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Influence of Digital Marketing Mix and Complaint Handling on Customer Decisions, Satisfaction, and Loyalty in Clinical Laboratory Services

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Abstract: This study examines the impact of the digital marketing mix and complaint management on customer satisfaction, loyalty, and decision-making in clinical laboratory services during the COVID-19 pandemic. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the findings indicate that promotion strategies and product quality significantly influence customer satisfaction and loyalty. Additionally, social media engagement and responsiveness are crucial factors in complaint resolution, which reinforces customer confidence and retention. Consumer perception emerges as a crucial link between marketing strategies and customer outcomes. The study highlights the importance of targeted marketing, high-quality services, and effective complaint handling in maintaining customer engagement, offering valuable insights for clinical laboratories to refine their digital strategies and enhance service quality.
Keywords: Digital Marketing Mix, Complaint Handling, Customer Satisfaction, Customer Loyalty, Clinical Laboratory Services, PLS-SEM, Product Quality, Promotion Strategies, COVID-19 Pandemic, Consumer Perception.

1. Introduction

The COVID-19 pandemic has resulted in global disruptions that have significantly affected various aspects of people's lives, particularly in rural areas, which often have limited access to economic and healthcare resources. The diverse obstacles encountered by rural residents over more than two years are indicative of their resilience across health, economic, and social factors (Mehta et al., 2020). Significant alterations in lifestyles, regional economies, and access to healthcare services are the primary factors that warrant further investigation. Compared with the impact the epidemic has had on urban regions, the pandemic has had a distinct influence on rural areas. Due to mobility restrictions, disrupted supply chains, and diminished purchasing power, rural regions, which often rely on agriculture, small businesses, and the informal economy, experience significant disruptions (Gualini, 2018). In addition, the vulnerability of populations in these regions to the pandemic's effects is further exacerbated by low awareness of health mitigation measures and limited access to modern healthcare facilities(Daniawati, 2022).

In the realm of health, the COVID-19 pandemic has introduced novel concepts regarding the importance of vaccination, healthy lifestyles, and personal hygiene. However, further research is required to determine how rural populations adjust to these changes (Reeves et al., 2020). Nevertheless, the pandemic has also necessitated that individuals rely more heavily on technology for communication and employment. The limited digital infrastructure in rural communities frequently renders it challenging for them to access this transformation (Habes et al., 2020).

The primary objective of this investigation is to investigate the impact of the COVID-19 pandemic on the lifestyles of rural residents in two primary areas: health and economy. Referring to the 7P theory (Product, Price, Place, Promotion, People, Process, Physical Evidence), this methodology applies not only to marketing but also to the examination of socio-economic dynamics (Siripipatthanakul & Chana, 2021).

For instance, the adoption of novel health products or services, changes in the distribution processes for goods and services, and the evolution of public perceptions of health and the economy during the pandemic will be assessed using each element of the 7P as a framework (Langan et al., 2019).The purpose of this study was to

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respond to the following queries: How have the health and financial needs of rural communities been impacted by the COVID-19 pandemic, and how well have they been able to adjust to healthy lifestyle choices like hand washing, mask wearing, and physical distance during and after the epidemic, Furthermore, how have fluctuations in product prices and availability, particularly of essential goods and medical devices, influenced the purchasing power of rural people, and what are the primary challenges they have in accessing healthcare services during the pandemic.

Furthermore, it is crucial to consider the impact of promotion and education on public awareness of health protocols in rural areas, as well as whether the pandemic has facilitated the digitalization of these regions, such as using telemedicine or online shopping. To address the needs of rural areas during the pandemic, this study will also examine how the state of physical infrastructure and the distribution mechanism have evolved.

2. Literature review

The variables employed in Jaikumar's research are passive and active loyalty, complaint handling satisfaction, relationship satisfaction, and sales process satisfaction. Structured Equation Modelling (SEM) is implemented as the analytical instrument. The objective of the investigation was to evaluate and examine the following: 1. the impact of sales process satisfaction on passive loyalty; 2. the impact of complaint resolution satisfaction on active loyalty; and 3. the impact of relationship satisfaction on active loyalty (Daniawati, 2022).

The research is titled "Information and technology for communication recommendations for the further development of a robust national electronic health strategy for epidemics and pandemics." This investigation focuses on the use of information technology as a tool for complaint management in healthcare strategies, particularly during a pandemic (Handayani et al., 2020). There is a tendency for complaint handling in Indonesia to be slow, due to insufficient attention to the complaint process and its potential impact on loyalty (Dahmani & Tadj, 2023). The methodology employed is qualitative, utilizing narratives to collect data from experts and community members who have utilized health facilities. This study revealed that regulations concerning complaint handling in hospitals and other healthcare facilities remain inaccessible to the public. The insufficient public comprehension of complaint handling, coupled with inadequate dissemination of information, contributes to the community's limited understanding. The complaint offense and the complaint handling procedure are not comprehended by both health facilities and hospitals, which serves as evidence of this (Sampe et al., 2022). The study offers the following advantages: the snowballing technique was used to conduct the sampling, the regression method was used to analyze the data, and recommendations were made regarding the use of paper for abandoned complaints. The complaint process against an institution is often dominated by social media, such as WhatsApp or Facebook pages, requiring a comprehensive understanding of these platforms to provide constructive feedback (Purba et al., 2021).

The title of the study, "The Effect of Health Services Marketing Mix on Patient Loyalty with Patient Trust as an Intervening Variable," indicates that it examines the impact of loyalty on patient satisfaction. The data used in this study is customer satisfaction data from health centers in West Java (Sampe et al., 2022). Daniwati posits that one factor influencing the market mix in health services is the increase in patient trust, which, along with the positive effects of the marketing mix, will enhance patient loyalty. In this investigation, purposive sampling was employed to analyze data from 140 patients who had undergone more than 2 examinations using a quantitative methodology. Based on the research model, it is evident that the model contains three latent variables: one independent variable, one mediating variable, and one dependent variable. M (Patient Trust), Y (Loyalty), and X (Marketing Mix) comprise the variables. The purposive sampling technique is used, and the path analysis approach is employed to analyze the data based on their characteristics. The PLS algorithm is used to identify the characteristics of one variable relative to another. These benefits can be derived from this research.

3. Methodology

This study employs a quantitative research approach, utilizing a survey-based methodology, to examine the impact of the digital marketing mix and complaint management on customer satisfaction, loyalty, and decision-making. A structured questionnaire was utilized to ensure consistency in data collection and facilitate statistical analysis (Siripipatthanakul & Chana, 2021).

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The target population for this study consists of customers of the Lumajang Regency Clinical Laboratory who have undergone medical examinations within the past two years. A purposive sampling technique was applied to ensure that respondents were directly relevant to the study's objectives. Purposive sampling was chosen to ensure that only individuals with direct experience with the clinical laboratory's digital marketing and complaint management systems were included. This enhances the validity of responses related to consumer decision-making, satisfaction, and loyalty. Given the constraints imposed by the COVID-19 pandemic, data collection was conducted online via Google Forms to ensure accessibility while minimizing health risks. However, this method introduces potential biases, including digital access limitations and self-selection bias, which are addressed in the data analysis section.

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The data collected to date will be described below (Tables 1 and 2).

Table 1: Distribution of Respondents' Education

Education	Amount of Respondent	Percentage
Elementary School	460	15%
Junior High School	491	16%
Senior High School	767	25%
Bachelor's degree	1228	40%
Master's degree	128	4%

In addition to education distribution data, age data were also obtained from respondents as follows:

Table 2: Distribution of the respondents' Age

Age	Amount	Percentage
16-30	1381	45%
31-45	1074	35%
>45	614	20%

Most respondents (42%) fell within the age range of 16 to 30, while 28 percent were between 31 and 45 years old, as per the age distribution used as a scale range. This age is associated with respondents' work or activities, whether they are students or employed, and is characterized by high mobility and productivity. In addition to age and education, the dataset obtained also includes employment data from respondents, as shown in Table 3.

Table 3: Distribution of Occupation

Occupation	Amount	Percentage
Student	767	25%
Government Employees	1228	40%
Self-Employed	614	20%
Teacher	460	15%

A total of 3,069 responses were collected, with the following demographic distribution:

Education: 40% of respondents held a bachelor's degree, while 25% had completed high school.
Age: The largest group (45%) fell within the **16-30 age range**, followed by **31-45 (35%)** and **>45 (20%)**.
Occupation: Government employees accounted for 40% of respondents, followed by students (25%) and self-employed individuals (20%). Next, model testing is implemented after the acquisition of these data. While interviews are used to learn about the ideas, thinking processes, and flaws of the model being developed, this model testing will focus more on the link between a single variable and multiple others. Measurement model results will be integrated with interview results to generate a new model that corresponds to field findings.
The model that we try to create is:

The Structural Equation Model (SEM) diagram shows the interconnections among the latent variables associated with Customer Decision, Digital Marketing, Marketing Mix, Customer Satisfaction, and Customer Loyalty. The model illustrates how upstream components, such as the marketing mix (assessed by indicators

like "People," "Promotion," "Physical Evidence," "Places," "Price," and "Product") and digital marketing (denoted by "Social Media Impact" and "Speed of Response"), affect downstream factors. A critical variable that links the Marketing Mix and Digital Marketing to Customer Satisfaction is Customer Decision, as evidenced by "Perception," "Objective," "Variety," and "Quality." Ultimately, customer happiness directly improves customer loyalty, as measured by "peer feedback" and "reviews from others."

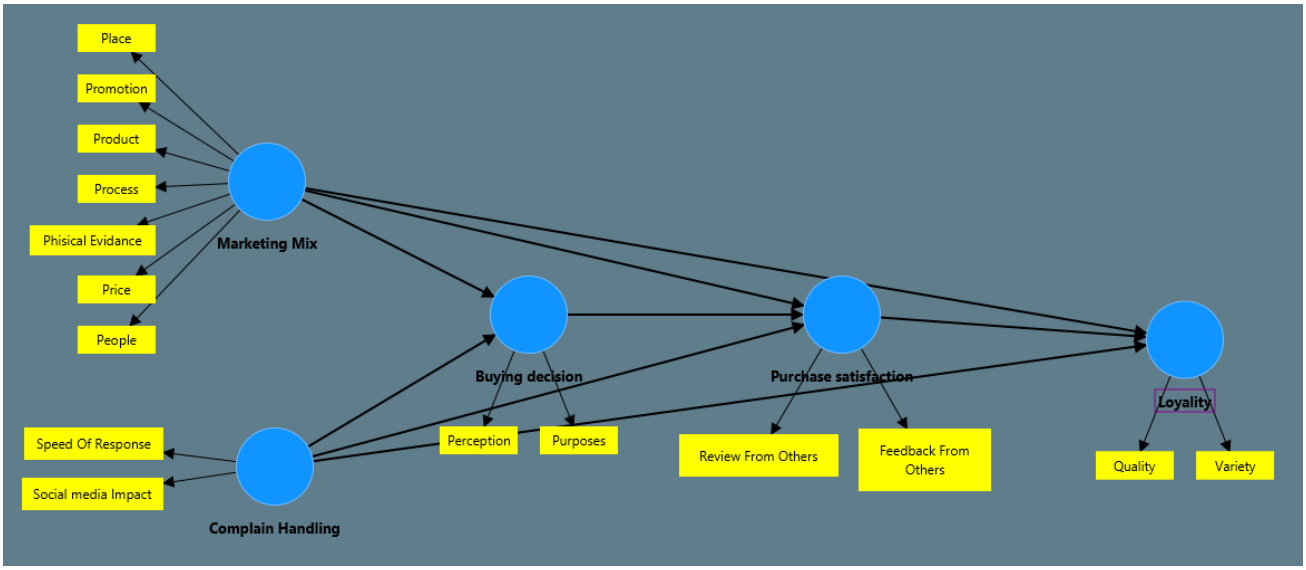

Figure 1: The PLS Model

The model illustrates a cascading effect in which the marketing mix and digital marketing function as exogenous variables, thus influencing consumer perception and decision-making. This enhances client satisfaction by aligning with their goals and delivering high-quality, diverse services. Pleased customers are more likely to demonstrate loyalty, as evidenced by their favorable comments and ratings. Emphasizing the significance of factors such as "Speed of Response" in digital marketing and "Promotion" in the marketing mix, the vectors connecting the constructs and their respective indicators underscore the potency of these relationships. Customer loyalty can be enhanced by altering upstream variables, as evidenced by the model's hierarchical structure. This provides businesses with valuable information to enhance their marketing strategies and consumer engagement efforts.

4. Results

Model testing is the subsequent procedure that follows the acquisition of these data. In this model testing, the link between one variable and several others will be the main emphasis, and the opinions, thinking processes and shortcomings of the model being produced are discovered via interviews. The interview results will be combined with those from the measurement model to develop a new model consistent with the field's findings. To test the validity of an instrument, the correlation coefficient between each item's score and the total score is computed at the 95% significance level ($\alpha = 0.05$). Given that this study employs a Likert scale for data measurement, the validity test employs correlation (product-moment) analysis. The significance value of the tool correlation is considered valid if the criterion is $\leqslant \alpha = 0.05$ or if the correlation coefficient (r) is> 0.30 [11].

The value of the r array is df = (n-2) or 100-2 = 98, with a probability of error of 5%, and the resulting r array value is 0.1966. The applicable rules are as follows: a) If the number r > r table (0.1954), then the question is valid; b) If the number r < r table (0.1954), then the question is invalid. The following data are the results of the validation calculations for the digital marketing mix variables (X1), complaint handling (X2), customer decisions (Y1), customer satisfaction (Y2), and customer loyalty (Y3), as shown in Table 4.

Table 4: Correlation Values

Variable	Indicator	R Count	R Tabel	Status
Marketing mix (X1)	Product	0.861	0,1954	Valid
	Place	0.577	0,1954	Valid
	Price	0.735	0,1954	Valid

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	People	0.857	0,1954	Valid
	Promotion	0.757	0,1954	Valid
	Process	0.819	0,1954	Valid
	Physical Evidence	0.868	0,1954	Valid
Complain Handling	Social Media Impact	0.901	0,1954	Valid
(X2)	Speed of response	0.694	0,1954	Valid
Customer Decision	Perception	0. 901	0,1954	Valid
(Y1)	Objective	0.813	0,1954	Valid
Customer Satisfaction	Review from others	0.925	0,1954	Valid
(Y2)	Feedback from seller	0.917	0,1954	Valid
Customer Loyalty (Y3)	Variety	0.932	0,1954	Valid
	Quality	0.938	0,1954	Valid

Conducting a correlation analysis of each variable to obtain the findings of the hypothesis test is the next step once all the data has been determined to be legitimate. For this test, the partial least squares method will be used. It is anticipated that this method will identify the degree of covariance between the variables represented by each component.

4.1 Loading value of the convergent validity test

Convergent validity assesses the validity of each relationship between indicators and their latent constructs/variables. We will use a loading factor limit of 0.60 in this study. All the indicators have loading factor values above 0.60, which means that the outer model value, or the relationship between the constructs and variables, has been proven to be valid. Table 5 shows that all loading factors exceed 0.60, indicating that the model retains all variables. It can be concluded that the construction has met the convergent validity criteria for product analysis using Smart PLS, as shown in the Figure.

The Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis reveals significant relationships among the latent variables: Customer Decision, Customer Satisfaction, Customer Loyalty, Complaint Handling, and Digital Marketing Mix. The Digital Marketing Mix exhibits excellent reliability, with "Promotion" (loading = 0.994) and "Process" (loading = 0.923) being the most influential indicators. This implies that the effectiveness of digital marketing efforts is significantly influenced by the implementation of effective promotional strategies and the optimization of processes. In the same vein, the significance of timely and visible responses to customer concerns, particularly through digital platforms, is underscored by the "Speed of response" (loading = 0.937) and "social media Impact" (loading = 0.941) factors that strongly influence complaint handling.

Table 5: Bootstrapping data

No	Indicator	Digital Marketing Mix	Complaint Handling	Customer decision	Customer satisfaction	Customer Loyalty
1	Product	0.837				
2	Place	0.869				
3	Price	0.853				
4	People	0.881				
5	Promotion	0.934				
6	Process	0.923				
7	Physical Evidence	0.822				
8	Social Media Impact		0.941			
9	Speed of Response		0.937			
10	Perception			0.962		
11	Objective			0.962		
12	Variety				0.925	
13	Quality				0.902	
14	Customer Review					0.950
15	Feedback from seller					0.974

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Additionally, the analysis emphasizes that Customer Perception (loading = 0.962) is the sole determinant of Customer Decision, emphasizing the critical importance of establishing and sustaining a positive brand image. Moreover, customer satisfaction is mostly affected by the alignment of aims (loading = 0.962), product variety (loading = 0.925), and quality (loading = 0.902). This suggests that fulfilling consumer expectations with varied, high-quality goods substantially improves satisfaction.

The significance of post-purchase engagement and the utilization of positive reviews to establish enduring loyalty are illustrated by the fact that "Feedback from Seller" (loading = 0.974) and "customer review" (loading = 0.950) are the primary factors driving customer loyalty.

The structural relationships between latent variables indicate a cascading influence, in which the digital marketing mix and complaint handling directly influence customer preferences through customer perception. Customer choices influence customer satisfaction, which, in turn, fosters customer loyalty. This route indicates that enhancing upstream elements such as promotions, social media engagement, and perception management can positively influence consumer happiness and loyalty. These results provide practical insights for organizations to prioritize essential indicators and optimize methods for improving customer experience and retention.

5. Discussion

The Structural Equation Model (SEM) diagram shows the interconnections among the latent variables associated with Customer Decision, Digital Marketing, Marketing Mix, Customer Satisfaction, and Customer Loyalty. The model illustrates how upstream components, such as the marketing mix (assessed by indicators including "People," "Promotion," "Physical Evidence," "Places," "Price," and "Product") and digital marketing (denoted by "Social Media Impact" and "Speed of Response"), affect downstream factors. "Perception" is a critical variable that unites the Marketing Mix and Digital Marketing with Customer Satisfaction, as evidenced by "Objective," "Variety," and "Quality." Ultimately, customer happiness directly improves customer loyalty, as measured by "peer feedback" and "reviews from others." The model illustrates a cascading effect in which the marketing mix and digital marketing function as exogenous variables, thus influencing consumer perception and decision-making. By aligning with consumer objectives and offering a diverse and high-quality selection, this, in turn, enhances customer satisfaction. Satisfied consumers are more inclined to demonstrate loyalty, as evidenced by their favourable feedback and evaluations.

The strength of these interactions is shown by the arrows connecting the constructs and their corresponding indicators, highlighting the significance of elements such as "Speed of Response" in digital marketing and "Promotion" in the marketing mix. The model demonstrates how adjustments to upstream factors can increase customer loyalty through its hierarchical structure. This provides organizations with valuable data to enhance their client engagement and marketing initiatives.

The second hypothesis (H2) posits that the digital marketing mix positively influences customer satisfaction. This outcome supports the notion that a well-designed marketing strategy can satisfy consumer expectations, including the availability of a diverse product selection, product quality, and the ease of accessing information through digital platforms. Improved customer satisfaction fuels a positive feedback loop between the business and its customers, fostering long-term loyalty. Customer loyalty is positively affected by the digital marketing mix, as indicated by the results of the third hypothesis test (H3). Elements such as responsive interactions on digital platforms and appealing promotions are critical components of loyalty development in this context. Customer loyalty to a specific brand is more likely to persist in competitive market conditions when they perceive themselves as valued and connected. Consistent pleasant encounters often foster client loyalty.

Customer decisions are advantageously affected by efficient complaint management, according to the fourth hypothesis (H4). Satisfactory problem resolution and prompt response foster additional trust among consumers, thereby increasing the probability that they will make another purchase. This discovery indicates that both retention and initial purchase decision-making are influenced by effective customer service components. The fifth hypothesis (H5) posits that customer loyalty is positively correlated with effective complaint management. In turn, consumers' loyalty is enhanced when companies can professionally manage complaints, as they feel valued and acknowledged. Social media influence and response speed are critical factors in establishing trust and fostering long-term relationships with consumers. According to the seventh hypothesis (H7), the investigation's findings indicate that customer satisfaction is positively affected by customer decisions. Acquisition choices influenced by favourable experiences, such as superior product and service quality, often lead to higher satisfaction levels. This discovery implies that to enhance customer satisfaction, organizations must ensure that the entire purchasing process, from the initial offer to post-sales maintenance, functions seamlessly.

According to the final hypothesis (H8), customer loyalty is significantly enhanced by customer satisfaction. Satisfied customers are more inclined to suggest a brand to others and make more purchases. It is crucial to establish long-term relationships by providing exceptional quality, variety, and service to create consumer value. Customer satisfaction serves as a potent mediating variable in this research model, linking customer loyalty to decision-making.

The practical implications of these findings for healthcare providers are substantial. First, laboratories and healthcare organizations should focus on improving their marketing efforts by emphasizing the quality of their services and promoting their offerings through digital platforms, where timely responses and engagement can make a noticeable difference in customer perceptions. The research underscores the importance of offering a diverse range of services that align with customer expectations, thereby directly influencing customer satisfaction and fostering loyalty. Moreover, a strong complaint management system that resolves issues swiftly and effectively is essential for building customer trust and increasing the likelihood of repeat business. The study's findings suggest that customer loyalty is not only influenced by product quality but also by how well organizations handle complaints and engage with customers online, particularly through social media.

For policymakers, these results suggest that regulations should encourage healthcare providers to adopt transparent, efficient complaint management systems and to integrate digital marketing strategies to improve patient engagement. Encouraging the use of digital platforms for communication and feedback may help healthcare providers better meet patient expectations, thereby improving service quality and enhancing patient satisfaction. Additionally, policymakers should consider initiatives that promote the development of customer-oriented marketing strategies, ensuring that both public and private healthcare providers are well-equipped to compete in an increasingly digital landscape.

Overall, the research provides actionable recommendations for healthcare providers to improve product/service offerings, enhance digital marketing efforts, and streamline complaint management. By addressing these factors, healthcare organizations can cultivate lasting relationships with their patients, ultimately contributing to improvements in healthcare services and patient satisfaction in a competitive market.

6. Conclusion

This investigation offers valuable insights into the impact of the digital marketing mix and complaint management on customer behaviour in the context of clinical laboratory services. The results confirm that both the digital marketing mix and effective complaint management play a critical role in shaping client decision-making, satisfaction, and loyalty. The research demonstrates that product quality is the most influential element of the marketing mix, with a high t-statistic value of 15.256, signalling its importance in fostering customer satisfaction and loyalty. Meanwhile, place (location) was found to have a relatively minimal impact on customer choices, particularly in the context of the COVID-19 pandemic, when service accessibility became secondary to quality and reliability. The study further emphasizes that complaint management systems, when effectively executed, have a significant positive influence on client retention and satisfaction.

Thus, clinical laboratories should prioritize not only enhancing their marketing efforts, particularly through product excellence and strategic promotions, but also focus on building robust complaint management systems that can address and resolve customer concerns swiftly. To maximize success, clinical laboratories should focus on improving product quality, investing in targeted promotional activities, and optimizing their complaint management processes. Additionally, integrating digital marketing tools like social media and search engine optimization (SEO) can increase visibility and engagement, ultimately driving more informed customer decisions. Future research could explore the impact of digital marketing on different customer segments, investigate the long-term effects of complaint management systems on customer loyalty, and compare digital marketing and complaint management strategies across industries to identify broader best practices. Another area for future investigation could be the role of technology, such as AI-driven diagnostics or telemedicine, in influencing customer satisfaction and loyalty. In conclusion, this research underscores the importance of prioritizing product quality and complaint management, while strategically leveraging the digital marketing mix to enhance customer satisfaction and loyalty. By focusing on these elements, clinical laboratories can navigate the competitive and rapidly changing healthcare environment, ensuring sustained growth and customer retention.

Author Contributions

Immanurdin; methodology, Immanurdin; software, Immanurdin; validation, Immanurdin; formal analysis, Immanurdin; investigation, Immanurdin; resources, Immanurdin; data curation, Immanurdin; writing—original draft preparation, Immanurdin; writing—review and editing, Immanurdin, Hadi Prayitno, Edy Wahyudi, and Wheny Khristianto; literature review, Hadi Prayitno; proofreading and feedback, Edy Wahyudi and Wheny Khristianto; supervision, Immanurdin. All authors have read and agreed to the published version of the manuscript.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent

Ethics approval was not required. All participants provided informed consent for participation and publication of anonymized data.

Competing interests

The authors declare no competing interests.

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