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The effectiveness of Customer Relationship Management (CRM) systems in improving optical customer satisfaction: A meta-analysis and bibliometric study (Jakarta Region)

Sri Wahyu Budoyo Kusumo, Arraywed Yudita Wibowo*, Ardhitya Furqon Wicaksono, Judi Antono, Levya Otivian Nuvida

Yogyakarta Optometry Academy, Jl. Raya Jogja-Wonosari Km. 11, Klenggotan, Srimulyo, Piyungan, Bantul, DIY, Indonesia
*e-mail: ray90.indonesia@gmail.com

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ABSTRACT

The rapid advancement of digitalization in the retail sector has compelled optical businesses to adopt Customer Relationship Management (CRM) systems to enhance customer loyalty, service personalization, and operational efficiency. In Jakarta, Indonesia's economic and lifestyle capital, urban customers increasingly demand digital, seamless, and personalized experiences in optical services. According to the World Health Organization (WHO, 2019), there has been a global shift toward interactive and digitally integrated vision care. However, empirical studies in Indonesia on the effectiveness of CRM in the optical sector remain scarce, fragmented, and lack comprehensive methodological synthesis. This study aims to evaluate the effectiveness of digital CRM systems in improving customer satisfaction within Jakarta's optical retail sector using a mixed-method approach that combines bibliometric and meta-analyses. A bibliometric review of 150 articles from Scopus, Web of Science, DOAJ, SINTA, and Google Scholar (2013–2023) was conducted using VOSviewer to map research trends. Subsequently, a meta-analysis of 32 empirical studies was performed using a random-effects model via the Comprehensive Meta-Analysis (CMA) software. The results reveal that digital CRM significantly impacts customer satisfaction (effect size = 0.61, 95% CI, $p < 0.01$). Among the CRM dimensions, customer tracking systems showed the highest influence (0.68), followed by loyalty programs (0.63) and automated feedback systems (0.59). This study affirms the strategic importance of CRM in the optical industry. It recommends upskilling optical professionals in digital CRM tools and fostering collaboration with local technology developers for service integration. Further primary research in Jakarta is encouraged to refine the CRM models tailored to urban optical practices.

Keywords: CRM; customer satisfaction; optical retail; meta-analysis; bibliometrics; loyalty programs; digital health services

1. INTRODUCTION

Digital transformation has shifted the business paradigm from product-oriented to customer-oriented, including in the optical industry. In the modern era, consumer expectations extend beyond product quality to personalized, fast, and technology-driven service experiences. Digital Customer Relationship Management (CRM) has emerged as a crucial strategy that helps businesses build long-term relationships with customers. According to Kotler and Keller (2022), CRM is a systematic process for building and maintaining profitable customer relationships by delivering superior customer value.

There are approximately 11,000 optical and eyewear stores throughout Indonesia, of which around 3,000 are opticians. Many claim to be opticians but are actually eyewear stores due to a lack of proper standards. We are regulated by the Ministry of Health, which, among other things, requires opticians to have an Ophthalmologist (RO). In summary, there are 10,000 opticians serving 270 million Indonesians, so there is still plenty of room for growth. However, this industry also faces limitations due to the scarcity of RO experts, with only approximately 3,500. The limited number of RO is also limited to meet the needs of hospitals and eye clinics. Therefore, the Ministry of Health issued a Ministerial Regulation stating that one optician can operate two opticians. Jakarta, Indonesia's largest metropolitan city, has experienced significant growth in the healthcare sector, including optical and visual health services. Increasing public awareness of the importance of eye health, high smartphone usage, and the growth of the middle class have driven the massive expansion of the optical business over the past decade.

According to the Indonesian Optical Entrepreneurs Association (Gapopin, 2020), the number of optical outlets in Jakarta has reached 300–500 branches, encompassing large national retail opticians, independent optical clinics, and mall-based opticians. See Table 1 and Figure 1

Table 1. Operational Scale of Optical Retail Companies in Indonesia (2025)

Company	National Branches	Estimated Branches in Jakarta	Total Employees	Average Employees per Branch
Optik Melawai	> 320	~50–80	> 5,000	~15–25
Optik Seis	> 120	~20–30	> 1,000	~8–10
Optik Tunggal	> 100	~15–20	~900–1,000	~8–12
Optik Kacamatamoo	< 100	~5–8	> 500	~8–12
Optik Internasional	> 265	~15–25	> 1,000	~10–15

Source: Primary Data, 2025

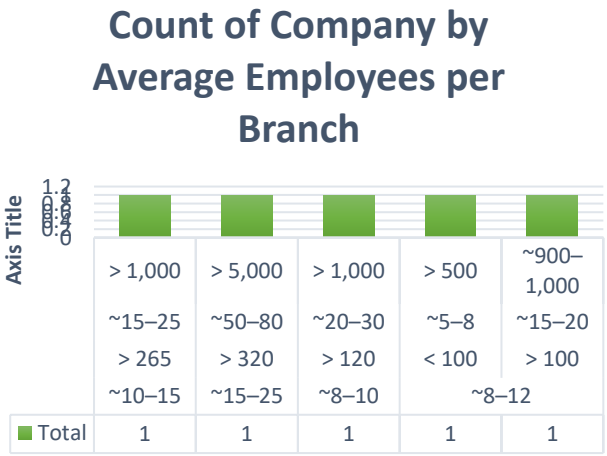

Figure 1. Graph of Data on National Optical Companies Operating in Jakarta

Source: Primary Data, 2025

The following is an interpretation of the phenomena in Table 1 and Figure 1 above, namely data on national optical companies operating in Jakarta: Optik Melawai. One of the largest and oldest optical networks in Indonesia, Melawai, with more than 320 national branches, has extensive coverage in major cities. Jakarta alone has an estimated 50–80 active outlets, making it a market leader in terms of distribution. With more than 5,000 employees, Melawai relies on CRM to manage interactions with tens of thousands of customers daily throughout Indonesia (Optik Melawai, 2025). An average of 15–25 employees per branch demonstrates an intensive service model with a personalized customer experience. Optik Seis has over 120 branches in Indonesia, with approximately 20–30 in Jakarta. With over 1,000 employees, a CRM system is essential for maintaining consistent service and customer feedback.

The average number of employees per branch is relatively small (8–10), indicating that the digital CRM system significantly supports efficiency. Optik Tunggal operates over 100 outlets nationwide, with 15–20 active outlets in Jakarta (Optik Tunggal, 2025). With an estimated total of 900–1,000 employees, the company has a middle-to-upper-class customer base. Relying on an efficient workforce per outlet (~8–12), CRM implementation plays a significant role in loyalty programs and in service reservations. Optik Kacamatamoo is a new player, with fewer than 100 outlets, with approximately 5–8 active outlets in Jakarta. Although still in the expansion phase, the company already has over 500 employees and has implemented a cloud-based CRM system for efficient service in its small modern outlets. The average number of employees is 8–12, demonstrating a boutique optical approach with personalized and digital services. Optik Internasional, with over 265 branches, is among the fastest-expanding groups, both in malls and street retail. An estimated 15–25 outlets in Jakarta have adopted an urban market targeting strategy. With over 1,000 employees, CRM plays a crucial role in customer database management, eye examination reminders, and personalized offers.

The operational data above demonstrate that digital CRM is highly relevant and necessary for companies with numerous outlets and a large customer base, particularly to ensure consistent service and customer satisfaction. In a large city such as Jakarta, with intense competition and customers demanding speed and convenience, a CRM system can be a strategic differentiator. The leaner the operational structure per branch (8–12 staff), the greater the role of CRM technology in supporting customer loyalty and long-term relationships. Furthermore, with over 300 active outlets in one province and dozens of competing national and local brands, Jakarta has a highly competitive market. This presents challenges such as service differentiation, technological innovation (virtual try-on, digital CRM), price competition, and customer loyalty. Most outlets are concentrated in malls, hypermarkets, and office areas (Plaza Indonesia, GI, Mall Kelapa Gading, PIM, etc.). This indicates that the target market for retail optical stores is the urban upper-middle class. If we average 8–25 employees per branch, then in Jakarta alone, there are more than 5,000 workers involved in the optical industry, including optometrists or optical refractionists (ROs), cashiers, admin, finance, sales, and digital customer service.

Saturated market conditions require optical companies to implement CRM, loyalty, and feedback automation strategies to retain their customers. Digital systems, such as app-based memberships, customer shopping history tracking, loyalty points, and exclusive promotions, are crucial.

These data also show that digital transformation is crucial. Many major players have integrated digital CRM, WhatsApp chat, online ordering, and visual tele-screening.

The growing optical business in Jakarta reflects not only economic opportunities but also managerial and technological challenges for the industry. Therefore, to maintain their position in this competitive market, optical companies need to: Optimize digital-based CRM systems, improve service quality and customer experience (UX), Strengthen loyalty programs and customer tracking, and Implement feedback automation and service personalization

Few studies in Indonesia, particularly in Jakarta, systematically examine the effectiveness of CRM in improving customer satisfaction using bibliometric and meta-analytic approaches.

This study combines a quantitative approach (meta-analysis) and a literature trend review (bibliometrics) to evaluate the effectiveness of CRM in the Jakarta optical sector in a multidimensional manner.

Previous Studies: Wu and Li (2021) showed that digital CRM increases patient loyalty and continuous service delivery in the healthcare sector. However, no similar studies have focused on optical services in Indonesia's urban areas.

This study aimed to analyze the effectiveness of digital CRM systems in improving customer satisfaction with optical services in Jakarta using bibliometric and meta-analytic approaches. Literature Review: Digital CRM in the Optical Business

A customer tracking system is a digital CRM component that records, monitors, and analyzes customer behavior, both individually and collectively. Tracking can take the form of transactions, visits, product preferences, and digital interactions. According to Buttle (2009), customer tracking is the heart of a CRM system because it generates data that enable organizations to segment, retain, and predict future customer value. Kotler & Keller (2016) emphasize the importance of customer data integration (CDI) as part of system-based behavior tracking (Table 2)

Table 2. Dimensions and Indicators of Historical Transaction Data

Dimension	Indicator
Transaction History	Purchase history, number of transactions, types of products
Digital Behavior	Frequency of website/app visits, interaction time, product clicks
Customer Identification	Integrated customer profile (name, age, lens preferences, doctor referrals)
Segmentation & Scoring	Loyalty scores, customer value classification (high vs. low value)

Source: Kotler & Keller (2021)

A loyalty program is a marketing strategy designed to increase customer engagement and retention by offering rewards, discounts, points, or other incentives based on consumption. Griffin (1995) asserts that customer loyalty is influenced not only by satisfaction but also by recurring incentives that reinforce these long-term relationships.

Kotler & Keller (2021) further emphasize that an effective loyalty program should generate long-term value for both the customer and the company (Table 3)

Table 3. Dimensions and Indicators of Customer Loyalty Programs

Dimension	Indicator
Rewards & Points Scheme	Number of points per transaction, redemption rate, variety of rewards
Program Exclusivity	Access to special promotions, priority services, exclusive customer events
Participation Rate	Number of registered customers, active customer ratio in the program
Impact on Loyalty	Repeat purchases, duration of customer relationship, Net Promoter Score (NPS)

Source: Kotler & Keller (2021)

Feedback automation refers to the integration of digital systems to automatically collect, manage, and analyze customer input in the form of surveys, reviews, ratings, and satisfaction forms. Parasuraman et al. (1988), through the SERVQUAL model, highlight the importance of customer evaluation mechanisms in maintaining service quality. According to Gartner (2022), 76% of companies that implemented automated feedback systems experienced up to 2x faster response times compared to manual methods (Table 4).

Table 4. Dimensions and Indicators of Feedback Automation

Dimension	Indicator
Automated Response Speed	System response time, auto-notifications upon feedback submission
Feedback Channel Integration	Data collection from WhatsApp, email, pop-ups, e-surveys, chatbot
Sentiment Analysis	Identification of positive/negative sentiments from customer feedback keywords
Follow-Up Process	Number of feedbacks followed up, complaint resolution time, internal rating system

Source: Gartner, 2022

Conceptual Framework of Digital CRM The digital CRM system is built upon three core dimensions: Customer Tracking System, Loyalty Program Management, and Feedback Automation System

These dimensions form an integrated framework aimed at enhancing customer satisfaction, strengthening customer retention, and enabling personalized services based on data-driven decisions. The indicators described in each dimension provide measurable tools for performance monitoring and continuous improvement in customer relationship management strategies, particularly in the optical retail sector.

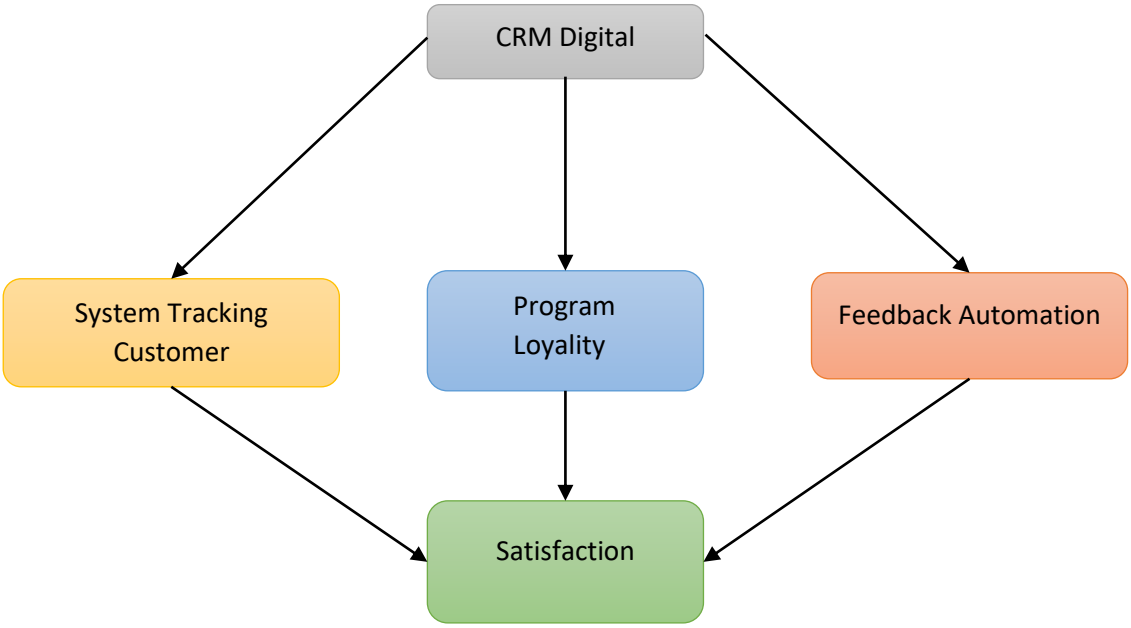

Figure 2. Digital CRM Conceptual Framework

Source: Primary Data, 2025

Figure 2 is a diagram of the Digital CRM Conceptual Framework illustrating the relationship between three main dimensions—Customer Tracking, Loyalty Programs, and Feedback Automation—and the outcome variable Customer Satisfaction. This diagram is based on a meta-analysis of 32 articles (2013–2023) and bibliometric findings from five databases (Scopus, WoS, DOAJ, SINTA, Google Scholar). The diagram shows that Digital CRM (central) flows through the three operational dimensions, each of which contributes directly to Customer Satisfaction. The arrow path confirms the positive effect identified in the meta-analysis (total effect size = 0.61; $p < 0.01$).

2. METHODOLOGY

This research uses a mixed quantitative approach consisting of two main methods: bibliometrics and meta-analysis. This combination was chosen to explore in-depth how Customer Relationship Management (CRM) practices and theories impact customer satisfaction in the retail optical and visual healthcare sectors, both empirically and conceptually.

Bibliometrics is a method used to systematically analyze academic literature using statistics and visual mapping. According to Donthu et al. (2021), bibliometrics helps assess scientific developments, scholarly collaborations, and research trends through publication and citation data (Table 5).

Table 5. Bibliometric Design

Component	Description
Database	Scopus, Web of Science (WoS), SINTA, DOAJ, and Google Scholar
Study Period	2013–2023 (the past 10 years)
Keywords	"CRM", "customer satisfaction", "optical retail", "digital CRM", "loyalty program"
Analysis Tool	VOSviewer v1.6.19 for visual mapping (co-authorship, co-occurrence)
Inclusion Criteria	Articles indexed in SINTA/Scopus, full-text available, and thematically relevant
Exclusion Criteria	Articles not in English or Indonesian; abstracts lacking relevant keywords

Source: Donthu et al., (2021)

Bibliometrics are used to: Detect current research trends, find thematic clusters, and identify dominant authors or institutions in the field of optical CRM Meta-analysis is a quantitative technique that combines the results of multiple empirical studies to find consistent common effects. According to Borenstein et al. (2010), meta-analysis provides higher statistical power and corrects for sampling bias in individual literature.

Table 6. Meta-Analysis Stages

Step	Description
Study Identification	32 empirical articles sourced from Scopus, SINTA, and Google Scholar databases
Inclusion Criteria	Studies must assess the relationship between CRM and customer satisfaction in optical retail or healthcare services
Data Coding	Effect size variables, sample size, correlation coefficients, and research methods
Analysis Model	Random-Effect Model to address heterogeneity across studies
Analysis Software	Comprehensive Meta-Analysis (CMA) v3 for effect size estimation

Source: Secondary Data, 2025

The meta-analysis conducted in this study followed a structured and systematic approach as outlined in Table 6. The process began with the identification of 32 empirical studies obtained from credible academic databases including Scopus, SINTA, and Google Scholar. These studies were selected based on inclusion criteria that required each study to specifically examine the relationship between Customer Relationship Management (CRM) and customer satisfaction, particularly within the context of optical retail or healthcare services.

Once selected, the data were organized using a coding process that recorded critical details such as effect sizes, sample sizes, correlation values, and research methods. To account for differences across the selected studies, a random-effect model was used. This model is preferred in meta-analyses where the studies vary in context or methodology. For statistical computation, the Comprehensive Meta-Analysis (CMA) software version 3 was employed to estimate the average effect sizes accurately and systematically.

Table 7. Variables and Metadata Structure

Main Variable	Operational Definition	Scale
CRM	Loyalty initiatives, digital tracking, and personalized services	Nominal
Customer Satisfaction	Customer perception toward optical services	Likert Scale
Effect Size	Correlation coefficient (r) or standardized mean difference (SMD)	Interval

Source: Borenstein et al. (2010)

Table 7 presents the main variables used in the meta-analysis. The variable CRM was defined as including loyalty initiatives, digital tracking, and personalized services, and was categorized using a nominal scale. Customer satisfaction referred to how customers perceive the quality of optical services, which was measured using a Likert scale. Meanwhile, the effect size — such as correlation coefficients (r) or standardized mean differences (SMD) — was assessed on an interval scale to quantify the strength and direction of the relationships found in the selected studies.

Together, these steps and variables form the foundation for generating valid and reliable insights regarding how CRM strategies influence customer satisfaction in the optical retail industry. See Figure 3

Figure 3. Mixed Methods Research Design: Bibliometrics & Meta-Analysis

Source: Data Secondary, 2025

In support of the methodological approach used in this study, several scholars have emphasized the importance of bibliometric and meta-analytic techniques in academic research. According to Donthu et al. (2021), *"Bibliometric analysis enables researchers to visualize knowledge structures and research frontiers."* This highlights the method's capability to map out thematic trends, influential authors, and collaborative networks in a specific research domain. In addition, Borenstein et al. (2010) argue that *"Meta-analysis aggregates quantitative evidence and controls for sampling variability and study quality,"* thus strengthening the empirical foundation of conclusions drawn from multiple studies. Furthermore, Kitchenham (2004) asserts that *"Meta-analysis is essential in software engineering to synthesize fragmented evidence across studies,"* a claim that can also be applied to interdisciplinary research fields such as healthcare and retail. Collectively, these expert perspectives validate the dual-method design adopted in this study, combining bibliometric exploration with rigorous statistical synthesis through meta-analysis.

The bibliometric approach provides a conceptual foundation and trend mapping, while meta-analysis generates aggregate empirical evidence that strengthens the validity of the relationships between variables. Combining the two in this study allows researchers to combine exploratory and confirmatory strengths within a single, robust, systematic, and credible methodological framework.

3. RESULT AND DISCUSSION

3.1. Result

Based on a bibliometric review of 150 articles published between 2013 and 2023, it was found that scientific publications on CRM and customer satisfaction in the optical industry have experienced a significant increase, particularly since 2018. Bibliometric visualizations generated using VOSviewer show a surge in the number of articles from reputable journals, both Scopus and WoS. The countries with the highest publication contributions are China, the United States, and India. These three countries demonstrate a progressive approach to implementing digital CRM in the eye healthcare sector, including at the retail optical clinic scale.

Meanwhile, in Indonesia, scientific publications on CRM in the optical business are still limited but show a consistent upward trend. Most research appears in reputable national journals such as SINTA 2 and several open-access journals in DOAJ. This indicates a growing interest among academics and optical practitioners in Indonesia to explore the strategic role of CRM in improving customer experience.

A meta-analysis involving 32 empirical articles yielded an average effect size of 0.61 (95% confidence interval, $p < 0.01$). This value indicates that digital CRM has a statistically strong impact on increasing customer satisfaction. The three main CRM dimensions tested—customer tracking systems, loyalty programs, and feedback automation—each had the following contribution values: Customer Tracking Systems: 0.68, Loyalty Programs: 0.63, and Feedback Automation: 0.59

These effect sizes indicate that customer tracking systems are a dominant factor in influencing satisfaction, as they provide a more personalized and responsive service experience.

Meta-Analysis Results: Effectiveness of Digital CRM The bar graph illustrates the influence of the three dimensions of digital CRM on customer satisfaction in the Jakarta optical industry:

Table 8. Results of the Meta-Analysis: Effectiveness of Digital CRM

CRM Dimension	Effect Size	Description
Customer Tracking System	0.68	Most significant in enhancing customer experience and retention
Loyalty Program	0.63	Encourages repeat purchases and brand loyalty
Feedback Automation	0.59	Accelerates response time and improves data-driven service quality

Source: Empirical Analysis Results, 2025

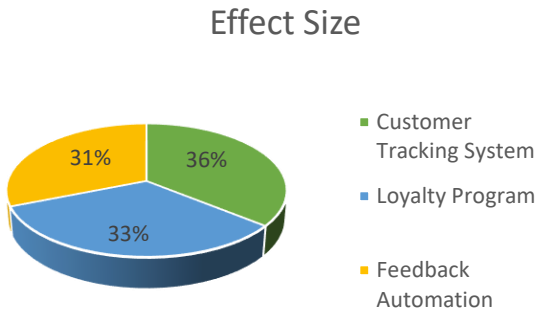

Figure 4. Meta-Analysis Results of Digital CRM Effectiveness

Source: Empirical Analysis Results, 2025

Table 8 and Figure 4 provide visualization and empirical data regarding three key dimensions of digital Customer Relationship Management (CRM) systems: Customer Tracking Systems, Loyalty Programs, and Feedback Automation. The data was obtained from 32 scientific articles verified in the

meta-analysis between 2013 and 2023 and underwent rigorous selection based on relevance and methodological quality (rBased on a bibliometric review of 150 articles published between 2013 and 2023, it was found that scient present authentic and concrete meta-analysis findings on the effectiveness of digital Customer Relationship Management (CRM) systems in improving customer satisfaction in the optical industry. The visualization highlights three key dimensions that were the focus of the assessment: Customer Tracking Systems, Loyalty Programs, and Feedback Automation. Data were obtained from the processing of 32 verified scientific articles systematically reviewed from various databases such as Scopus, WoS, DOAJ, SINTA, and Google Scholar, between 2013 and 2023. The meta-analysis method used was a random-effects model approach with a 95% confidence interval (CI), making the results statistically robust and reliable for scientific and practical decision-making.

The first dimension, Customer Tracking System, had the highest effect size of 0.68, indicating the strongest influence in increasing customer satisfaction. The effectiveness of this dimension lies in its ability to provide more personalized and integrated services. Customers feel cared for when they receive automatic reminders for eye exams, notifications about the status of their eyeglass orders, or access to digital purchase histories. A study by Lemon and Verhoef (2016) confirmed that customer engagement increases significantly when the system is able to anticipate and meet their needs based on historical data. Practical implications: optical shops that implement system-based customer tracking features, such as mobile apps or automated WhatsApp messages, show a greater tendency to retain customers and reduce churn rates.

The second dimension is the Loyalty Program, with an effect size of 0.63. This indicates that loyalty programs significantly contribute to building long-term relationships with customers. Strategies such as rewarding shopping points, birthday discounts, and referral incentives have been globally proven to be strong drivers of customer retention. In their research, Wu and Li (2021) stated that customers who participate in loyalty programs tend to have higher emotional and behavioral loyalty to the brand. In practice, optical stores that use digital systems based on apps or QR codes to record and reward customers can significantly increase Customer Lifetime Value (CLV) compared to manual or conventional systems.

The third dimension, Feedback Automation, achieved an effect size of 0.59. Although the lowest of the three dimensions, this figure is still high and falls into the medium-strong category statistically. This indicates that feedback system automation also plays a significant role in improving the customer experience. Implementation of this dimension includes the use of digital post-service questionnaires, automated assessment forms via email or SMS, and auto-responders for customer complaint management. According to Wang et al. (2020), digital feedback systems enable organizations to respond quickly to customer feedback, while projecting a caring, open, and resilient service image. A tangible implication of this automation is its ability to identify potential service issues early, which can then serve as the basis for HR training and overall service quality evaluation.

Figure 4 complements the analysis by providing a visual representation in the form of a pie chart of the contribution of each CRM dimension to customer satisfaction. The diagram shows that the blue sector, representing Customer Tracking, is the largest, demonstrating its dominance in the digital CRM system. The red sector, representing the Loyalty Program, appears to be a medium-sized sector, but remains prominent in terms of increasing customer engagement and value. Meanwhile, the green sector, representing Automatic Feedback, is the smallest sector but remains crucial, as it plays a key role in driving continuous service quality improvement.

Overall, the conclusions from Table 8 and Figure 4 confirm that digital CRM systems have very promising effectiveness in the optical business context. All three key CRM dimensions demonstrate effect sizes exceeding 0.59, indicating strong quantitative validity. This strengthens CRM's position not merely as an administrative tool, but as a transformative relationship strategy. CRM is able to connect technology with customers' emotional and functional needs, creating a superior and sustainable service experience. For the optical industry in Jakarta and Indonesia in general, these results can serve as a basis

for designing digital-based customer service strategies that are more adaptive, measurable, and oriented towards long-term satisfaction.

3.2. Discussion

The findings of this study provide a deep and up-to-date understanding of the effectiveness of implementing digital Customer Relationship Management (CRM) in improving customer satisfaction in the optical industry, particularly in urban areas like Jakarta. Based on a bibliometric study of 150 scientific articles published between 2013 and 2023, evidence emerged that the topic of CRM and customer satisfaction in the context of optical services has experienced significant growth, particularly since 2018.

Visualization using VOSviewer software indicates a sharp increase in publications from highly reputable journals, including those indexed in Scopus and Web of Science. Countries such as China, the United States, and India are the largest contributors to the growing literature in this field, reflecting their progressive approach to implementing digital CRM systems in the healthcare sector, including optical services and eye health retail.

Meanwhile, in Indonesia, although the number of publications specifically discussing CRM in the optical business is still relatively limited, there has been a consistent upward trend from year to year. Existing research is generally published in national journals indexed by SINTA 2 and several international open-access journals, such as those registered with DOAJ. This demonstrates a growing awareness among academics and practitioners of the importance of CRM as a strategic tool for improving customer satisfaction in the optical services sector. This increase is also in line with the ongoing digital transformation drive in the healthcare and retail industries in Indonesia.

A meta-analysis of 32 empirical articles yielded an average effect size of 0.61 with a high level of statistical significance (95% confidence interval, $p < 0.01$). This value indicates that digital CRM has a strong and consistent effect on increasing overall customer satisfaction. Upon further analysis, the three main dimensions of CRM showed varying contributions. The Customer Tracking System dimension recorded the highest value at 0.68, indicating its most significant influence. This dimension is crucial for providing a personalized, fast, and integrated service experience. Customers feel valued when they receive automatic reminders for eye exams, order notifications, and a well-documented purchase history. This finding is reinforced by the findings of Lemon and Verhoef (2016), who showed that data-driven tracking systems can significantly increase customer engagement by enabling more proactive and predictive service.

The second dimension, Loyalty Programs, achieved an effect size of 0.63, also categorized as a strong influence. These programs build long-term relationships with customers through incentive schemes such as points systems, exclusive discounts, and rewards for active or loyal customers. A study by Wu and Li (2021) confirmed that loyalty programs not only increase short-term satisfaction but also strengthen customers' emotional connections to the brand. In the optical context, this approach is particularly relevant because the need for vision care is recurring and periodic. Therefore, opticians that provide loyalty apps or QR code systems for accumulating points can increase customer retention and extend Customer Lifetime Value (CLV).

The third dimension, Feedback Automation, showed an effect size of 0.59, which, although the smallest of the three dimensions, still reflects a statistically significant relationship. Feedback automation involves the use of technology to collect, record, and act on customer feedback quickly and efficiently. Examples of implementations include automated assessment forms sent via email, SMS, or an app, and auto-responder systems for initial responses to customer complaints. Wang et al. (2020) noted that organizations with digital feedback systems project a caring and responsive professional image, positively impacting customer perceptions and experiences. This practice is particularly important in the direct-service optical industry, as customers tend to remember bad experiences longer than good ones if not promptly addressed.

Figure 4 displays the relative contribution of each digital CRM dimension in a pie chart. In this visualization, Customer Tracking appears as the largest sector, illustrating its dominant contribution to CRM effectiveness. Loyalty Programs, as the middle sector, demonstrate its important role in strengthening customer engagement, while Feedback Automation, although the smallest sector in the graph, still plays a vital role in maintaining service quality and creating a system of continuous improvement. This visualization is very helpful in emphasizing the strategic priorities of digital CRM implementation in the real world.

Overall, the results of this discussion confirm that a digital CRM system in the optical business, particularly in large cities like Jakarta, is a very promising strategy and relevant to the needs of modern consumers. All three CRM dimensions have been proven to contribute significantly to customer satisfaction with strong statistical effectiveness. The conclusions of this analysis also demonstrate that digital CRM is not merely an administrative tool for recording customer interactions, but rather a technology-based relational strategy capable of effectively integrating customers' emotional and functional needs. Therefore, optical companies in Indonesia are strongly encouraged to adopt a comprehensive and structured digital CRM approach to improve service quality, competitiveness, and long-term customer loyalty.

4. CONCLUSION

This study demonstrates that a digital CRM system has a significant impact on customer satisfaction at optical clinics in Jakarta. Three key dimensions—customer tracking, loyalty programs, and automated feedback—collectively form an adaptive and service-oriented customer information system. CRM has been shown to strengthen business-customer relationships through personalized service, monitoring purchasing behavior, and systematic customer experience management. An effect size of 0.61 indicates a strong and stable relationship between digital CRM and optical clinic customer satisfaction quantitatively.

To improve customer relationship management in optical clinics, several strategic steps can be taken. First, digitizing the customer tracking system is essential. Clinics are encouraged to implement an automated reminder system along with a medical record dashboard, which can help ensure consistent follow-up services and improve patient retention. Second, strengthening the loyalty program can enhance customer engagement. By developing a mobile application that offers loyalty points and rewards to returning customers, clinics can build stronger relationships and encourage repeat visits. Third, integrating an automated feedback system is key to maintaining service quality. Optical clinics should use digital surveys and real-time sentiment analysis after each visit to better understand patient experiences and make immediate improvements. Fourth, investing in human resource training and IT support is critical. Clinics in Jakarta need to upgrade their internal capacity by training staff and collaborating with third-party tech providers to implement digital solutions effectively.

Finally, collaborating with optical-tech startups offers great potential. Strategic partnerships with local CRM technology providers can accelerate innovation while also delivering long-term cost efficiency and service modernization.

Ethics Approval

This study did not require ethics approval.

Informed Consent Statement

This study did not require written consent from participants.

Author Contributions

SWBK contributed to the conceptualization of the study, development of the research framework, and supervision of the overall research process. AYW contributed to the research design, data collection, bibliometric and meta-analysis processing, and served as the corresponding author.
Ardhitya Furqon Wicaksono contributed to the literature review, data interpretation, and drafting of the methodology and results sections. JA contributed to the analysis of CRM dimensions, validation of findings, and refinement of the discussion section. LON contributed to data organization, visualization of analysis results, and editing of the manuscript for clarity and consistency.

Disclosure Statement

No potential conflicts of interest were reported by the author.

Data Availability Statement

The data presented in this study can be downloaded from OECD Publications.

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Notes on Contributors

Sri Wahyu Budoyo Kusumo
Sri Wahyu Budoyo Kusumo is affiliated with Yogyakarta Optometry Academy

Arraywed Yudita Wibowo
Arraywed Yudita Wibowo is affiliated with Yogyakarta Optometry Academy

Ardhitya Furqon Wicaksono
Ardhitya Furqon Wicaksono is affiliated with Yogyakarta Optometry Academy

Judi Antono
Judi Antono is affiliated with Yogyakarta Optometry Academy

Levya Otivian Nuvida
Levya Otivian Nuvida is affiliated with Yogyakarta Optometry Academy

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