

# **Positioning Analysis Of An M-Health Application Based On User Perception Using A Multidimensional Scaling Method (A Case Of Kimia Farma Mobile In Indonesia)**

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## **Abstract**

The health industry is currently entering the 5.0 transformation, where the power of digital interaction creates contactless and real-time relationships. The potential of technology in the world of health creates new business opportunities in a better direction, which also leads to the emergence of m-Health application innovations. PT. Kimia Farma Tbk responded to the demand for online-based health services by releasing the Kimia Farma Mobile m-Health application. However, the number of active users of the Kimia Farma Mobile m-Health application shows defeat compared to the Top 3 m-Health applications in Indonesia, even though it was released two years ago and the service facilities offered are similar. The purpose of this research is to map the positioning of the four m-Health applications, namely Kimia Farma Mobile, Halodoc, Alodokter, and SehatQ, from user perceptions in Indonesia and compare the similarity and dissimilarity between the brands based on the eight variable dimensions of e-SERVQUAL using Multidimensional Scaling (MDS) method, as well as to analyze further of the position of the Kimia Farma Mobile m-Health application compared to competitors by the euclidean distance scores. The results show that the Kimia Farma Mobile m-Health application ranks fourth among all eight variable dimensions of e-SERVQUAL and is perceived as the least favourite among other leading m-Health applications. Also, another finding shows that the positioning map of this study has an R-Square value of 0.994 and a stress value of 7.53%, which means that the resulting map distinguishes the positioning of the four m-Health applications in this study.

**Keywords:** Kimia Farma Mobile, M-health, E-SERVQUAL, Multidimensional Scaling.

## **1. Introduction**

The results of a survey conducted by APJII (Asosiasi Penyelenggara Jasa Internet Indonesia) stated that 196,714 million people in Indonesia had used the internet, which also indicates an increase in internet penetration in Indonesia by 8.9% from the previous year

(APJII, 2020). With the tendency to use smartphones compared to other internet-connecting devices (APJII, 2020), one of the most frequently accessed content and information varies from movies, music, sports, and culinary to the health sector. The formation of consumer behavior that is more technologically literate when faced with health makes the pharmaceutical market increasingly competitive. It requires corporate driving values to survive and compete with other brands (Churry, 2020).

The global COVID-19 pandemic that has hit the world, including Indonesia, strengthens the relationship between humans and digital technology. With limited space for people to move and awareness of the importance of health among the public increasing, it directly impacts the percentage of the largest technology user group that falls in the health sector (Vargo et al., 2021).

There has been a change in behavior towards society in the COVID-19 era in the use of technology for online communication, robotic technology, and contactless systems, which have become as important as electricity, water, and oxygen (Kahar et al., 2020). People are changing their lifestyles from consumptive to more selective and frugal, from travelling to watching videos at home, from shopping at malls to shopping online. Apart from that, government policies related to self-protection have drastically increased the need for health products and even created new product innovations (Iriani et al., 2021).

Human support appears useful for therapeutic alliances and treatment outcomes, but in many cases, it is considered impractical, costly, and obsolete. In addition, the prediction of the power of digital interaction in the health world creates contactless and real-time relationships. *invent.ure* involves the telemedicine and health industry in the category of 'the rise' after COVID-19. This prediction means that this industry will rise to prominence due to changes in people's behavior and lifestyle and form emerging businesses. Demands for needs and critical mass have made people get used to consulting activities and fulfilling health needs online, so it has become a mainstream habit (*invent.ure*, 2021). Business opportunities in the health industry will face new opportunities and challenges in the post-COVID-19 era, so health companies need to be considerate to survive and develop by building a health service system that keeps up with the pace of technological innovation and has a distribution of health service resources, provide On-Off-Line services, expand indirect health services, and have psychological stability by providing collaborative care using an integrated system (Lee & Lee, 2021).

According to a survey conducted among health patients, the emergence of m-Health (mobile health) as a digital health innovation is considered more convenient, reliable, flexible, less judgmental, and faster, and the support provided is intense. However, its existence must be made as attractive and reliable as possible to influence changes in the behavior of its users (Müssener, 2021). Optimizing the potential of m-Health is believed to move the health sector in a better direction (Papaspanos, 2021). PT. Kimia Farma Tbk foresaw the opportunities and acted quickly to present a one-stop healthcare solution called the Kimia Farma Mobile m-Health application. This application exists to meet the demands and needs of the community so that they can be better connected, provide concrete and real-time information, provide optimal medical care, provide excellent service, and sell a complete product in one place.

PT. Kimia Farma Tbk has seven subsidiary companies, three grandson companies, and one great-grandson company, including pharmacies, health clinics, clinical laboratories, optics, and beauty clinics (Budidarmo, 2021). Distribution of business units of PT. Kimia Farma Tbk proposed to meet the needs of the government and society in the health sector. The industrial

revolution 5.0 is a paramount concern for PT. Kimia Farma Tbk. In the future, PT. Kimia Farma Tbk has prepared to apply the principles of a healthcare ecosystem that connects the supply and demand sides, where the actors involved are humans, services, places, products, and information that the access connects in one ecosystem within one process (Prasoz, 2021). One of the renewal innovations carried out by PT. Kimia Farma Tbk is releasing Kimia Farma Mobile to anticipate the demands and trends of people's lifestyles and answer digital needs that facilitate health services through an application format known as mHealth. Kimia Farma's internal team, in collaboration with PT. Telkom Indonesia handles the development of this application to achieve BUMN synergy promoted by the Minister of BUMN Indonesia (Churry, 2020).

Kimia Farma Mobile is one of m-Health's choices that claim to serve a simple and user-friendly UI/UX and fulfill laboratory orders for medical service, purchase medicines, and book VGR (Gotong Royong Vaccine) services. This application connects to 1,200 Kimia Farma Pharmacies, 500 Kimia Farma Clinics, and 70 Kimia Farma Clinical Laboratories (PT. Kimia Farma Apotek, 2022). Even though the promotion by its owned media, Instagram, is regularly done, the approximate number of users of Kimia Farma Mobile is 80,000 users (Mulyana, 2021). The cause is closely related to the tough competition with similar mHealth applications, namely the Halodoc, Alodokter, and SehatQ m-Health applications which already exist and offer things that intersect with what is presented by Kimia Farma Mobile. In contrast, the fourth rating and review of the mHealth application on the Appstore shows that the Kimia Farma Mobile m-Health application has the lowest rating, namely 4.6/5, with several reviews 30 times less than its competitors. On the other hand, even though the SehatQ m-Health application rating still lags behind Kimia Farma Mobile, the number of visits to the SehatQ m-Health application until June 2021 reaches 27.5 million every month, and this figure will continue to increase by 200% until the end of the year (Handoyo, 2021). This phenomenon is motivated by the need for strong brand positioning owned by Kimia Farma Mobile. Good brand positioning helps companies develop marketing strategies by clarifying the brand's essence, identifying goals that help consumers achieve them, and showing how to do it uniquely (Kotler & Keller, 2016).

Based on the explanation above, the acceptance of Kimia Farma Mobile, based on consumer perceptions, still needs to catch up to its competitors, namely Halodoc, Alodokter, and SehatQ. Consumer perceptions of Kimia Farma Mobile as a mHealth application in Indonesia still need to be stronger, even though the company has tried approaches and interactions. According to Kotler & Keller (2016), to develop an effective positioning, companies need to study the service quality of competitors and the level of satisfaction of consumers and prospective customers regarding the quality of these services. Therefore, the purpose of this study is to measure the perceptions of users of the Kimia Farma Mobile m-Health application and its three competitors by measuring with the Multidimensional Scaling (MDS) method with the e-SERVQUAL variable dimension as an attribute of the measurement parameters and analyzing the positioning of the Kimia Farma m-Health application.

The objective of this study is to answer the research questions to the following: First, based on the user's assessment of the e-SERVQUAL variable dimensions (efficiency, fulfillment, reliability, privacy, responsiveness, compensation, contact, and reliability), how important are these dimensions to the use of the Halodoc, Alodokter, SehatQ, and Kimia Farma Mobile m-Health applications? Second, how is the positioning of Kimia Farma Mobile based on perceptual mapping compared to competing applications?

## **2. Literature Review**

### ***Organizational Performance***

Marketing is identifying and fulfilling human and social needs (Kotler & Keller, 2016) and a management process that identifies and anticipates consumer needs effectively and profitably (Blythe, 2014). Achieving marketing goals in digital marketing activities is carried out by applying digital media, data, and technology. Digital marketing focuses on managing different formats for online presence companies. Several things are influencing digital marketing adoption, which can also support the marketing objectives (Chaffey & Chadwick, 2019), namely: (1) Digital devices: Business interactions using smartphones, tablets, desktop computers, TVs, gaming devices, and virtual assistants that make up the Internet of Things (IoT); (2) Digital platform: Interaction using a browser or an application that is already available on the device; (3) Digital media: Interaction using advertising, email, social media, and more; (4) Digital data: Gather legally protected consumer profiles; and (5) Digital technology: Creating interesting interactions when accessing websites or applications on consumer cell phones.

### ***Organizational Performance***

Consumer behavior is an exciting and endlessly complex result of multifaceted interactions between organisms and the environment (Lalaounis, 2020). Cognitive, emotional, and conative are the three cognitive aspects that influence consumer behavior. Where the cognitive aspect relates to the mental function and the consumer's ability to understand and reason, the emotional aspect includes the motivation and ability of the consumer to set preferences, and the conative aspect which involves the conscious action and intention of the consumer's actual behavior (Pasquier & Villeneuve, 2017). cultural, social, and personal factors are the three influences that attract consumer transactions (Kotler & Keller, 2016). When fulfilling the consumer's core values by buying goods and services offered by marketers achieved, it will be elementary to influence the buying behavior of these consumers in the future.

### ***Positioning***

Product positioning is a marketer's decision to achieve a brand image that is determined relative to competition in a market segment and to decide about brands, stores, companies, and product categories. Product positioning is vital for increasing interest and sales figures and providing brand uniqueness compared to competitors (Hawkins & Mothersbaugh, 2016). The following are the things needed to design a company offer and image for the desired target market (Kotler & Armstrong, 2018), namely: First, determine the competitive frame of reference: conduct a competitive analysis of brands that have the potential to become the strongest rivals. Second, Identify the optimal points-of-difference and points-of-parity: Identify the attributes that are most socialized to the brand and not owned by other brands.

Positioning helps develop new products, market expansion, communication, pricing, and even selecting the proper distribution channels (Fayvishenko, 2018). Generally, an excellent strategic positioning must have a unique value proposition and activities that stand out compared to competitors (Porter & School, 2012). There are two approaches available for brand positioning. The first approach is independent positioning, which determines the perception of potential consumers in the target market segment of the product marketed. Then the perceived positioning approach, in which consumer surveys mainly measure consumer perceptions. In the perceived positioning approach, there is an influence on consumers'

perceptions because of their relevance and individual interests. e-SERVQUAL has proven robust in measuring customer perception in the service sector and helpful for companies in creating differences, influencing the overall image, spurring global competition, shaping the company's image, and creating a competitive position (Kalia & Paul, 2021). Thus, this study uses the 8-dimensional variable of e-SERVQUAL as the customer perception measurement parameter to map the position of the four m-Health applications and determine the rank of the Kimia Farma Mobile m-Health application compared to the other three competitors (Kalia & Paul, 2021).

### ***E-Servqual***

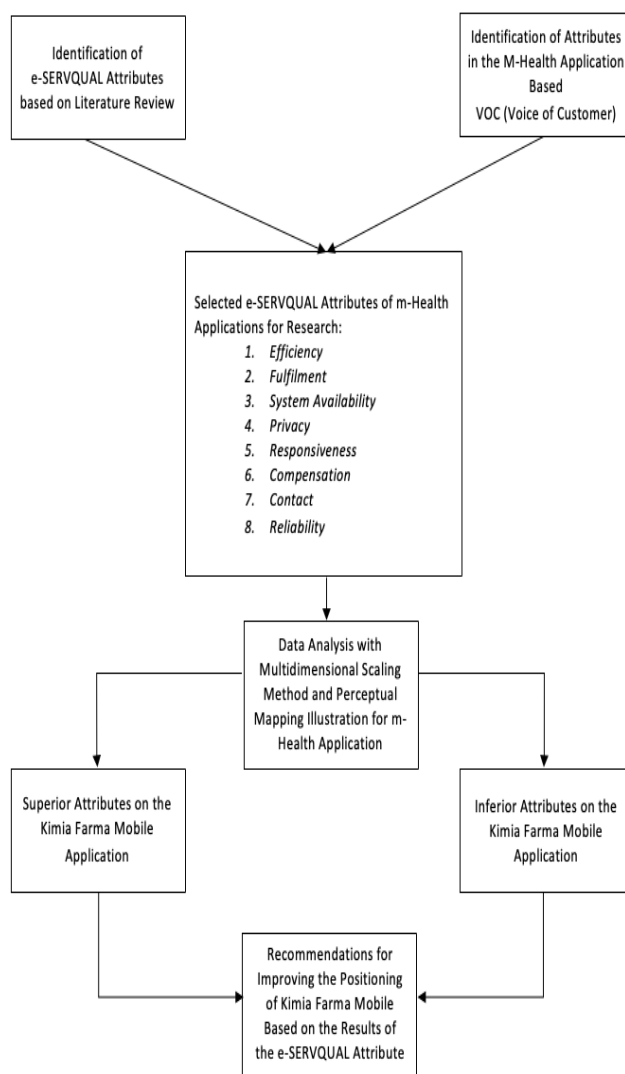
e-SERVQUAL is the development of an adaptation scale that refers to all non-internet-based customer interactions with the company (Parasuraman et al., 2005). Digital channel incorporation enables companies to implement quality service online. Identifying the relationship between different service quality dimensions can make it easier for health decision-makers and the government to identify core and secondary factors of consumer perceptions of m-Health services (Alzahrani et al., 2022). The e-SERVQUAL model developed by (Alzahrani et al., 2022) is a model that is considered the most prominent, comprehensive, integrative, and the most suitable model for measuring e-SERVQUAL in a service. The e-SERVQUAL model that uses the E-S-QUAL and E-RecS-QUAL composite scales is an appropriate basis for investigating service quality in m-Health applications (Huang, 2018). The researchers added the dimension of the reliability variable as a measure of service quality in the m-Health application. The addition of the variable dimension reliability based on preliminary data gathering conducted by researchers, Esmailpour et al. (2017) also proves that reliability has a positive and significant impact on brand reputation and brand trust. Zemblytė (2015) also proves that a direct relationship between assurance and the reliability of m-Health has proven to affect the user's continuous use of the service. The definition of the seven variable dimensions in the research used in this study was adopted and adapted based on research conducted by Huang (Huang, 2018; Parasuraman et al., 2005) and the reliability dimension was adopted from Hamari et al. (Hamari et al., 2017). Efficiency is the level of ease-of-use and promptness of mobile healthcare, System Availability is the accuracy and stability of the operation of mobile healthcare technique, Fulfillment is the level of fulfillment of mobile healthcare commitment, Privacy is the level of safety of mobile healthcare and protection of customers' privacy, Responsiveness is the level of effective handling of mobile healthcare and ability to respond to questions, Compensation is the level of compensation made for customers in the case of any mobile healthcare-related issues, Contact is the level of effectiveness of handling of problems via telephone or online service. Finally, Reliability is the technical functionality and accuracy of the service.

## **3. Research Design**

Conceptual models are examples of large and highly abstract theories with related constructs and descriptions of a phenomenon of interest that express assumptions (Premkumar et al., 2017). In this study, several stages must be passed and described in the conceptual model, shown by Figure 1.



**Figure 1. Conceptual Model**



The researchers pinpointed the attributes or dimensions of e-SERVQUAL suited for measuring the four m-Health applications. There are two phases to identify the dimensions: a breakdown of previous research and a preliminary test to determine the Voice of the Customer (VOC). Then, the researchers decides the eight dimensions of the e-SERVQUAL variable as measurement parameters. The users fill out the assessment forms concerning consumer perceptions of the Kimia Farma Mobile, Halodoc, Alodokter, and SehatQ m-Health applications assessment based on the chosen e-SERVQUAL dimensions. Consumer assessment is done by intermediary GoogleForms and represented in a questionnaire. In the third stage, the researchers then processed the existing data using the multidimensional scaling method and visually described consumer perceptions regarding their assessment of the four existing m-Health applications into perceptual mapping. The results obtained can then be processed to design recommendations regarding which dimensions must be improved first in Kimia Farma Mobile's positioning. Table 1 describes the questionnaire items used for each dimension of the e-SERVQUAL variable in this study.

**Table 1. Questionnaire Items**

<b>Item Code</b>	<b>Items of questionnaire</b>
	<i>Efficiency</i>
EF1	The use of m-Health application is simple
EF2	m-Health application enables me to complete a transaction very quick
EF3	The use of m-Health application is fast
EF4	m-Health application has good application layout
EF5	It is easy to find what I want inside m-Health application
	<i>Fulfillment</i>
FU1	M-Health application will fulfil the originally promised services
FU2	There are no hidden fees on top of the prices that showed on m-Health application
FU3	M-Health application has the services the company claims to have
FU4	M-Health application delivers quickly what I order
FU5	M-Health application has truthful offerings
	<i>System availability</i>
SA1	M-Health application can be used immediately
SA2	M-Health application works well when I intend to use it.
SA3	M-Health application runs in no time
SA4	M-Health application runs well after I enter information about my order
SA5	M-Health application enables me to get a flexible service
	<i>Privacy</i>
PR1	The use of m-Health application is safe
PR2	M-Health application will protect my privacy
PR3	M-Health application protects all the information about my health service activities (such as doctor consultations, medicine purchases, and medical records)
PR4	M-Health application protects information about my debit/credit card I use
PR5	M-Health application does not share my personal information with others
	<i>Responsiveness</i>
RS1	M-Health application system service providers are willing to help me
RS2	M-Health application service providers can effectively control problems
RS3	M-Health application service providers can immediately deal with problems
RS4	I found the whole service process on m-Health application very responsive
RS5	Employee's response when handling problems easily understood
	<i>Compensation</i>
CM1	Service providers will compensate me, if there is anything wrong with m-Health application
CM2	Service providers will compensate all of my losses, if there is anything wrong with m-Health application
CM3	m-Health application compensates me when there is a delay in service
CM4	The cancelation on m-Health application with minimum hassle
	<i>Contact</i>
CN1	M-Health application provides the telephone numbers that can be contacted
CN2	M-Health application providers provide online services to solve problems
CN3	M-Health application provider provided dedicated personnel to deal with the problem I experienced

Item Code	Items of questionnaire
CN4	M-Health application provides social media that can be contacted if a problem occurs
	<i>Reliability</i>
RL1	M-Health application is of good quality
RL2	M-Health application is well made
RL3	I believe that m-Health application works reliably
RL4	I think that m-Health application works as I expect it to

## 4. Empirical Finding

### *Respondent Demography*

Respondents' questionnaire data is the primary source in this study. The tool utilized to disseminate research questionnaires is by using Google Forms. The questionnaire rating scale uses a five-point Likert scale where 1 means "Strongly Disagree" and 5 means "Strongly Agree". Respondents declared eligible to fill out the questionnaire were Indonesian citizens aged 17-60 years and used or at least had used the Kimia Farma Mobile, Halodoc, Alodokter, and SehatQ m-Health applications. Table 2 shows the summary of the demographic profile of the respondents.

**Table 2.** *Summary of Respondent Demography*

Demographic Categories	Frequency (n = 409)
<i>Age group</i>	
17 – 24	149 (24.47%)
25 – 60	260 (63.57%)
<i>Gender</i>	
Male	196 (47.92%)
Female	213 (52.08%)
<i>Educational background</i>	
Junior high school	6 (1.47%)
Senior high school	79 (19.32%)
Diploma	122 (29.83%)
Under graduate	156 (38.14%)
Post graduate	46 (11.24%)
<i>Occupation</i>	
Private Employee	127 (31.05%)
Government Employee	78 (19.07%)
SOEs Employee	62 (15.16%)
Entrepreneur	57 (13.94%)
University Student	73 (17.84%)
Profession	7 (1.71%)
Housewife	4 (0.98%)
Freelancer	1 (0.24%)

### *Descriptive Analysis*

The researchers conducted a descriptive analysis to answer the first research question to determine the consumer's assessment of the four m-Health applications on the eight variable dimensions of the e-SERVQUAL used. The variable dimension assessment scores from the highest to the lowest percentage are Contact, Compensation, System Availability,



Responsiveness, Efficiency, Privacy, Fulfillment, and Reliability. The final calculation of the overall percentage reveals that all variable dimensions are still in the 'Very High' category because all the values are above 84%.

The descriptive analysis results reveal that Contact has a percentage of 87.82%, which suggests it is in the 'Very High' category based on users' perceptions. CN2 is the highest item discussed, "m-Health application providers provide online services to solve problems", and the lowest item comes from CN4 regarding "m-Health application provides social media that can be contacted if a problem occurs". This outcome implies that the level of compensation made in the case of any mobile healthcare-related issues is critical based on users' perceptions.

Compensation is an essential dimension variable with a percentage of 87.73%. The most elevated item is CM2 which concerns compensation for all user defeats if there is a mistaken or inaccurate service when using the m-Health application. The lowest item is CM1, regarding providing compensation if there is an incorrect service. The conclusion is that the level of compensation given to users of the Kimia Farma Mobile, Halodoc, Alodokter, and SehatQ m-Health applications, if there is a problem with the application, is considered very important by the users.

Next, is System Availability, believed to be very important by users of the m-Health application, with a percentage score of 87.70%. The highest score is in item SA5, which concerns "The m-Health application allows me to get flexible services", while the lowest score is in item SA3 concerning "m-Health application works in a short time". The accuracy and stability of the operation of mobile healthcare techniques are considered very important based on user perceptions.

Regarding Responsiveness, this dimension variable is in the 'Very High' category with a score of 87.70%, which means that based on user perceptions, the level of effective handling of mobile healthcare and the ability to respond to questions is critical. The most elevated item comes from RS2, which discussed "m-Health application service providers can effectively control problems". On the other hand, the most inferior comes from RS4, which is about "I found the whole service process on m-Health application very responsive".

Based on the descriptive analysis, Efficiency is in the 'Very High' category with 87.67%, meaning that mobile healthcare's ease of use and promptness is considered very important based on user perceptions. The highest score is on item EF1 regarding the easy use of mobile healthcare, and the lowest score is on EF2, which concerns the quickness of the transaction completed on the m-Health application.

Based on user perception, Privacy is in the 'Very High' category with a percentage of 87.59%, which signifies that the level of safety of mobile healthcare and protection of users' privacy is significantly vital for users. The highest item goes to PR2, and the lowest goes to PR4, which sequentially discusses the protection of users' privacy and the protection of debit or credit card information used by users.

In Fulfillment, item FU4 is the highest score for Halodoc but the lowest for Kimia Farma Mobile, indicating differences in user perceptions depending on which the m-Health

application assessed. FU4 discusses the speed of service delivery obtained to users of the m-Health application. Regardless, System Availability is still in the 'Very High' category with a score of 87.49%, implying that the level of fulfillment of mobile healthcare commitment is fundamental based on user perceptions.

Lastly, Reliability is an additional dimensional variable of the (Parasuraman et al., 2005) model. The descriptive analysis results display that Reliability is in the 'Very High' category with a percentage of 87.45%. This result denotes that the technical functionality and accuracy of the service are very important based on the m-Health application users' perceptions. The most elevated item is RL2 which discussed the m-Health that is well-made, and the most inferior item is RL4 which discussed the m-Health that works as expected.

### ***Multidimensional Scaling***

After conducting descriptive analysis and comprehending the m-Health application users' assessment of the e-SERVQUAL variable dimensions, the researcher processed 409 filled data from respondents using IBM SPSS Software Version 26 with the multidimensional scaling (MDS) method. MDS results allowed researchers to envision the data in the form of perceptual mapping, show each m-Health application's position and the cluster analysis of the matrix, and show similarities or differences in m-Health applications based on sample distribution. The output showcased the current position of the Kimia Farma Mobile m-Health application compared to its competitors and its rank based on the euclidean distance calculation.

In MDS, the goodness of fit testing is necessary to measure the reliability and validity of the resulting perceptual mapping model. R-square indicates how compatible or well-matched the MDS model is with the input data. R-square is acceptable if the score is  $\geq 0.60$ . While Stress values are indicators that can assess, show the quality of solutions, and determine the goodness of fit in the MDS model. The model is 'fair' if the stress value is  $\leq 10\%$ , though it would be better if the score is lower than 10% (Malhotra, 2020). Table 3 displays this study's results of the R-square value and stress value.

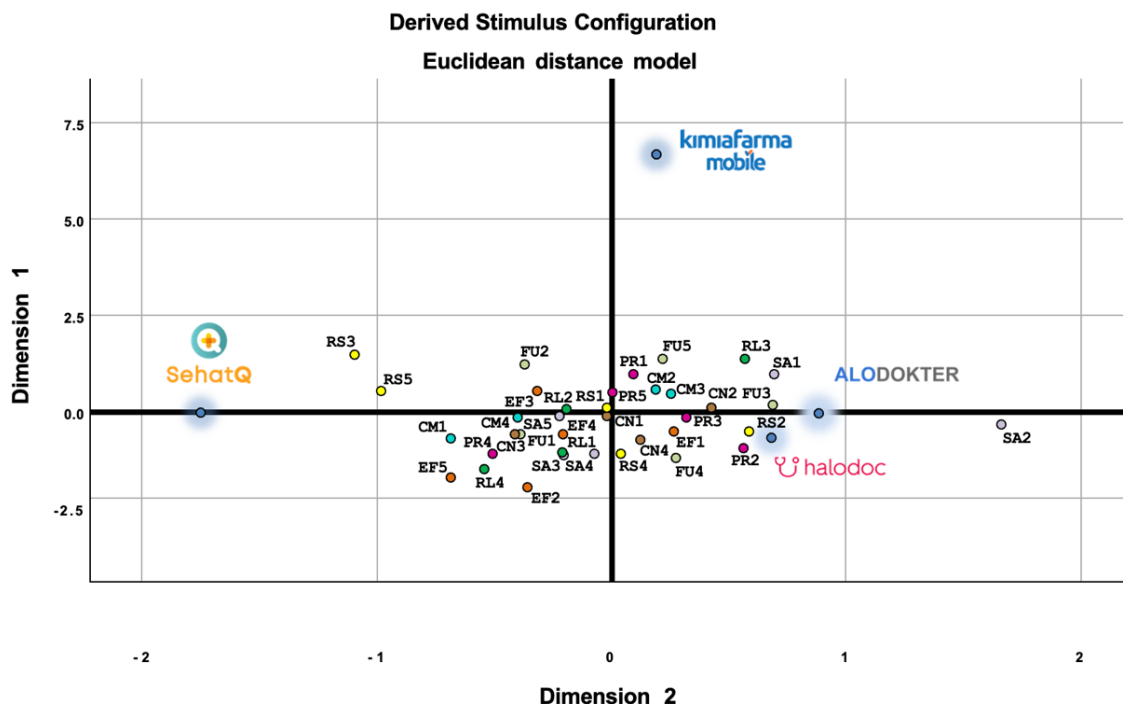
***Table 3. Stress Value and R-Square Result***

<b>Stress Value</b>	<b>R-Square</b>
0.07535	0.99433

The results of the stress value score in this study were 0.07535 or 7.53%, which means that based on the feasibility standard, the positioning or perceptual map produced in this study is in the 'good' category. The R-Square value is 0.99, indicating that the constructed map in this study is feasible to be used to measure the positioning of the Kimia Farma Mobile, Halodoc, Alodokter, and SehatQ m-Health applications based on the eight variable dimensions of e-SERVQUAL.

Perceptual mapping of the whole dimension variable e-SERVQUAL indicators is shown in Figure 2.

*Figure 2. Perceptual Mapping Result*



Based on the results, the position of the four m-Health applications has diverged into three quadrants. Whereas the m-Health application included in quadrant I is Kimia Farma Mobile, quadrant II is Halodoc and Alodokter, and then quadrant IV is SehatQ. Suppose there is more than one object that occupies the same quadrant area. In that case, the level of competition will be high because it indicates that the objects have similarities in the indicators tested. Kimia Farma Mobile is isolated in quadrant I and is far from its competitors. On top of it, the indicators tested gathered close to competitors and far from where Kimia Farma Mobile was, which means not only is the competition low, but also Kimia Farma Mobile's position is fragile based on the indicators used. The division of the quadrant area can be identified by referring to the coordinate point values shown in Table 4.

**Table 4.** *The Coordinate Points of The Four M-Health Applications*

<b>m-Health Application</b>	<b>Axis X</b>	<b>Axis Y</b>
Kimia Farma Mobile	6.7730	0.2113
Halodoc	-0.4556	0.7327
Alodokter	-0.0521	0.8844
SehatQ	0.0009	-1.7534

Besides examining the coordinates of the four m-Health applications, researchers also examined the indicator points of each e-SERVQUAL variable dimension indicator used in this study which permits calculating the Euclidean distance and providing the rank of each m-Health application. If the Euclidean distance results are known, then the four m-Health applications will be ranked from first to fourth. In its interpretation, rank one is considered superior, rank two is considered good, rank three is considered good enough, and rank four is considered poor. Table 5 displays the coordinate points for each dimension indicator of the e-SERVQUAL variable on the positioning map of this study

**Table 5.** *The Coordinate Points of e-SERVQUAL Variable Dimension Indicators*

<b>Dimension Variable</b>	<b>Indicator</b>	<b>Axis X</b>	<b>Axis Y</b>
Efficiency	EF1	-0.4484	0.2126
	EF2	-2.0934	-0.3108
	EF3	0.4076	-0.2760
	EF4	-0.5870	-0.1552
	EF5	-1.4849	-0.6867
Fulfillment	FU1	-0.4336	-0.3104
	FU2	1.0271	-0.3094
	FU3	0.0527	0.7227
	FU4	-0.8698	0.2142
	FU5	1.1624	0.2337
System Availability	SA1	0.6208	0.7251
	SA2	-0.3203	1.5643
	SA3	-0.8349	-0.1597
	SA4	-0.8248	-0.0522
	SA5	-0.0876	-0.1900
Privacy	PR1	0.9493	0.1073
	PR2	-0.5876	0.6657
	PR3	-0.0853	0.3294
	PR4	-0.8082	-0.4570
	PR5	0.4153	0.0006
Responsiveness	RS1	0.0365	-0.0068
	RS2	-0.4311	0.6772
	RS3	1.1344	-1.0749
	RS4	-0.8253	0.0336
	RS5	0.5268	-0.9757
Compensation	CM1	-0.5527	-0.6687
	CM2	0.5634	0.1757
	CM3	0.4189	0.2347
	CM4	-0.0776	-0.3188
Contact	CN1	-0.0878	-0.0148
	CN2	0.0420	0.4079
	CN3	-0.4345	-0.3269
	CN4	-0.5976	0.1070
Reliability	RL1	-0.8257	-0.1605
	RL2	0.0349	-0.1709
	RL3	1.0018	0.6394
	RL4	-1.3618	-0.5008

The smaller the euclidean distance created, the closer the distance of each object is, indicating the higher the competition level. This translation aligns with this study's purpose: to see which object is the most superior among other objects based on calculating the Euclidean distance of each existing e-SERVQUAL dimension measured in this study. The formula for calculating the euclidean distance (Malhotra, 2020), namely:

$$ed = \sqrt{(x_i - x_{i1})^2 + (y_i - y_{i1})^2} \quad (1)$$

Description:

ed = Euclidean Distance

$x_i$  = Values of Horizontal Axis in The Coordinate Plane  
 $y_i$  = Values of Vertical Axis in The Coordinate Plane

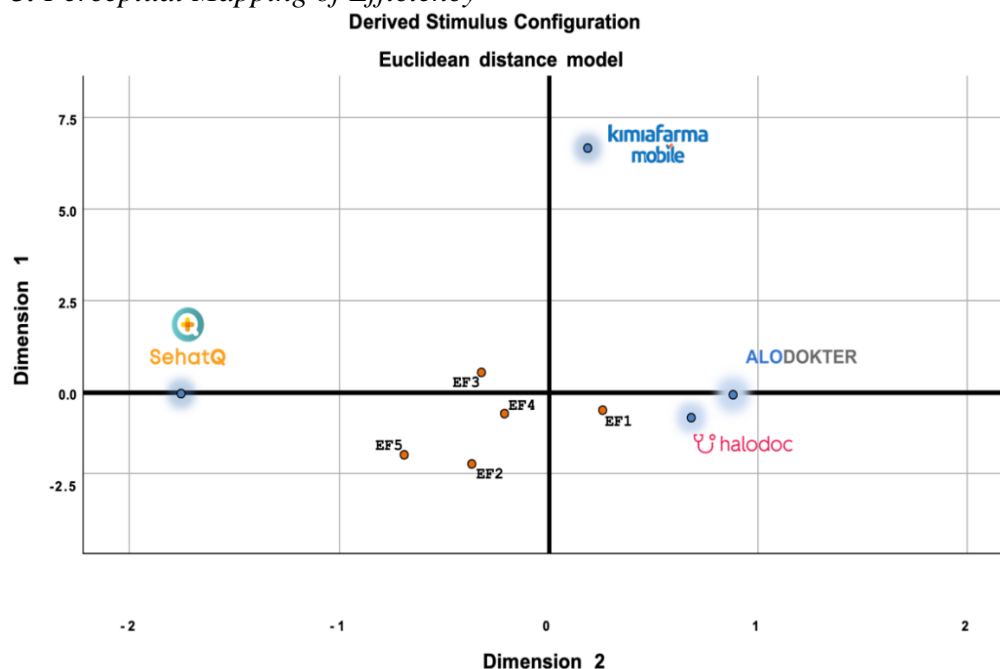
## 5. Empirical Finding

### *Euclidean Distance Calculation*

#### 1. Efficiency

Figure 3 shows five indicators of Efficiency. Contrary to Halodoc, which ranked first, the accumulated euclidean distance score shows that Kimia Farma Mobile is ranked fourth on Efficiency.

**Figure 3. Perceptual Mapping of Efficiency**



This result indicates that the ease of use and accuracy of health services in the Kimia Farma Mobile could be better and still needs to be more competitive with the other three m-Health applications. The result is in line with the reviews given by users of the Kimia Farma Mobile in the Appstore, strengthening evidence of the lack of efficiency aspects. Today's consumers want online services that are consumer-centric, easy to navigate, and easy to order (Chaffey & Chadwick, 2019). Kimia Farma Mobile must improve the transaction system so that it does not cause a giving-away effect for re-using the application, especially now that consumers prefer something stress-free to choose from (Chaffey & Chadwick, 2019). Besides, many service menus seem hidden even though inspections are available in the application. The display layout of the Kimia Farma Mobile needs to refine further, and the 'search bar' feature should be able to search not only for drug names but also shows the result of examination services booking facilities for both clinics and clinical laboratories. These changes will make users feel practical in finding their needs without going through several complicated steps. The conclusion from the accumulated euclidean distance calculations for each dimension variable efficiency indicator shown in Table 6.



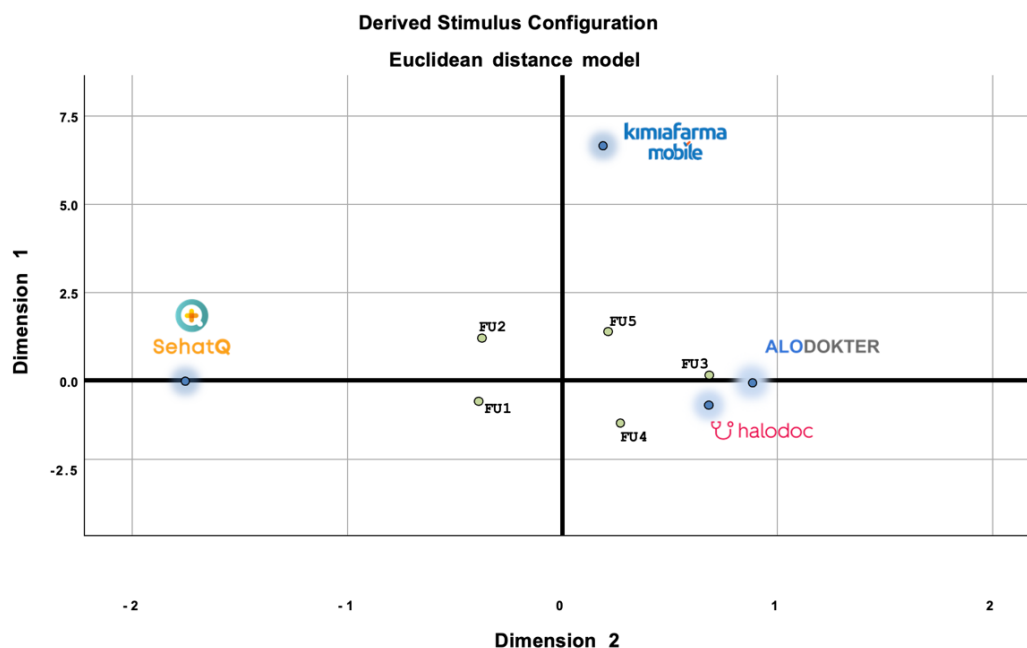
**Table 6. Euclidean Distance of Efficiency**

m-Health Application	Efficiency	
	Euclidean Distance	Rank
KF Mobile	38,1629	4
Halodoc	6,4407	1
Alodokter	7,6890	2
SehatQ	9,6241	3

**2. Fulfillment**

Figure 4 shows Kimia Farma Mobile is ranked fourth for fulfillment.

**Figure 4. Perceptual Mapping of Fulfillment**



This result suggests that Kimia Farma Mobile is farthest from the indicators utilized compared to the other three m-Health applications. In line with the results, the reviews of Kimia Farma Mobile on the App Store support evidence that the quality service in the fulfillment sector could be more optimal and needs improvement. The users felt dissatisfied with Kimia Farma Mobile because service delays often occur, especially in medicine delivery. Kimia Farma Mobile also often includes inaccurate medicine stocks, inappropriate hours for booking laboratory and clinic services, and appointments with doctors that requires a D+1 order method.

According to Kalia & Paul (2021), fulfillment is essential because it can significantly differentiate ten e-retailers in India. Jaiyeoba et al. (2018) state that it influences the perceived quality of e-service use in South Africa. Fulfillment is vital in determining the user's first impression because if the first impression is not pleasing, the user will form a wrong perception. Kimia Farma Tbk company must realize that Kimia Farma Mobile must be a health service application with complete service fulfillment, not only functioning online but also supported by its offline component. Kimia Farma Mobile must provide measurable and well-integrated service promises, double confirmation when there is an order, and an estimated time for the application. When active offline, employees must be on standby and be able to prepare orders that users need immediately, whether preparing medicine and medical stuff, entering queues into the laboratory system, or preparing doctors to consult both online and in person.

Table 7 shows the accumulated euclidean distance calculations for each dimension variable fulfilment indicator.

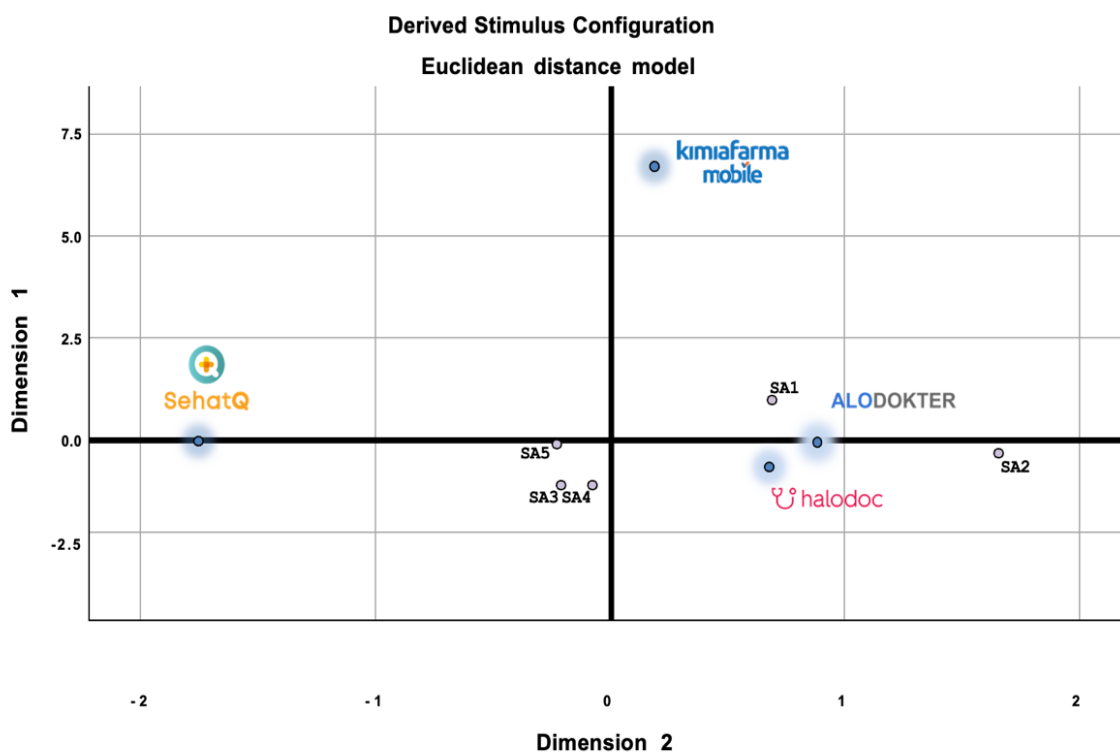
**Table 7. Euclidean Distance of Fulfillment**

m-Health Application	Fulfilment	
	Euclidean Distance	Rank
KF Mobile	32,9881	4
Halodoc	5,7208	2
Alodokter	5,4913	1
SehatQ	10,2084	3

**3. System Availability**

Figure 5 shows Kimia Farma Mobile ranks fourth on the variable system availability dimension. Thus, Kimia Farma Mobile is farthest from all the indicators used compared to the other three m-Health applications and is perceived less favorably on the variable dimension of system availability. Supporting the outcomes, Kimia Farma Mobile users' express dissatisfaction because the application often performs forced closes. The server is also repeatedly down, crashes, and has bugs often, hindering the activities of users who want to browse the application or enter orders into the basket. Users also experience inconvenience due to inaccurate access to the application, where service availability should be 24 hours. Also, synchronization with pharmacies, clinics, and laboratories is inconsistent for users since the application does not provide an order cancellation feature which causes inflexibility. System availability significantly affects customer satisfaction with website (Jaiyeoba et al, 2018). One of the factors that the Netflix application is ranked first as a Video on Demand application is that the availability system offered on Netflix is more flexible than other Video on Demand applications (Suyanto & Damayanti, 2022).

**Figure 5. Perceptual Mapping of System Availability**



Reflecting on its competitors, Kimia Farma Mobile should provide a cancellation feature to solve the problems if the user inputs an order incorrectly, correct the address, changes the consultation schedule, or also schedules examinations at the clinic and laboratory. Kimia Farma Mobile should also add an intelligent searching feature that automatically directs and gives users choices to the closest outlets open when the intended outlet closes, especially now that PT. Kimia Farma Tbk has opened a network of pharmacies, clinics, and laboratories open 24 hours (PT. Kimia Farma Apotek, 2022). Kimia Farma Mobile system must also support various Android, iPhone, and other devices. Kimia Farma Mobile m-Health can conduct a survey every time users complete a transaction related to their experience using the application. Listening to user feedback can be a good assessment tool for Kimia Farma Mobile to improve the quality of the application.

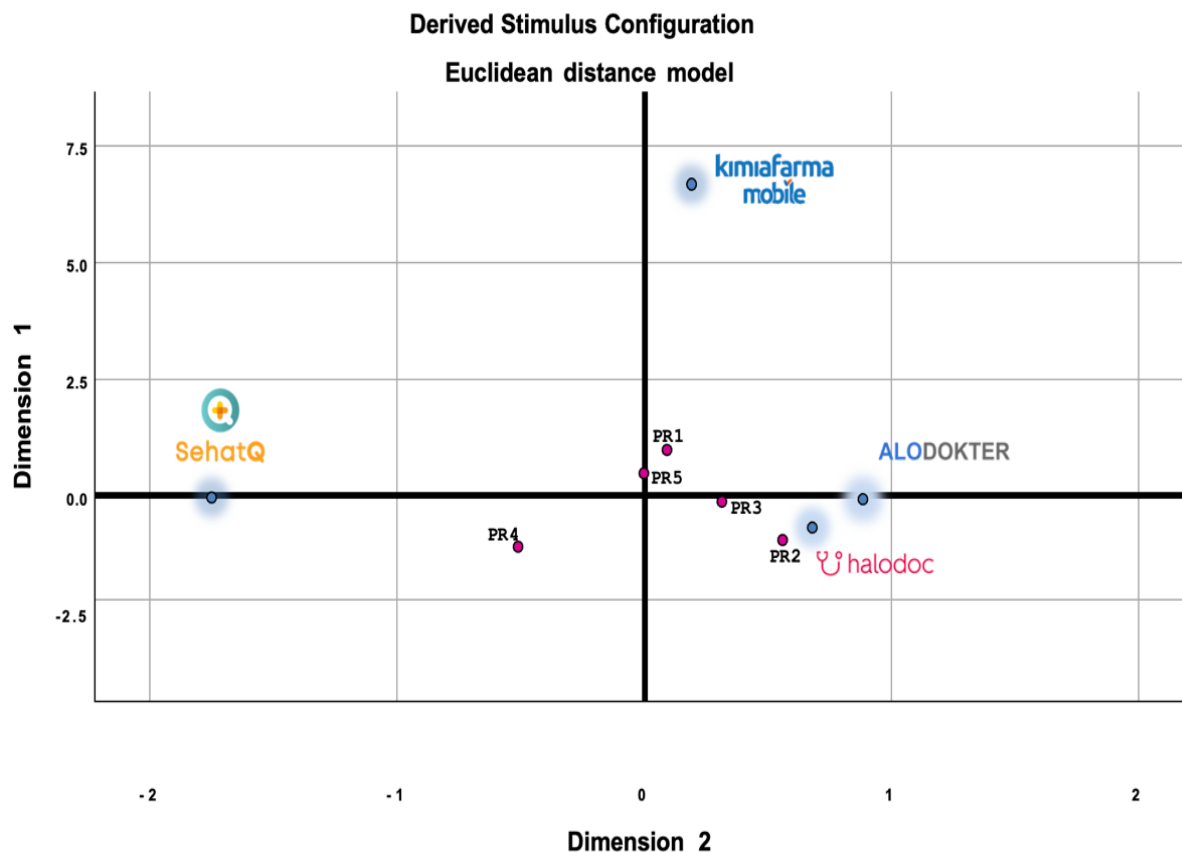
**Table 8.** *Euclidean Distance of System Availability*

m-Health Application	System Availability	
	Euclidean Distance	Rank
KF Mobile	35,4864	4
Halodoc	4,7494	1
Alodokter	5,0165	2
SehatQ	11,1445	3

#### 4. *Privacy*

Figure 1 shows the perceptual mapping of Privacy. Kimia Farma Mobile is in quadrant I and ranks fourth for privacy based on euclidean distance calculation. The safe use of the m-Health application and the availability of a system that can maintain the privacy of the individuals who use it are the main priority for users and the most critical e-SERVQUAL dimensions (Huang, 2018). Privacy of personal data, such as identity, likes, and dislikes, is a significant concern for consumers today, especially with the dramatic increase in identity theft (Chaffey & Chadwick, 2019). The three competing applications have ensured and committed to their users regarding the security and confidentiality of user data. On the respective website pages, Halodoc guarantees the protection of its consumers in the digital era and claims that transactions with Halodoc are trusted, have credibility, and are safe in protecting consumer data (PT Media Dokter Investama, 2022). On its official website, Alodokter assures users that shopping for health products from home using Alodokter is done safely and reliably (PT. Sumo Teknologi Solusi, 2022). On the other hand, SehatQ already has a PSEF (Penyelenggara Sistem Elektronik Farmasi) certificate from the Ministry of Health, which indicates that SehatQ has carried out internet-based pharmaceutical services that comply with government regulations (Nurchayani, 2021). Nevertheless, Kimia Farma has yet to provide user security and privacy guarantees.

*Figure 6. Perceptual Mapping of Privacy*



Kimia Farma Mobile can enhance privacy by guaranteeing that the user's activities and personal data, such as NIK, debit, or credit card numbers, will be used as they should and protected by Kimia Farma Mobile at the beginning of the user registration. This act can boost consumer confidence regarding privacy protection. In addition, logging in using Face ID or fingerprint can be an option for authenticating the account owner so that the level of security increases. In addition, Kimia Farma Mobile can add an order security insurance option with an additional charge if consumers are still trying to figure out the safety of purchases and orders made.

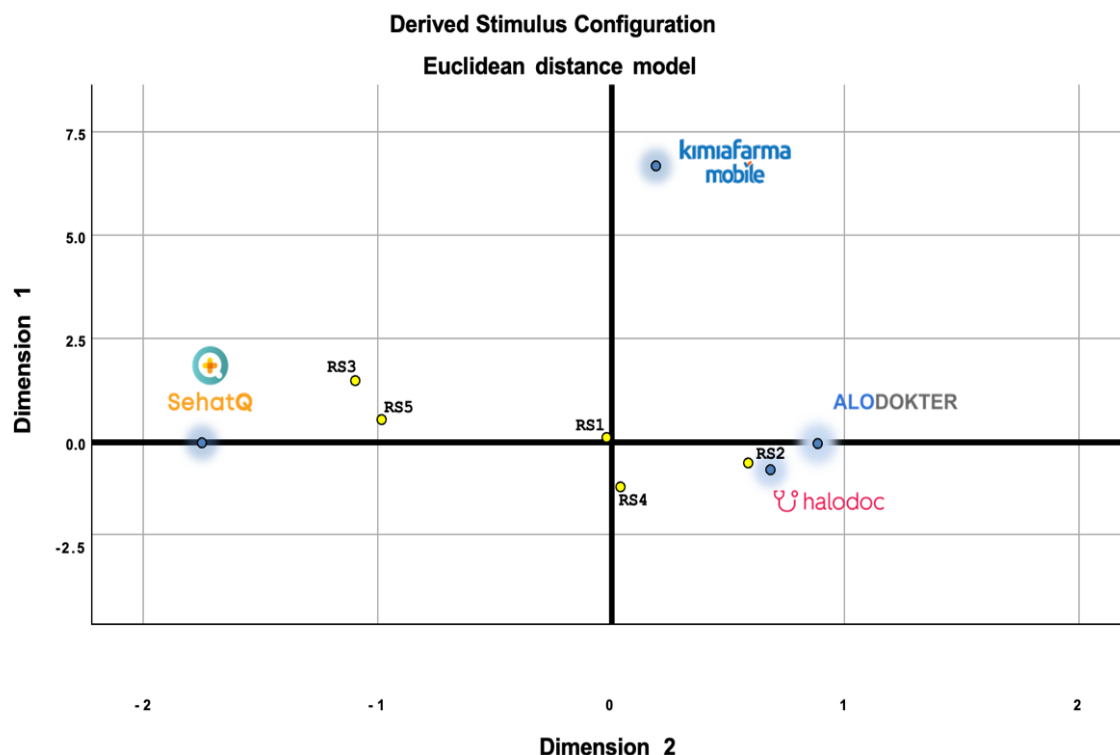
*Table 9. Euclidean Distance of Privacy*

m-Health Application	Privacy	
	Euclidean Distance	Rank
KF Mobile	34,0303	4
Halodoc	4,6119	1
Alodokter	4,9416	2
SehatQ	9,9932	3

**5. Responsiveness**

Figure 7 shows the perceptual mapping of Responsiveness. Kimia Farma Mobile ranks fourth for Responsiveness because it is the farthest from the five measured indicators compared to the other three competitors and less perceived by users.

*Figure 7. Perceptual Mapping of Responsiveness*



The responsiveness dimension affects perceived values in email and website services (Jaiyeoba et al., 2018). Responsiveness also significantly differentiates the positioning of three private banks (Bose, 2013). Unresponsive behavior is in the 'critical incident' category, which includes not providing prompt service and treating customers politely, and can cause lousy for companies (Sekaran & Bougie, 2016).

Kimia Farma Mobile, alertness, handling of problems, and willingness to help still need to be enhanced. This concern is in line with evidence from the reviews of Kimia Farma Mobile users on the App Store as supporting evidence. Kimia Farma Mobile is currently solving complaints within a 1 x 24-hour system. It starts with confirming incoming complaints from the party concerned, asking for an explanation, and then troubleshooting is done afterward. Kimia Farma Mobile should be able to solve problems faced by consumers in real-time and provide a help center feature specifically for the application so that when there are users who complain, it separates from the other complaints. Adding Artificial Intelligence (AI) can also be applied to save time and effort. If AI cannot solve the problem, consumers can directly connect with the call center person. The level of responsiveness of chatbots or AI proves to positively impact the intrinsic values of the consumer experience (Chen et al., 2021).

*Table 10. Euclidean Distance of Responsiveness*

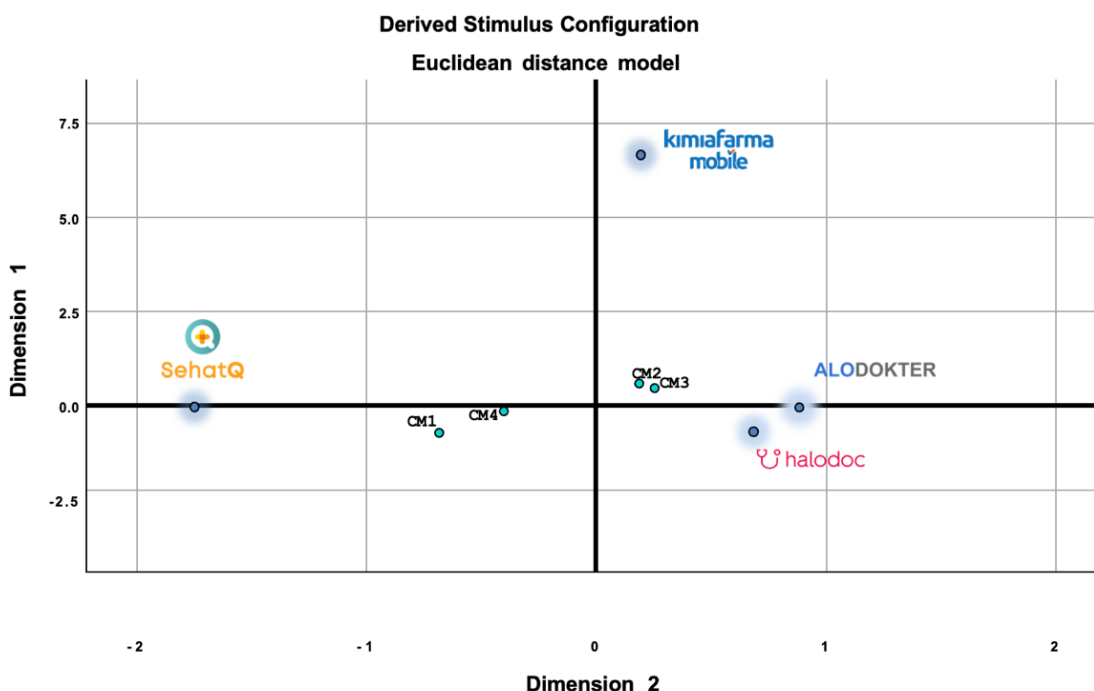
m-Health Application	Responsiveness	
	Euclidean Distance	Rank
KF Mobile	33,7010	4
Halodoc	6,1179	1
Alodokter	6,7158	2
SehatQ	8,4443	3



**6. Compensation**

Figure 8 shows the perceptual mapping of compensation. Kimia Farma Mobile ranked fourth based on the results of calculating its euclidean distance and based on the existing positioning map, perceived less favorably by users on the variable dimension of compensation. The level of competition is higher when the distance to each object is getting closer. Halodoc, Alodokter, and SehatQ have a policy of refunding if the services obtained are not suitable or even not received. On the other hand, Kimia Farma Mobile does not have the policy to make refunds, let alone provide compensation for losses experienced by its users. Compensation, in the context of the m-Health application, is defined as the level of compensation given to the user if a problem occurs when using the application (Huang, 2018).

*Figure 8. Perceptual Mapping of Compensation*



Compensation Kimia Farma Mobile can provide using an appealing scheme, whereby Kimia Farma Mobile can provide a compensation application form to the user. Afterward, the user can contact Kimia Farma Mobile's customer service while attaching the completed form. After this, the appeal process proceeded per the applicable provisions. One effective way to help restore consumer disappointment is by providing compensation to prove that the company cares about its consumers (Kotler & Keller, 2016).

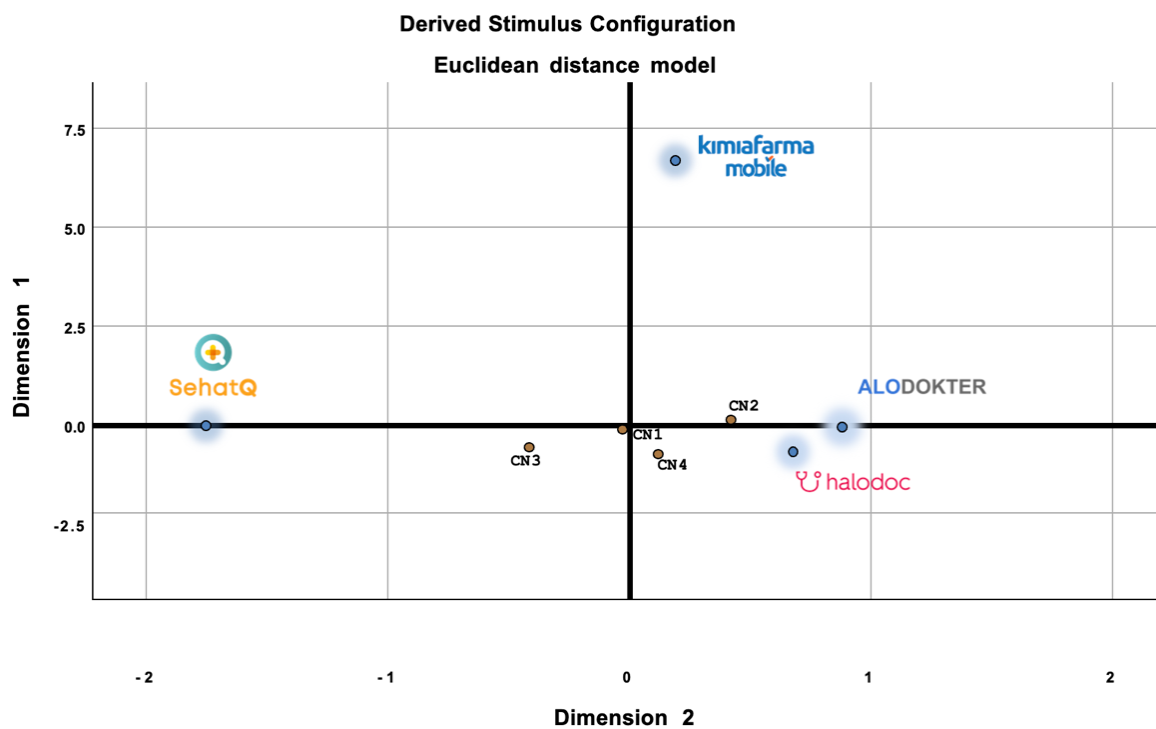
*Table 11. Euclidean Distance of Compensation*

m-Health Application	Compensation	
	Euclidean Distance	Rank
KF Mobile	26,8133	4
Halodoc	4,6898	2
Alodokter	4,5764	1
SehatQ	6,6956	3

**7. Contact**

Figure 9 shows that Kimia Farma Mobile ranks fourth in Contact. Even though Kimia Farma Mobile provides a call center, Kimia Farma's call center appears difficult to contact, causing the problems faced by users to go unresolved. In addition, Kimia Farma Mobile has Instagram and Twitter as a place to interact with users. However, it contrasts that Kimia Farma Mobile's Instagram activities and followers still need to catch up to other m-Health applications, especially Halodoc and Alodokter, which have 848 thousand followers and 1 million users, respectively. Also, Kimia Farma Mobile provides an e-mail address for those experiencing problems. However, users still feel that the service using e-mail could be better and respond quickly. Kimia Farma Mobile can provide a contact center specifically for Kimia Farma Mobile users and not integrated with other entities as it is today. This solution avoids handling overloaded and mixed complaints so that users can handle problems or questions faced by users and achieve user satisfaction. Customer satisfaction achieved from good call center service is vital because it affects the income of a business as a whole (Yoshimura et al., 2021).

**Figure 9. Perceptual Mapping of Contact**



Kimia Farma Mobile's social media activity must be further enhanced because social media helps companies create brand awareness, influence consumer attitudes, increase brand equity, and have an impact on increasing sales (Kapoor et al., 2018; Stojanovic, Andreu & Curras-Perez, 2018; Mishra, 2019; Lal et al., 2020; Gupta et al., 2021). Indonesia holds the fourth active internet user title and the third most Instagram users in the world. Also, 82% of business people receive short customer messages daily, and 87% agree that using Instagram can increase sales and marketing activities (Aji et al., 2020). Utilizing social media, especially Instagram, is a good step for Kimia Farma Mobile to communicate with its community. It can be a forum for users to ask complaints, submit questions, or interact. Kimia Farma's active social media makes this application top of mind when users want to use the m-Health application or when they want to recommend the m-Health application to the surrounding community.

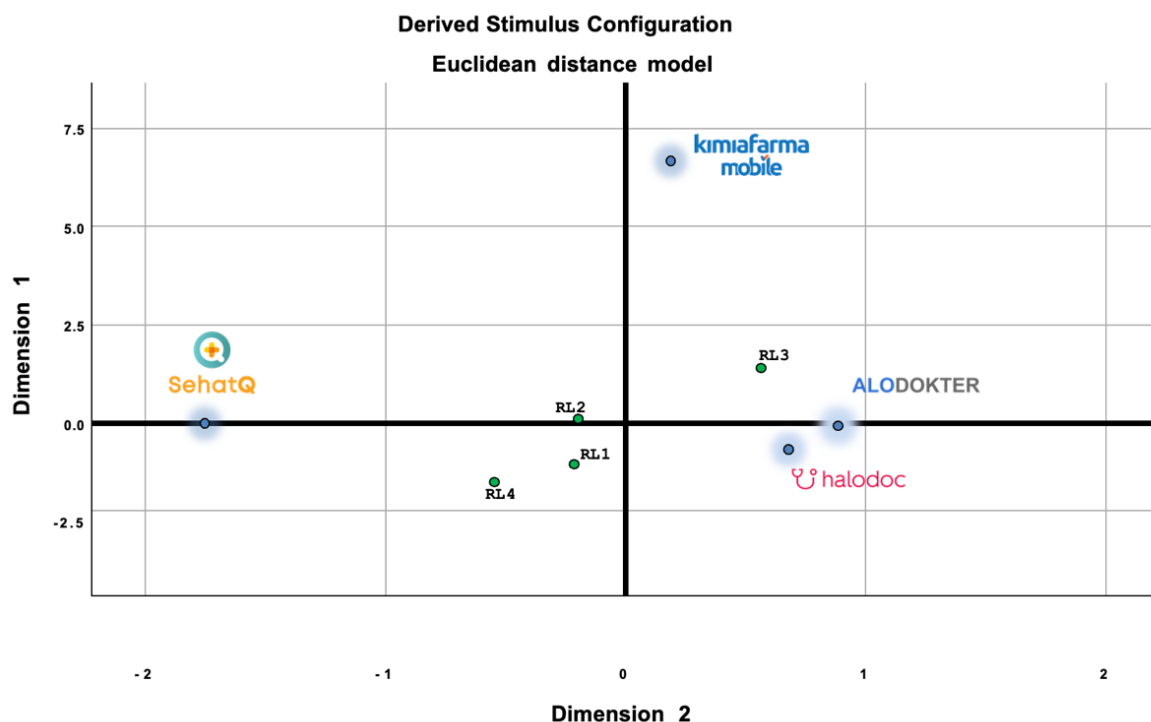
**Table 12. Euclidean Distance of Contact**

m-Health Application	Dimensi Variabel Contact	
	Euclidean Distance	Rank
KF Mobile	28,1973	4
Halodoc	3,1287	1
Alodokter	3,6055	2
SehatQ	7,3483	3

**8. Reliability**

Figure 2 shows the perceptual mapping of reliability. Reliability is an additional dimension of the seven variables compiled by Parasuraman et al. (2005). Based on the results of this study, Reliability succeeded in distinguishing the four m-Health applications that were the object of this research. The results show that the rankings of Halodoc, Alodokter, and SehatQ alternately change on the four reliability indicators used as measuring tools. However, Kimia Farma Mobile's ranking remained in the last rank. Service's reliability significantly affects the intention to continue using m-Health during the Covid-19 pandemic. Also, user perceptions of services might change based on their reliability and availability (Alzahrani et al., 2022). Reliability is an appropriate construct for measuring e-SERVQUAL in a system presented by an organization (Zemblytė, 2015). In research on commercial and private banks, the variable reliability dimension can significantly differentiate consumer perceptions of the new generation of private commercial banks (Bose, 2013). The level of reliability also affects online game application users' purchasing decisions for premium content (Hamari et al., 2017).

**Figure 10. Perceptual Mapping of Reliability**



Kimia Farma Mobile can improve its positioning by maximizing the overall application reliability. Developers must create applications that meet the expectations in the minds of consumers by listening to the reviews left by users so that application performance can increase. Listening to users' complaints and requests can be an excellent step to improve the

application and build brand image and reputation, so the number of active users and service purchases can increase. The variable reliability dimension reflects the consumer's relationship with the organization regarding reputation, image, and privacy policy (Zemblytė, 2015).

**Table 13. Euclidean Distance of Reliability**

m-Health Application	Dimensi Variabel Reliability	
	Euclidean Distance	Rank
KF Mobile	28,3097	4
Halodoc	4,9860	1
Alodokter	5,3473	2
SehatQ	7,8221	3

Based on the analysis of the positioning map and the accumulated euclidean distance as measured using the e-SERVQUAL variable dimension parameters along with the 37 indicators in it, the overall ranking summary conclusion is in Table 14. Kimia Farma Mobile is in fourth place with an accumulated rating score of 32 points. Kimia Farma Mobil is perceived as unfavorable in this study's eight dimensions of e-SERVQUAL.

**Table 14. Rank Summary of M-Health Applications**

Dimension Variable e-SERVQUAL	Kimia Farma Mobile	Halodoc	Alodokter	SehatQ
Efficiency	4	1	2	3
Fulfilment	4	2	1	3
System Availability	4	1	2	3
Privacy	4	1	2	3
Responsiveness	4	1	2	3
Compensation	4	2	1	3
Contact	4	1	2	3
Reliability	4	1	2	3
Total	32	10	14	24
Rank	4	1	2	3

## 6. Conclusion

Kimia Farma Mobile is ranked fourth among the other three m-Health applications. This result indicates that Kimia Farma Mobile is perceived less favorably in the eight dimensions of e-SERVQUAL when compared to Halodoc, Alodokter, and SehatQ. The results show that based on descriptive analysis of all dimensions of e-SERVQUAL, this research is in the 'Very High' category. Kimia Farma Mobile ranks fourth with a distance score of each variable dimension equal to Efficiency (38.1629), Fulfillment (32,9881), System Availability (35,4864), Privacy (34,0303), Responsiveness (33,7010), Compensation (26,8133), Contact (28,1973), and Reliability (28,3097). This rank shows that Kimia Farma Mobile requires quality improvement by providing clear service standards in every aspect of e-SERVQUAL to transcend user expectations. Also, Kimia Farma Mobile m-Health needs to conduct routine application testing to construct an application that satisfies user needs to become top of mind in the m-Health application category and win over the competitors. The resulting positioning map has an R-Square value of 0.994 and a stress value of 7.53%, which means that the resulting map distinguishes the positioning of the four m-Health applications in this study.

This study took a sample at one time (cross-sectional) due to the limitations of the researchers so that further research could take longitudinal data, change the research objective

to determine long-term positioning, and perform multiple tests on the first and subsequent sample data. Future research can also test other objects using the same method and adjust the sample size according to the needs and geographical conditions.

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