sector contribution, electricity sales were dominated by the business and industrial sector, with a total volume of 145.70 TWh, followed by the household sector at 122.34 TWh, and other sectors such as government and social sectors contributing 20.4 TWh. Furthermore, PLN recorded revenue growth outside of electricity sales (beyond kWh) amounting to Rp10.27 trillion, an increase of approximately 1.5 times compared to the previous year. This diversification of revenue sources demonstrates that PLN continues to adapt and innovate in response to the increasingly challenging dynamics of the energy sector.

Positive marketing performance was also evident at PT PLN (Persero) Aceh Main Distribution Unit (UID). A pre-survey of 30 respondents regarding marketing performance variables yielded an average score of 3.74, well above the threshold for the category. This finding indicates that customers generally perceive PLN UID Aceh's marketing performance as effective, particularly in terms of service delivery, utilization of additional services, and the perception of PLN as the primary electricity provider for the community.

However, the pre-survey results also revealed indicators with relatively lower scores, particularly those related to the intensity of service socialization and promotion. Some customers still felt they were not receiving adequate information about new services and additional benefits offered by PLN. This indicates that, while marketing performance is generally strong, marketing communications still need to be strengthened to ensure more widespread and equitable communication among customers.

One of the key factors influencing marketing performance is customer satisfaction. Pre-survey results indicated an average customer satisfaction score of 3.67, which is considered good. Furthermore, PT PLN (Persero)'s Customer Satisfaction Index (CSI) data for the 2022-2025 period shows a generally high trend, despite some fluctuations. In 2024, the CSI peaked at 98.93% but declined to 97.81% in 2025. Although still within the excellent category, this decline highlights emerging challenges in meeting customer expectations, particularly concerning consistent service quality, response speed, and electricity supply stability.

In addition to customer satisfaction, another factor influencing marketing performance is the implementation of Customer Relationship Management (CRM). A pre-survey on CRM at PT PLN UID Aceh revealed an average score of 3.67, which is considered good. However, the company's communication with customers still requires improvement, particularly regarding the clarity and ease of understanding of service information. This suggests that optimizing CRM depends not only on the information system but also on the effectiveness of message delivery to customers.

Service quality is closely linked to marketing performance. Reliable, responsive, and consistent service fosters a positive customer experience, ultimately enhancing loyalty and corporate image. According to [1], service quality influences customers' value perceptions and repurchase decisions. A pre-survey of PT PLN UID Aceh's service quality revealed an average score of 3.62, which is considered good, although weaknesses remain in the speed of employee responses to customer needs.

Furthermore, technological innovation is a crucial factor in enhancing PLN's marketing performance in the digital era. The use of information technology, such as the PLN Mobile application and digital payment systems, has facilitated customer access to services. However, pre-survey results indicate that the effectiveness of technology in accelerating and simplifying service processes still requires improvement. [2] emphasize that technological innovation in marketing increases competitiveness and improves the effectiveness of achieving company objectives.

Technological innovation serves not only as an operational support tool but also as a strategic instrument for building long-term relationships between PLN and its customers. In the digital era, customers demand fast, transparent, and accessible services at all times. Therefore, the success of information technology utilization depends heavily on how well the implemented system meets these customer needs and expectations. If the technology used still presents obstacles, such as delayed responses or complexity of use, the benefits of the innovation will not be fully realized by service users.

In addition to ease of access, the quality of the user experience is a crucial factor in the effectiveness of marketing technology. Digital applications like PLN Mobile must be designed to be intuitive, responsive, and stable to enhance customer satisfaction. A positive user experience fosters customer trust and loyalty toward the company. Conversely, if customers encounter difficulties accessing service features or finding the information they need, it can negatively affect their perception of PLN's overall marketing performance.

On the other hand, implementing technology requires internal organizational readiness, particularly among the human resources responsible for managing it. Digital transformation will not be optimal without the support of competent employees who can operate and utilize technology to its full potential. Therefore, continuous training and the development of digital capabilities are crucial steps for PLN to ensure the effective implementation of technological innovations. With adaptive and tech-savvy personnel, service and marketing processes can become more efficient and integrated.

Furthermore, integrating customer data through digital systems provides a foundation for more targeted marketing decisions. Data collected from various digital channels enables PLN to gain a deeper understanding of customer behavior patterns, needs, and satisfaction levels. This information can be used to develop more personalized and relevant marketing strategies. Thus, technological innovation not only enhances service efficiency but also serves as a strategic tool to strengthen PLN's competitiveness and marketing performance amid increasingly complex competitive dynamics.

Based on a review of empirical phenomena and previous research findings, several research gaps remain, particularly concerning the examination of the impact of CRM, service quality, and technological innovation on marketing performance, with customer satisfaction serving as a mediating variable. This is especially relevant in the context of state-owned enterprises in the electricity sector. Therefore, this study is important to undertake in order to provide both academic and practical contributions, particularly for PT PLN (Persero) UID Aceh.

2. Theoretical Study

2.1. Marketing Performance

[3] explains that marketing performance encompasses various marketing activities that influence sales growth, customer acquisition, and a company's ability to sustain its market position. Therefore, marketing performance serves as a tangible indicator of the success of the implemented marketing strategy.

[4] elaborates on this viewpoint by emphasizing that financial measures alone are insufficient to evaluate marketing performance. Non-financial factors, such as customer satisfaction and loyalty, must be considered alongside sales and earnings because they are crucial to the long-term sustainability of businesses. [5] asserts that, in the context of contemporary competition, marketing success also reflects a company's ability to build enduring relationships with clients, particularly through the use of technology and the capacity to adapt to changing customer preferences and behaviors. Consequently, marketing performance can be regarded as a comprehensive indicator of how successful, efficient, and competitive a company's marketing strategy is.

In the digital era, technological innovation plays an increasingly prominent role in enhancing marketing performance. Therefore, integrating customer satisfaction, customer relationship management, service quality, and technological innovation is essential for achieving superior marketing outcomes.

To objectively evaluate the success of a marketing strategy, companies need measurable and relevant marketing performance indicators. According to [2], several key metrics such as market penetration, sales growth, market share, and profitability can be used to assess marketing performance. Sales growth reflects an increase in sales volume over a specific period, while market penetration indicates a company's ability to attract and reach new customers. Profitability demonstrates how marketing efforts contribute to a company's overall profits, and market share reveals a company's competitive position relative to its rivals. By using these indicators collectively, businesses can sustain the long-term effectiveness of their marketing performance and thoroughly evaluate the success of their marketing strategies.

2.2. Customer Satisfaction

[6] explains that customer satisfaction arises from comparing perceived product or service performance with customer expectations, where conformity or superior performance results in satisfaction. This perspective aligns with [2] definition of customer satisfaction, which is the evaluation of a consumption experience based on a comparison between initial expectations and the actual performance of a product or service. According to research by [7], customer satisfaction is strongly correlated with perceived value and service quality. In a digital context, customer experience is also influenced by the company's level of personalization, speed of service, and ease of access [8].

Effective CRM implementation can enhance customer experience and foster a sense of appreciation, according to [9]. Additionally, customer satisfaction is strongly influenced by service quality, particularly regarding attributes such as reliability, assurance, responsiveness, empathy, and tangibles [10]. Technological innovation is also crucial in the current era; leveraging digital technology can improve the effectiveness, convenience, and quality of customer interactions, thereby increasing customer satisfaction levels [11].

Customer views and experiences must be comprehensively described using indicators to quantify customer satisfaction. [12] states that customer satisfaction can be measured by how well a product or service meets customer expectations, how customers perceive the quality of the product or service, and how they interact with the business. Additionally, client loyalty and the willingness to recommend a product or service to others are essential metrics for evaluating customer satisfaction. By utilizing these metrics, businesses can assess the effectiveness of their marketing and service initiatives and develop continuous improvement plans.

2.3 Customer Relationship Management

CRM is a strategic approach employed by companies to manage and optimize customer relationships sustainably. [13] define CRM as a structured process for building, maintaining, and developing mutually beneficial relationships between companies and customers. This concept emphasizes the importance of deeply understanding customer needs and behaviors to create sustainable value for both parties. [2] further explain that CRM involves collecting and managing customer data from various company touchpoints, which is then used to develop more personalized and relevant marketing and service strategies, thereby enhancing customer loyalty and satisfaction.

Developments in information technology have driven the implementation of CRM systems to become increasingly integrated and digitally based. [14] state that the effectiveness of CRM depends heavily on a company's ability to leverage technology to integrate customer data and automate interaction processes. Technology-based CRM systems enable companies to respond to customer needs more quickly, accurately, and consistently. In a digital context, the use of cloud-based CRM and artificial intelligence (AI) allows companies to proactively analyze customer behavior and predict future needs. [15] emphasize that optimal digital CRM implementation can strengthen long-term customer relationships and enhance customer satisfaction and trust in the company.

To assess the effectiveness of CRM implementation, it is essential to use indicators that comprehensively reflect the quality of customer relationship management. According to [16], CRM indicators include a company's ability to manage customer data, the degree of service personalization, the effectiveness of customer communication, and strategies for building and maintaining long-term relationships. Additionally, the use of CRM technology is a critical factor in supporting optimal customer relationship management. Employing these indicators enables companies to evaluate the success of their CRM strategies and ensure that customer relationships are managed effectively and sustainably.

2.4. Quality of Service

Service quality refers to the degree to which a company's service meets or exceeds customer expectations. This concept is based on customers' evaluations of their service experiences, considering both the outcomes and the delivery process. [10] define service quality as a customer's overall assessment of the excellence of a service. To measure this concept, they developed the SERVQUAL model, which highlights that service quality is not a singular entity but is composed of several interrelated dimensions.

The SERVQUAL approach divides service quality into five primary categories: tangibles, assurance, responsiveness, empathy, and reliability. These five dimensions provide a framework for evaluating how consistently and effectively customers perceive various service scenarios.

The concept of service quality has broadened significantly. [17] highlight that service quality now includes not only face-to-face interactions but also customer experiences with digital services, such as ease of system access, speed of online service, and the effectiveness of complaint handling via digital platforms.

2.5. Technological Innovation

Technological innovation is the process of applying new ideas, methods, or technologies to create added value for an organization. [18] defines technological innovation as an idea, practice, or object perceived as new by an individual or adopting unit, used to enhance efficiency, effectiveness, or competitive advantage. The innovation process encompasses not only the discovery of technology but also its development and implementation within a company's operations and services. Therefore, technological innovation is a crucial tool for driving change and continuously improving organizational performance.

In the modern business environment, technological innovation does not always involve creating entirely new technologies; it also encompasses the creative and strategic use of existing technologies. [19] emphasize that technological innovation is crucial for maintaining a company's competitiveness amid market dynamics and evolving consumer needs. [20] further highlight that technological innovation serves as a key pillar of digital transformation through the application of artificial intelligence, the Internet of Things (IoT), and big data analytics, enabling companies to enhance operational efficiency and deliver more personalized and responsive products and services. Similarly, [21] assert that companies that innovatively adopt the latest technologies tend to achieve better business performance and growth.

Overall, technological innovation is a strategic factor that supports organizational sustainability and growth in the digital era. This innovation encompasses a company's ability to adopt new technologies, develop technology-based products and services, enhance operational processes, and integrate information systems to support decision-making. [22] identify indicators of technological innovation as the adoption of new technologies, development of new products and services, improvements in operational processes, use of integrated information systems, and the organization's capacity to adapt to technological change. Effective management of these indicators enables companies to sustainably improve efficiency, service quality, and competitive advantage.

3. Research Methods

3.1 Research Population and Sample

All of PT PLN UID Aceh's clients made up the study's population. The number of indicators was multiplied by five to ten to determine the sample size [23]. By multiplying the number of indicators (23) by 10, the sample size was 230. The researcher used previously gathered data analysis techniques to present the findings. This study used the SEM method with AMOS for data analysis.

4. Research Results and Discussion

4.1. Hypothesis Testing

The testing of the research hypothesis is as in Table 1 below.

Table 1: Regression Weight Structural Equational Model

			Estimate	SE	CR	P
Customer satisfaction	<---	Customer Relationship Management	0.358	0.109	3.163	0.000
Customer satisfaction	<---	Quality of Service	0.463	0.107	4.988	0.000
Customer satisfaction	<---	Technological Innovation	0.187	0.067	2.042	0.041
Marketing Performance	<---	Customer Relationship Management	0.263	0.106	2.510	0.012
Marketing Performance	<---	Quality of Service	0.213	0.104	2.330	0.024
Marketing Performance	<---	Technological Innovation	0.067	0.066	0.762	0.446
Marketing Performance	<---	Customer satisfaction	0.407	0.077	3.535	0.000

Source: Processed Primary Data, (2025)

4.1.1. Direct Hypothesis Testing

The study's findings indicate that PT PLN's customer satisfaction is influenced to varying degrees by CRM, service quality, and technological innovation. CRM showed a positive and significant impact, suggesting that effective customer relationship management can enhance satisfaction. Service quality had a positive and significant effect on customer satisfaction and emerged as the most important factor. Although its contribution was less than that of CRM and service quality, technological innovation also had a meaningful and significant impact.

Additionally, marketing performance is positively and significantly influenced by CRM and service quality. Enhanced customer loyalty and favorable perceptions can improve marketing performance through effective customer relationship management and high-quality service. Unlike these two factors, technical innovation impacts marketing success indirectly by enhancing customer satisfaction rather than having a direct and significant effect.

Additionally, it has been demonstrated that marketing performance is positively and significantly influenced by customer satisfaction. This indicates that improved marketing success is closely associated with higher levels of customer satisfaction. Therefore, customer satisfaction is a crucial factor that mediates the impact of CRM, service quality, and technical innovation on PT PLN's marketing success.

4.1.2. Testing the Mediation Hypothesis

The test results indicate that customer satisfaction serves as a mediating variable in the relationship between CRM and PT PLN's marketing performance. A significant Sobel test demonstrates that CRM influences marketing performance both directly and indirectly through enhanced customer satisfaction. This suggests that effective customer relationship management fosters positive customer experiences, which in turn improve marketing performance. However, since CRM's direct effect remains significant, customer satisfaction functions as a partial mediator.

Additionally, it has been demonstrated that the relationship between marketing performance and service quality is mediated by customer satisfaction. The results of the Sobel test indicate that marketing performance is both directly and indirectly influenced by service quality through customer satisfaction. Dependable, attentive, and personalized service enhances customer satisfaction, which in turn improves marketing effectiveness.

Unlike the previous two variables, the test results indicate that customer satisfaction fully mediates the relationship between technological innovation and marketing performance. The significant Sobel test value, combined with the insignificant direct effect of technological innovation on marketing performance, suggests that technological innovation does not directly enhance marketing performance. Instead, technological innovation first increases customer satisfaction by improving the ease, speed, and convenience of service, which subsequently contributes to better marketing performance. Thus, customer satisfaction serves as a full mediator in this relationship.

Overall, the results of the mediation analysis confirm that customer satisfaction plays a strategic role in mediating the effects of CRM, service quality, and technological innovation on PT PLN's marketing performance. The variations in the types of mediation observed indicate that not all independent variables impact marketing performance in the same manner. CRM and service quality influence marketing performance both directly and indirectly, whereas technological innovation primarily affects marketing performance through customer satisfaction. This finding underscores that efforts to enhance a company's marketing performance should focus on strategies that sustainably increase customer satisfaction.

5. Discussion

The study's findings demonstrate that customer satisfaction is positively and significantly influenced by CRM. By employing systematic CRM, businesses can deliver more personalized, responsive, and consistent service, better understanding their customers' needs and expectations. This approach creates satisfying experiences that enhance client satisfaction and foster enduring relationships with customers.

Service quality has been shown to significantly influence customer satisfaction. Reliable, prompt, and empathetic service, supported by adequate facilities, can meet customer expectations and foster positive perceptions of the company. These findings confirm that service quality is a key factor in creating satisfaction, especially for service companies like PT PLN, which interact directly with the public.

Furthermore, technological innovation significantly influences customer satisfaction. The implementation of digital services and integrated systems enhances ease, speed, and convenience in accessing services. Thus, technological innovation not only supports company operations but also improves the customer experience and strengthens satisfaction levels. Additionally, research shows that CRM has a substantial impact on marketing performance. Effective CRM enables companies to build loyalty, retain customers, and increase customer value over the long term. It also helps companies develop more targeted marketing strategies by leveraging customer data. Therefore, CRM plays a strategic role in enhancing marketing performance by strengthening relationships and interactions with customers.

Service quality has been shown to positively impact marketing performance. High-quality service enhances a company's trust and image among customers, which in turn drives loyalty and generates positive recommendations. Superior service quality is a key differentiator for companies in competitive markets, directly influencing sales growth, customer retention, and overall marketing success. This demonstrates that investing in service quality improvement is a strategic step toward strengthening a company's market position.

Unlike other variables, technological innovation does not have a significant direct impact on marketing performance. This finding suggests that technology implementation at PT PLN focuses more on improving operational efficiency and service quality rather than on direct marketing activities. Due to the public service nature of the electricity industry, the impact of technological innovation on marketing performance is not immediately apparent. Therefore, technological innovation serves more as a supporting factor than as a primary driver of marketing performance.

The research results indicate that customer satisfaction significantly influences marketing performance. Satisfied customers are more likely to remain loyal, continue using services, and offer positive recommendations. Customer satisfaction is a strategic asset because it enhances a company's reputation and improves marketing effectiveness at a relatively low cost. Therefore, customer satisfaction is a critical factor in driving long-term marketing success.

Overall, customer satisfaction serves as a mediating variable between CRM, service quality, technological innovation, and marketing performance. CRM and service quality are partially mediated, meaning they influence customer satisfaction both

directly and indirectly. Meanwhile, technological innovation primarily impacts marketing performance by enhancing customer satisfaction. This confirms that improving PT PLN's marketing performance heavily depends on continuous efforts to enhance customer satisfaction.

Customer satisfaction reflects the alignment between expectations and the service received. When service meets or exceeds expectations, it creates a positive perception that influences customer attitudes and behaviors, encouraging continued use of the service. Over time, satisfaction fosters loyalty, reduces customer churn, and enhances marketing cost efficiency. Therefore, improving customer satisfaction is a crucial strategy for sustaining the stability and growth of a company's marketing performance.

The role of customer satisfaction as a mediating variable demonstrates that the success of CRM, service quality, and technological innovation is measured not only by their implementation but also by the extent to which customers perceive the benefits of these efforts. Effective CRM strengthens both emotional and functional relationships with customers when supported by consistent service quality. Similarly, technological innovation adds value by improving the convenience, speed, and reliability of service. Without customer satisfaction, the impact of these variables on marketing performance will be suboptimal.

Therefore, PT PLN must prioritize customer satisfaction at the core of all marketing and operational strategies. A customer-centric approach demands continuous evaluation of evolving customer needs and expectations. By integrating customer relationship management (CRM), enhancing service quality, and strategically leveraging technology, the company can create a positive and sustainable customer experience. This will ultimately strengthen marketing performance and support the achievement of long-term corporate objectives.

6. Conclusion

According to the study's findings, PT PLN (Persero) UID Aceh's marketing performance, customer happiness, CRM, service quality, and technological innovation are all generally in the "good" range. This shows that the business has successfully supported operations and customer service by managing customer connections, offering services, and utilizing technology.

Empirically, CRM, service quality, and technological innovation have been shown to have a direct and significant impact on customer satisfaction. This means that well-managed customer relationships, reliable and responsive service, and the implementation of technology that facilitates service access can increase customer satisfaction. This satisfaction is shaped by positive service experiences and the company's ability to respond to customer needs and complaints.

CRM and service quality have a direct and significant impact on marketing performance. This confirms that good customer interactions and consistent service quality can increase positive customer perceptions and loyalty, thus improving marketing performance. Conversely, technological innovation does not directly impact marketing performance but rather plays a role in supporting the service process.

Customer satisfaction has been shown to have a direct and significant impact on marketing performance. Satisfied customers tend to be more loyal and provide positive responses, thus supporting a company's marketing success. Furthermore, customer satisfaction acts as a mediating variable. Satisfaction partially mediates the effects of CRM and service quality on marketing performance, as both influence each other directly and indirectly. Meanwhile, customer satisfaction fully mediates the effect of technological innovation on marketing performance, meaning that technological innovation can only improve marketing performance through increased customer satisfaction.

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