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E-Service Quality Analysis of the MyTelkomsel Application Using CSI, IPA, and PGCV

Ananda Khoirunnisa[1], Dwi Rosa Indah[2*], Ardina Ariani[3] , Ari Wedhasmara[4], Naretha Kawadha Pasemah Gumay[5], M. Rudi Sanjaya[6], Mukhlis Febriady[7]
[1-7] Department of Information System, Universitas Sriwijaya, Palembang, Indonesia
indah812@unsri.ac.id

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***Abstract*— This study evaluates the e-service quality of the MyTelkomsel application in response to ongoing user Ccerns, particularly slow service response and the limited effectiveness of the automated support system. A structured questionnaire based on the five SERVQUAL dimensions was used and demonstrated strong validity and reliability. Data were collected from one hundred users in Java and Sumatera. The analysis combined three methods: the Customer Satisfaction Index, Importance Performance Analysis, and Potential Gain in Customer Value. The findings show that the application achieved a Customer Satisfaction Index score of 67.75 percent, indicating that users are generally satisfied but expect further improvement. The Importance Performance Analysis recorded a suitability level of 74.54 percent, with several attributes placed in the high-importance low-performance quadrant, including login security, chatbot speed, complaint handling, and personal data protection. The Potential Gain in Customer Value results indicate that chatbot-related attributes and transaction reliability provide the highest potential for increasing customer value. Overall, the study highlights specific service attributes that require priority enhancement to strengthen user satisfaction and service quality. Furthermore, the identified service gaps suggest that chatbot-related issues are not solely operational but are also associated with inherent limitations of conventional rule-based or intent-based chatbot systems, which often lack contextual understanding, adaptability, and effective problem-solving capabilities. This indicates the need for more advanced, human-centered AI approaches to improve service performance and user experience.**

***Index Terms*— e-service quality; customer satisfaction; importance performance analysis; potential gain in customer value; servqual**

I. INTRODUCTION

The current landscape, characterized by rapid digital transformation, underscores the critical role of the telecommunications sector in driving national digitalization initiatives, such as the Indonesia Digital Network program [1]. This technological advancement, coupled with infrastructural progress like the initiation of 5G network implementation [2], has generated novel means of communication and daily operation [3]. As the dominant mobile telecommunications provider in Indonesia, serving an extensive customer base exceeding 170 million [4], PT Telekomunikasi Selular (Telkomsel) introduced and subsequently developed the MyTelkomsel application. This application was originally launched to streamline customer-company interactions and has since evolved into an integrated "superapp" consolidating diverse service streams [5].

Despite its strategic evolution, the MyTelkomsel application is consistently subjected to significant customer discontent pertaining to its e-service quality. The fundamental challenge revolves around the operational efficiency of customer support and issue resolution. Frequent complaints detail protracted response times and a documented inadequacy of the automated chatbot, Veronika, whose standardized replies often fail to provide substantive solutions. This frequently compels customers to seek assistance via less convenient physical channels [6]. While chatbots are widely implemented as cost-efficient customer service solutions, traditional rule-based or intent-based chatbots often lack contextual understanding, reasoning capability, and adaptive interaction. As a result, user dissatisfaction may originate not merely from service execution, but from structural technological constraints embedded in conventional chatbot architectures. Research on e-service quality has widely emphasized its importance in shaping user satisfaction and loyalty, especially within digital platforms and mobile applications. Demonstrated this relationship in the context of internet banking, showing that higher e-service quality significantly increases customer satisfaction, which subsequently strengthens loyalty. Their findings highlight the critical role of service dimensions such as responsiveness, reliability, and system functionality in determining user

perceptions within digital environments [7]. Similar conclusions are found in studies evaluating various digital applications, reinforcing the relevance of assessing e-service quality for platforms like MyTelkomsel.

In the area of customer satisfaction measurement, several studies have employed the Customer Satisfaction Index (CSI) to quantify overall user satisfaction levels. Previous research used CSI to evaluate logistics service quality and found that customers were generally satisfied, although several key service attributes still required improvement [8]. Another study applied CSI to assess service strategies on digital platforms and reported positive satisfaction levels, yet noted that certain underperforming components continued to influence the overall user experience. Collectively, these findings highlight the value of CSI as a standardized and reliable quantitative measure for assessing customer satisfaction [9].

Beyond CSI, many researchers have applied Importance–Performance Analysis (IPA) to identify service attributes that require managerial attention. Studying food delivery applications, found that several features considered highly important by users were performing below expectations, placing them in Quadrant I as main priorities for improvement [10]. Similarly, Previous research used IPA to analyze the quality of OVO electronic payment services in Tokopedia and identified specific attributes that needed immediate enhancement. These results show that IPA is effective for mapping performance gaps in digital services [11].

To complement IPA and quantify the potential value of service improvements, prior studies have also utilized the Potential Gain in Customer Value (PGCV) method. Previous research applied PGCV alongside other satisfaction measurement tools, identifying key attributes with the highest potential value gain in higher education services [12]. Another study, demonstrated that the integration of IPA and PGCV could effectively determine customer value priorities in public service institutions[13]. Similarly, previous research confirmed the effectiveness of the PGCV method by identifying underperforming attributes in OVO's service that offered the greatest potential for improvement when optimized [11].

Overall, previous research consistently shows that e-service quality strongly influences user satisfaction and that the combined use of CSI, IPA, and PGCV provides a powerful analytical framework for evaluating performance gaps and prioritizing strategic improvements. However, only a limited number of studies have applied this full combination of methods within the telecommunications sector, especially for evaluating a large-scale mobile application such as MyTelkomsel. Furthermore, prior studies have predominantly focused on methodological approaches, with limited attention to the technological limitations of underlying systems, particularly conventional chatbot architectures. There is still a lack of research that examines e-service quality from an AI-oriented and human-centered perspective, especially in understanding how the constraints of rule-based or intent-based chatbots affect user satisfaction. Therefore, this gap provides a strong rationale for the present study.

The distinct contribution of this research lies in the integrated use of the CSI, IPA, and PGCV models, which together provide a more comprehensive and value-oriented diagnostic assessment compared to studies that rely on a single analytical method. This combined approach produces more actionable insights for improving service performance. The sampling frame is intentionally focused on users in Java and Sumatera, which together account for more than 70% of Indonesia's population [14] and record some of the country's highest levels of digital adoption, with internet penetration rates of 83.64% in Java and 77.34% in Sumatera [15]. This regional focus enhances the representativeness and relevance of the findings and enables Telkomsel to formulate more targeted and effective strategies for improving the e-service quality of the MyTelkomsel application.

II. METHODOLOGY

Fig. 1. Methodological Flowchart

Figure 1. illustrates the methodological flowchart employed in this study. Figure 1. presents the research workflow applied to assess the service quality of the MyTelkomsel application using the Customer Satisfaction Index (CSI), Importance Performance Analysis (IPA), and Potential Gain in Customer Value (PGCV) methods. The following subsections explain each stage in detail.

A. Planning

1. Literature Review

The study begins with a review of key theories and prior research on service quality, customer satisfaction, and analytical methods such as CSI, IPA, and PGCV, forming the conceptual and theoretical foundation for the analysis.

2. Problem Identification

After the literature review, the researcher identifies key issues related to user perceptions and satisfaction with MyTelkomsel's service quality, which then form the basis of the research problem.

3. Determining Research Objectives and Benefits

The research objectives are formulated to evaluate the service quality of the MyTelkomsel application based on user assessments, while both practical and academic contributions are outlined to emphasize the study's significance.

4. Determining Population and Sample Size

The research population consists of all users of the MyTelkomsel application. A population is a generalization area containing subjects or objects with specific characteristics determined by the researcher, while a sample represents a portion of that population with similar characteristics, symbolized by *n*. Several sampling techniques may be applied to determine an appropriate sample size [16]. In this study, the Slovin formula was used because it is commonly applied in quantitative research and does not require complex statistical tables. Based on data from the Central Bureau of Statistics , the population of Sumatera is 62,259,500 and Java is 158,079,100, resulting in a combined population of 220,368,600 [14].

Using the Slovin formula with a 10 percent error tolerance, the calculation is as follows. The use of a 10% error margin is considered acceptable given the exploratory and diagnostic nature of this study, which aims to identify general patterns and service gaps rather than achieve high-precision estimation.

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Description:

n : sample size
N : population size
e : error tolerance limit (10% or 0,1)

$$n = \frac{220.368.600}{1 + 220.368.600\ (0{,}1)^2}$$

$$= \frac{220.368.600}{2.203.687} = 99{,}98$$

Thus, the minimum required sample is 100 respondents. This number is deemed sufficient to represent the population while anticipating incomplete or invalid data. Respondents were selected using purposive sampling with the inclusion criterion of being active MyTelkomsel users for at least one month.

Sampling refers to the process of selecting a subset of elements from a population [17]. This study applies Proportionate Stratified Random Sampling, which divides the population into proportional strata and selects samples randomly within each stratum. The unit of analysis consists of active MyTelkomsel users who meet the established inclusion criteria for the CSI, IPA, and PGCV assessments.

The formula for determining the number of samples in each stratum is as follows [18]:

$$ni = \frac{Ni}{N} \times n \quad (2)$$

ni : sample in each stratum
n : total sample (100)
Ni : population of each stratum
N : total population (220,368,600)

The proportional distribution of samples across Java and Sumatera is shown below:

- Java Island

1. DKI Jakarta:

$$ni = \frac{10.678.000}{220.368.600} \times 100$$
$$ni = 4{,}84 \approx 5$$

2. West Java:

$$ni = \frac{50.759.000}{220.368.600} \times 100$$
$$ni = 23{,}03 \approx 23$$

3. Central Java:

$$ni = \frac{38.233.900}{220.368.600} \times 100$$
$$ni = 17{,}34 \approx 17$$

4. DI Yogyakarta:

$$ni = \frac{3.781.500}{220.368.600} \times 100$$
$$ni = 1{,}71 \approx 2$$

5. East Java:

$$ni = \frac{42.089.300}{220.368.600} \times 100$$
$$ni = 19{,}09 \approx 19$$

6. Banten:

$$ni = \frac{12.537.400}{220.368.600} \times 100$$
$$ni = 5{,}68 \approx 6$$

- Sumatera Island

1. Aceh:

$$ni = \frac{5.626.000}{220.368.600} \times 100$$
$$ni = 2{,}55 \approx 2$$

2. North Sumatera:

$$ni = \frac{15.785.800}{220.368.600} \times 100$$
$$ni = 7{,}16 \approx 7$$

3. West Sumatera:

$$ni = \frac{5.914.300}{220.368.600} \times 100$$
$$ni = 2{,}68 \approx 3$$

4. Riau:

$$ni = \frac{6.811.200}{220.368.600} \times 100$$
$$ni = 3{,}09 \approx 3$$

5. Jambi:

$$ni = \frac{3.768.500}{220.368.600} \times 100$$
$$ni = 1{,}71 \approx 2$$

6. South Sumatera:

$$ni = \frac{8.928.500}{220.368.600} \times 100$$
$$ni = 4{,}05 \approx 4$$

7. Bengkulu:

$$ni = \frac{2.138.000}{220.368.600} \times 100$$
$$ni = 0{,}97 \approx 1$$

8. Lampung:

$$ni = \frac{9.522.900}{220.368.600} \times 100$$
$$ni = 4{,}32 \approx 4$$

9. Bangka Belitung Islands:

$$ni = \frac{1.550.800}{220.368.600} \times 100$$
$$ni = 0{,}70 \approx 1$$

10. Riau Islands:

$$ni = \frac{12.537.400}{220.368.600} \times 100$$
$$ni = 1{,}00 \approx 1$$

This proportional allocation ensures that the sample reflects the distribution of the population across both islands.

B. *Design*

1. Questionnaire Development Based on SERVQUAL Dimensions

According to Lovelock and Wirtz, service quality is a long-term cognitive evaluation by consumers regarding the performance of the services provided by a company [19]. E-service quality refers to the quality of services delivered through internet-based platforms, enabling interactions between sellers and buyers so that transactions and shopping activities can be carried out more effectively and efficiently [20]. The questionnaire is constructed based on the five SERVQUAL dimensions Tangibles, Reliability, Responsiveness, Assurance, and Empathy and measures two aspects: importance and performance [21].

TABLE I. RESEARCH QUESTIONNAIRE INDICATORS

Dimension	Code	Variable
Tangibles	A1	The application's user interface (UI) is visually appealing and easy to understand.
	A2	Navigation within the application is easy to use and not confusing.
	A3	Service information and features in the application are displayed clearly and informatively.
	A4	The application rarely experiences bugs or errors during use.
	A5	The visual quality of the application meets current digital application standards.
Reliability	B1	The application can be accessed at any time without significant disruptions.
	B2	The features in the application function as promised.
	B3	Billing and payment history is displayed accurately and completely.
	B4	Notifications from the application are delivered in a timely and relevant manner.
	B5	The login system and application security operate properly without errors.
Responsiveness	C1	The application provides a responsive and easily accessible issue-reporting feature.
	C2	Responses to complaints submitted through the application are quick and solution-oriented.
	C3	The application is updated regularly to improve functionality.
	C4	The application displays real-time status updates on complaint resolution.
	C5	Detailed instructions for using the application's features are provided.
Assurance	D1	Users' personal data is securely stored within the application.
	D2	Transactions within the application (such as payments) are safe and trustworthy.
	D3	Privacy policies and terms of use are easy to access.
	D4	Users feel comfortable using the application without concerns about data leaks.
	D5	The application provides transparent information regarding user rights and obligations.
Empathy	E1	The application offers active and responsive customer support or assistance features.
	E2	The application provides offers or promotions relevant to users' needs.
	E3	The application adjusts language and content based on users' location or profile.
	E4	User feedback is followed up by the service provider.

	E5	User experience is prioritized in the development of new features.

2. Content Validity Assessment

Content validity refers to the extent to which each element of an assessment instrument is relevant and adequately represents the intended construct [22]. A highly valid instrument is essential to ensure scientifically reliable research results [23]. According to Suryadi, several methods are commonly used to evaluate content validity, including I-CVI, S-CVI/Ave, S-CVI/UA, CVR, and CVI [24]. Before distribution, the questionnaire undergoes a content validity test (expert judgment) to ensure clarity, relevance, and representativeness of each item. Validation is carried out by the academic supervisor and subject-matter experts in digital service quality and e-commerce.

1) I-CVI (*Item-Content Validity Index*)

$$I-CVI = \frac{Number\ of\ Approved\ Items}{Number\ of\ Reviewers} \quad (3)$$

2) S-CVI/Ave (*Scale-Content Validity Index/Average*)

$$S-\frac{CVI}{Ave} = \frac{\sum I-CVI}{Number\ of\ Questions} \quad (4)$$

3) S-CVI/UA (*Scale-Content Validity Index/Universal Agreement*)

$$S-CVI/UA = \frac{\sum Skor\ UA}{Jumlah\ Item\ Pertanyaan} \quad (5)$$

4) CVR (*Content Validity Ratio*)

$$CVR = \frac{ne-\frac{n}{2}}{\frac{N}{2}} \quad (6)$$

5) CVI (*Content Validity Index*)

$$CVI = \frac{\sum CVR}{Number\ of\ Questions} \quad (7)$$

3. Data Collection

Validated questionnaires are distributed to qualified respondents to gather data on user perceptions and experiences when using the MyTelkomsel application.

C. Analysis

1. Validity and Reliability Testing

All collected data undergo validity and reliability tests to ensure the measurement instrument is accurate and consistent. Items that do not meet the criteria are revised accordingly.

2. Data Processing Based on Respondent Demographics

Valid and reliable responses are processed by classifying demographic characteristics such as province and duration of MyTelkomsel usage. This supports a more contextual interpretation of the findings.

3. Analytical Procedures

Three analytical methods are used:

- Customer Satisfaction Index (CSI)
  Customer Satisfaction Index (CSI) is a qualitative measure expressed as the percentage of customers who report satisfaction in a customer satisfaction survey [25]. CSI is used to evaluate satisfaction by considering both the importance and performance of service attributes. According to Aritonang, the steps for calculating CSI include [26]:

- Mean Importance Score (MIS)
  Average importance rating given by respondents:

$$MIS = \frac{\sum_{i=1}^{n} Y_i}{n} \quad (8)$$

- Weight Factor (WF)
  The proportion of each MIS relative to the total MIS:

$$WF = \frac{MIS_i}{\sum_{i=1}^{n} MIS_i} \quad (9)$$

- Weight Score (WS)
  Calculated by multiplying WF by the Mean Satisfaction Score (MSS):

$$WS = WF_i \times MSS \quad (10)$$

- Customer Satisfaction Index (CSI)
  Overall satisfaction level based on weighted scores:

$$CSI = \frac{\sum_{k=1}^{p} WSk}{HS} \times 100\% \quad (11)$$

TABLE II. CSI INDEX TABLE

CSI Value	Category
81% - 100%	Very Satisfied
66% - 80,99%	Satisfied
51% - 65,99%	Fairly Satisfied
35% - 50,99%	Less Satisfied
0% - 34,99%	Not Satisfied

Source: Aritonang (2005)

- Importance Performance Analysis (IPA)
  The Importance Performance Analysis (IPA) method is used to determine the level of alignment between user expectations and perceived performance, which is then mapped onto a Cartesian diagram [27]. IPA combines the measurement of importance and performance into a two-dimensional analysis, allowing easier interpretation and practical recommendations [28]. In this study, variable X represents the perceived performance of MyTelkomsel's service quality, while variable Y reflects the level of importance or user expectations.
  According to Tjiptono, the IPA framework consists of four strategic quadrants [29]:
  1) Quadrant I (Concentrate Here): High importance, low performance; attributes requiring immediate managerial attention.

2) Quadrant II (Keep Up the Good Work): High importance, high performance; attributes that should be maintained.
3) Quadrant III (Low Priority): Low importance, low performance; attributes with minimal impact on users.
4) Quadrant IV (Possible Overkill): Low importance, high performance; attributes performed well but considered less essential by users.

- Potential Gain in Customer Value (PGCV)
  The analysis of importance and performance helps identify priority areas for improvement [30]. This approach allows Importance and Performance scores to be compared quantitatively in a more detailed manner. The steps of the PGCV index are as follows:
  - Achieved Customer Value (ACV)
    ACV reflects the value perceived by customers based on their assessments of performance and importance.
    $ACV = \bar{X} \times \bar{Y}$ (12)
    $\bar{X}$: average performance score
    $\bar{Y}$: average importance score
  - Ultimately Desired Customer Value (UDCV)
    UDCV represents the value ideally expected by customers. It is obtained by multiplying the average importance score by the maximum Likert scale value.
    $UDCV = \bar{Y} \times P\,Max$ (13)
    $\bar{Y}$: average importance score
    $Pmax$: highest Likert scale value
  - PGCV Index
    The PGCV value indicates the gap between desired and achieved value. Higher PGCV values reflect attributes that require higher priority improvements.
    $PGCV\ Index = UDCV - ACV$ (14)
    This index helps identify which service attributes or features should be improved first to enhance overall customer satisfaction.

D. Evaluation

This stage presents the outcomes of the analytical processes conducted in the study. The results include the calculated Customer Satisfaction Index, the distribution of service attributes across the four Importance Performance Analysis quadrants, and the priority values generated through the PGCV index. These findings reflect users' perceived performance, expectations, and the attributes requiring improvement within the MyTelkomsel application.

III. Result and Discussion

This section presents the empirical findings of the study in accordance with the research stages described previously, namely Planning, Design, Data Collection, Analysis, and Evaluation. The results cover the content validity process, respondent characteristics, validity and reliability testing, and the outcomes of the CSI, IPA, and PGCV analyses for the MyTelkomsel application.

A. Planning

The planning stage produced a final sampling design and a clear profile of the respondents involved in this study. Questionnaires were distributed to 100 users of the MyTelkomsel application residing in Java and Sumatera.

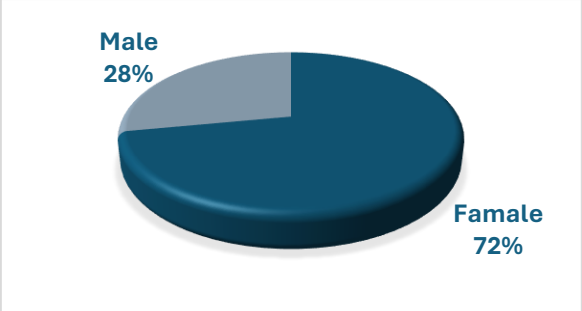

Fig. 2. Gender of Customer Respondents

Based on Figure 2., 28 respondents (28%) were male and 72 respondents (72%) were female.

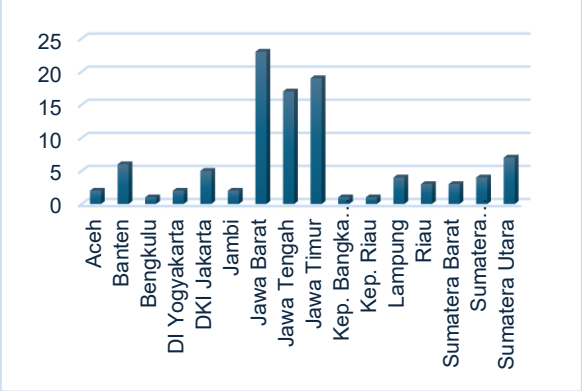

Fig. 3. Respondent Domicile Distribution

Figure 3. shows that all respondents live in provinces located in Java and Sumatera, with the highest proportion coming from West Java Province, while the remaining respondents are fairly distributed across other provinces. This pattern is consistent with the use of Proportionate Stratified Random Sampling, indicating that each province in both islands is proportionally represented.

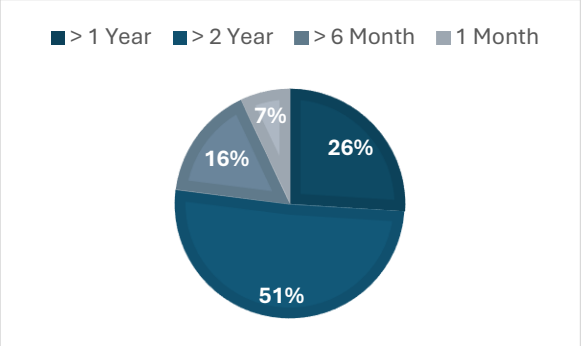

Fig. 4. Distribution of Long-Term Application Usage

Furthermore, Figure 4. describes the length of app usage. The majority of respondents (51%) have used the MyTelkomsel application for more than two years, 26% for more than one year, 16% for more than six months, and 7% for approximately one month. These findings confirm that most respondents are experienced users, so their assessments are highly relevant for measuring perceived service quality and customer satisfaction.

B. Design

The design stage focused on developing and refining the measurement instrument through content validity and psychometric testing.

1. Content Validity
   The content validity stage was conducted to ensure that each item in the research instrument adequately represented the intended construct. In this study, content validity was assessed by two experts, Mr. Ari Wedhasmara, S.Kom., M.T.I., and Ms. Naretha Kawadha Pasemah Gumay, S.Si., M.Kom. Both experts evaluated the relevance and clarity of each indicator using a four-point rating scale.

TABLE III. CONTENT VALIDITY CALCULATION RESULTS AFTER REVISION

Code	Expert 1	Expert 2	I-CVI	Agreement
A1	4	4	1	Accepted
A2	4	4	1	Accepted
A3	4	4	1	Accepted
A4	4	4	1	Accepted
A5	4	4	1	Accepted
B1	4	4	1	Accepted
B2	4	4	1	Accepted
B3	4	4	1	Accepted
B4	4	4	1	Accepted
B5	4	4	1	Accepted
C1	4	4	1	Accepted
C2	4	4	1	Accepted
C3	4	4	1	Accepted
C4	4	4	1	Accepted
C5	4	4	1	Accepted
D1	4	4	1	Accepted
D2	4	4	1	Accepted
D3	4	4	1	Accepted
D4	4	4	1	Accepted
D5	4	4	1	Accepted
E1	4	4	1	Accepted
E2	1	4	1	Accepted
E3	4	4	1	Accepted
E4	4	4	1	Accepted
S-CVI			1	Accepted

After incorporating expert feedback and completing two rounds of revisions, the instrument was re-evaluated. The results in Table 3. show that all indicators achieved I-CVI = 1.00 and S-CVI = 1.00, indicating perfect agreement between experts that the items are clear, relevant, and accurately represent their respective constructs. Therefore, the final questionnaire fully meets the criteria for strong content validity and is appropriate for subsequent testing.

2. Instrument Structure
   The finalized questionnaire consists of 24 indicators distributed across the five SERVQUAL dimensions (Tangibles, Reliability, Responsiveness, Assurance, and Empathy), each measured with importance and performance/satisfaction scales using a five-point Likert format. This structure directly supports the application of the CSI, IPA, and PGCV methods in subsequent stages.

3. Data Collection

   Data collection produced a complete distribution of responses for each indicator on both importance and satisfaction dimensions.

TABLE IV. DISTRIBUTION OF RESPONDENTS' ANSWERS LEVEL OF IMPORTANCE

Code	TP 1	KP 2	CP 3	P 4	SP 5	*Scale*
A1	1	2	7	33	56	*Tangibles*
A2	0	0	7	34	59	*Tangibles*
A3	0	1	7	28	64	*Tangibles*
A4	0	1	6	26	67	*Tangibles*
A5	0	0	4	37	59	*Tangibles*
B1	0	1	13	18	68	*Reliability*
B2	0	1	6	25	68	*Reliability*
B3	1	6	10	23	60	*Reliability*
B4	0	2	9	29	60	*Reliability*
B5	0	0	14	21	65	*Reliability*
C1	0	0	10	32	58	*Responsiveness*
C2	0	0	10	29	61	*Responsiveness*
C3	0	2	9	25	64	*Responsiveness*
C4	0	0	12	27	61	*Responsiveness*
C5	0	0	10	27	63	*Responsiveness*
D1	0	2	5	21	72	*Assurance*
D2	0	0	6	23	71	*Assurance*
D3	0	0	7	24	69	*Assurance*
D4	0	0	8	28	64	*Assurance*
D5	0	0	8	28	64	*Assurance*
E1	0	0	7	26	67	*Empathy*
E2	0	0	6	29	65	*Empathy*
E3	0	0	8	30	62	*Empathy*
E4	0	0	9	23	68	*Empathy*

Table 4. presents the frequency distribution of importance scores. Most responses are concentrated in the "important" (4) and "very important" (5) categories across all attributes, confirming that the selected indicators are indeed perceived as relevant by users.

TABLE V. DISTRIBUTION OF RESPONDENTS' ANSWERS LEVEL OF SATISFACTION

Code	TP	KP	CP	P	SP	*Scale*
	1	2	3	4	5	
A1	8	10	13	48	21	*Tangibles*
A2	6	13	10	52	19	*Tangibles*
A3	7	7	12	48	26	*Tangibles*
A4	5	12	9	40	34	*Tangibles*
A5	7	7	11	50	25	*Tangibles*
B1	9	12	20	39	20	*Reliability*
B2	8	13	8	49	22	*Reliability*
B3	15	22	16	31	16	*Reliability*
B4	9	10	16	36	29	*Reliability*
B5	12	16	18	33	21	*Reliability*
C1	28	12	14	31	15	*Responsiveness*
C2	29	10	18	27	16	*Responsiveness*
C3	30	11	13	29	17	*Responsiveness*
C4	30	11	17	26	16	*Responsiveness*
C5	29	12	12	30	17	*Responsiveness*
D1	9	28	12	28	23	*Assurance*
D2	9	10	12	37	32	*Assurance*
D3	10	10	15	37	28	*Assurance*
D4	13	25	13	29	20	*Assurance*
D5	8	15	12	41	24	*Assurance*
E1	29	9	12	29	21	*Empathy*
E2	12	10	8	31	39	*Empathy*
E3	13	25	25	24	23	*Empathy*
E4	9	26	12	28	25	*Empathy*

Table 5. shows the distribution of satisfaction scores. Compared to the importance dimension, satisfaction responses are more dispersed, with noticeable portions in the "neutral" and "less satisfied" categories for several attributes, especially within the Responsiveness dimension. This difference between importance and satisfaction distributions suggests potential gaps between user expectations and perceived performance, which are explored further using CSI, IPA, and PGCV. In this context, chatbot-related attributes reflect the effectiveness of automated service intelligence, particularly in delivering responsiveness and perceived empathy within digital interactions.

C. *Analysis*

1. Content Validity

The validity test was conducted to examine whether each questionnaire item accurately measures the intended construct. Item validity was assessed by comparing the correlation coefficient (r-count) with the critical value (r-table).

TABLE VI. VALIDITY TEST RESULTS (30 RESPONDENTS)

Code	I	S	R Tabel (5%)	Validity
A1	0.711	0.534	0,361	Valid
A2	0.849	0.759	0,361	Valid
A3	0.786	0.611	0,361	Valid
A4	0.746	0.592	0,361	Valid
A5	0.810	0.727	0,361	Valid
B1	0.841	0.634	0,361	Valid
B2	0.907	0.766	0,361	Valid
B3	0.728	0.913	0,361	Valid
B4	0.789	0.822	0,361	Valid
B5	0.747	0.920	0,361	Valid
C1	0.836	0.847	0,361	Valid
C2	0.865	0.853	0,361	Valid
C3	0.886	0.905	0,361	Valid
C4	0.854	0.899	0,361	Valid
C5	0.805	0.730	0,361	Valid
D1	0.825	0.517	0,361	Valid
D2	0.880	0.781	0,361	Valid
D3	0.925	0.865	0,361	Valid
D4	0.869	0.440	0,361	Valid
D5	0.884	0.812	0,361	Valid
E1	0.839	0.810	0,361	Valid
E2	0.816	0.697	0,361	Valid
E3	0.871	0.759	0,361	Valid
E4	0.892	0.608	0,361	Valid

TABLE VII. VALIDITY TEST RESULTS (100 RESPONDENTS)

Code	I	S	R Tabel (5%)	Validity
A1	0.506	0.744	0,196	Valid
A2	0.743	0.838	0,196	Valid
A3	0.660	0.818	0,196	Valid
A4	0.657	0.757	0,196	Valid
A5	0.720	0.799	0,196	Valid
B1	0.689	0.753	0,196	Valid
B2	0.731	0.864	0,196	Valid
B3	0.746	0.726	0,196	Valid
B4	0.802	0.735	0,196	Valid
B5	0.850	0.747	0,196	Valid
C1	0.841	0.788	0,196	Valid
C2	0.864	0.837	0,196	Valid
C3	0.863	0.830	0,196	Valid
C4	0.874	0.839	0,196	Valid
C5	0.829	0.827	0,196	Valid
D1	0.675	0.852	0,196	Valid
D2	0.796	0.843	0,196	Valid
D3	0.829	0.826	0,196	Valid
D4	0.700	0.848	0,196	Valid
D5	0.779	0.856	0,196	Valid
E1	0.768	0.817	0,196	Valid
E2	0.745	0.764	0,196	Valid
E3	0.819	0.889	0,196	Valid
E4	0.726	0.835	0,196	Valid

A preliminary test with 30 respondents showed that all 24 items had r-count > 0.361, indicating that every item was valid. The main validity test with 100 respondents also confirmed that all indicators had r-count > 0.196 with $p < 0.05$ for both importance and satisfaction dimensions. These results demonstrate that all questionnaire items are

statistically valid and suitable for use in the CSI, IPA, and PGCV analyses.

2. Reliability Test

Reliability was assessed using Cronbach's Alpha to evaluate internal consistency. An instrument is considered reliable when $\alpha > 0.60$.

TABLE VIII. RELIABILITY TEST RESULTS (30 RESPONDENTS)

Variable	Cronbach Alpha	N of Items	Desc
Importance	0,963	24	Reliable
Satisfaction	0,980	24	Reliable

TABLE IX. RELIABILITY TEST RESULTS (100 RESPONDENTS)

Variable	Cronbach Alpha	N of Items	Desc
Importance	0,967	24	Reliable
Satisfaction	0,977	24	Reliable

In the preliminary test (30 respondents), Cronbach's Alpha values were 0.963 (importance) and 0.980 (satisfaction). In the main test (100 respondents), reliability remained high with $\alpha = 0.967$ (importance) and 0.977 (satisfaction). All coefficients far exceed the minimum threshold, indicating that the instrument is highly reliable and consistent in me asuring both user importance and satisfaction toward MyTelkomsel's service quality.

3. Customer Satisfaction Index (CSI)

CSI was computed using the Mean Importance Score (MIS), Weight Factor (WF), Mean Satisfaction Score (MSS), and Weighted Score (WS) for each attribute. The total WS is 338.77. With a maximum Likert scale of 5, the CSI is:

$$CSI = \frac{338,77}{5} \times 100\% = 67,75 \times 100\% = 67,75$$

According to Aritonang's CSI classification, a score of 67.75% falls into the "Satisfied" category (66%–80.99%). This indicates that, overall, users in Java and Sumatera are satisfied with the e-service quality of the MyTelkomsel application. Nevertheless, the score has not yet reached the "very satisfied" category, implying that there is still room for improvement, particularly on attributes with high importance but relatively lower performance.

4. Importance Performance Analysis (IPA)

a) Attribute Suitability Level Analysis

Based on the calculation of the level of conformity between the level of importance and the level of performance, the average level of conformity was 74.54%. which falls into the "appropriate" category (70%–79%).

- Attributes with the highest conformity include A4 (84.10%) and A3/A5 (83.30%), showing that ease of use and clarity of information are well aligned with user expectations.
- The lowest conformity is found in C4 (64.06%), followed by C2 (64.38%) and C3 (64.60%), all related to the Responsiveness of the Chatbot Veronica and help features.

b) Cartesian Diagram Analysis

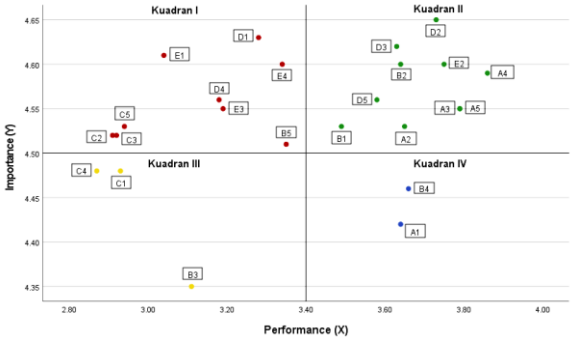

Fig. 5. Cartesian Diagram

The Cartesian diagram in Figure 4.4 then classifies attributes into four quadrants:

1. Quadrant I – Main Priorities: B5, C2, C3, C5, D1, D4, E1, E3, and E4 (high importance, low performance). These attributes involve login and security reliability, chatbot speed and accuracy, completeness of guidance, data protection, and follow-up on feedback. They require urgent improvement.
2. Quadrant II – Maintain Performance: A2, A3, A4, A5, B1, B2, D2, D3, D5, E2, and E5 (high importance, high performance), which should be maintained through continuous monitoring and system maintenance.
3. Quadrant III – Low Priority: B3, C1, and C4 (low importance, low performance). Improvements here can be carried out gradually.
4. Quadrant IV – Possible Overinvestment: A1 and B4 (low importance, high performance), indicating that current performance is already very good relative to their perceived importance.

c) Analysis of Chatbot Performance Limitations

The consistent underperformance of chatbot-related attributes in Quadrant I

indicates that the issue is not solely operational but also structural in nature. Conventional chatbot systems, which are typically rule-based or intent-based, have limited capability in understanding user context, handling complex queries, and providing adaptive responses. As a result, users often receive generic, repetitive, or irrelevant responses, particularly when their inquiries fall outside predefined scenarios. This limitation directly affects perceived responsiveness, accuracy, and empathy key dimensions in e-service quality. Therefore, the improvement of chatbot performance requires not only operational enhancements but also the adoption of more advanced conversational AI technologies that enable context-aware, flexible, and human-centered interactions.

5. Potential Gain in Customer Value (PGCV)

TABLE X. POTENTIAL CUSTOMER VALUE INCREASE (PGCV) RESULTS

Code	Avg (Y)	Avg (X)	ACV (X*Y)	UDCV (Y*5)	UDCV - ACV
B5	4,51	3,35	15,10	22,55	7,4415
C2	4,52	2,91	13,15	22,6	9,4468
C3	4,52	2,92	13,19	22,6	9,4016
C5	4,53	2,94	13,31	22,65	9,3318
D1	4,63	3,28	15,18	23,15	7,9636
D4	4,56	3,18	14,50	22,8	8,2992
E1	4,61	3,04	14,01	23,05	9,0356
E3	4,55	3,19	14,51	22,75	8,2355
E4	4,60	3,34	15,36	23	7,636

PGCV analysis quantifies the gap between Actual Customer Value (ACV) and Ultimate Desired Customer Value (UDCV) for key attributes (Table 4.10). The larger the difference (UDCV – ACV), the greater the potential gain in customer value if performance is improved.

The highest PGCV values are:

- C2 – Chatbot responsiveness (≤ 1 minute): 9.4468
- C3 – Accuracy of chatbot responses: 9.4016
- C5 – Chatbot's ability to provide satisfactory solutions: 9.3318
- E1 – Smoothness of transactions via MyTelkomsel: 9.0356

These four attributes represent the primary leverage points for increasing customer value. Other attributes with high PGCV values include D4 (feeling safe from data leakage), E3 (up-to-date and relevant information), D1 (security of personal data), E4 (ease of finding features), and B5 (login and security system reliability). Improvements in these areas will significantly enhance perceived value, trust, and satisfaction. The dominance of chatbot-related attributes (C2, C3, and C5) among the highest PGCV values indicates that automated service quality plays a critical role in shaping customer value. This suggests that users place high expectations not only on the speed of chatbot responses but also on their accuracy and problem-solving capabilities. From a technological perspective, these findings highlight the limitations of conventional rule-based or intent-based chatbot systems, which often fail to meet user expectations due to their lack of contextual understanding and adaptability. In contrast, the adoption of more advanced conversational AI can significantly enhance customer value by enabling more intelligent, responsive, and personalized interactions.

D. Evaluation

The results of this study summarize the key findings from the CSI, IPA, and PGCV analytical methods. The CSI score of 67.75% places MyTelkomsel in the "Satisfied" category, indicating that service performance meets user expectations but has not yet reached the "Very Satisfied" level. The IPA results show an average conformity of 74.54%, with the highest alignment found in UI-related attributes and the lowest in attributes related to chatbot responsiveness. The Cartesian diagram identifies several attributes particularly B5, C2, C3, C5, D1, D4, E1, E3, and E4 as main priorities for improvement. PGCV analysis reinforces these findings, with the largest potential gains observed in C2, C3, C5, and E1, indicating that chatbot performance, transaction smoothness, and data security are the attributes most in need of enhancement to increase customer value and satisfaction.

IV. CONCLUSION

This study delivers an all-encompassing assessment of MyTelkomsel's e-service quality by combining CSI, IPA, and PGCV methods. The 67.75% CSI score shows users are reasonably satisfied, while the 74.54% conformity figure indicates performance generally matches what users expect, though significant shortfalls exist, especially regarding Responsiveness and Security. IPA results pinpoint chatbot performance, data protection, and how complaints are handled as the main improvement priorities. PGCV analysis underscores that enhancing chatbot responsiveness, accuracy, solution quality, and transaction ease would generate the most customer value. The findings suggest that the primary service quality gaps are structurally linked to the limitations of conventional chatbot-based systems. Therefore, future development should not only focus on improving existing chatbot performance but also consider

adopting human-centered conversational AI capable of contextual understanding, adaptive interaction, and effective problem resolution. Addressing these critical areas while maintaining currently strong features will elevate overall satisfaction and bolster MyTelkomsel's reliability. Future efforts should concentrate on regular system upgrades, improved responsiveness, and stronger user-oriented improvements to deliver a more seamless and protected digital service. However, this study has several limitations. First, the data were collected from a limited number of respondents and were geographically restricted to users in Java and Sumatra, thus not fully representing all MyTelkomsel users in Indonesia. Second, the study focuses only on specific service quality dimensions and may not capture other factors influencing user satisfaction, such as pricing or network performance. Therefore, future research is recommended to involve a larger and more diverse sample, expand the study area to include users across Indonesia, incorporate additional variables, and explore comparative studies with other digital service applications to provide more comprehensive insights into e-service quality improvement.

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