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# Optimization of Sub-Provider Evaluation Using ANP Approach and CSI Modification at PT XYZ

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***Abstract***

*This study aims to develop an internal performance evaluation model for Sub-Providers at PT XYZ Lintas Nusantara using the Analytic Network Process (ANP) and a modified Customer Satisfaction Index (CSI), called the Internal Performance Index (IPI). The main problem addressed is the delay of Sub-Providers in handling customer complaints, which affects customer satisfaction and operational efficiency. ANP is applied to determine the weighted interdependent criteria, while IPI assesses efficiency, compliance, and internal reporting accuracy. Data were collected through interviews and questionnaires involving five experienced internal respondents. The analysis resulted in a ranking of Sub-Providers based on weighted indicators. This finding contributes to improving the objective and systematic partner evaluation process and provides strategic recommendations for management in selecting the most appropriate partners.*

***Keywords***: *Analytic Network Process, Customer Satisfaction Index, Internal Performance Index, Evaluation Model, Sub-Provider*

## INTRODUCTION

The rapid development of the information and communication technology industry has encouraged the emergence of various digital network infrastructure service provider companies (Danuri 2019). One of the companies that plays a role in supporting such connectivity is PT XYZ, a business entity engaged in the management of fiber optic-based communication networks for corporate services. In practice, the company relies heavily on external partners called Sub-providers, which are third parties that help build and maintain networks in various operational areas. Dependence on Sub-Providers makes aspects of monitoring and performance evaluation becomes very crucial, especially when the quality of Service and customer satisfaction become the main benchmark in maintaining the reputation and competitiveness of the company.

The phenomenon in the field shows that not all Sub-providers have a balanced work performance. The main problems that often arise are delays in handling customer complaints, slow response to network repairs, and non-compliance with technical reporting in the field. This problem not only has an impact on repeated complaints from customers, but also on the internal efficiency of PT XYZ. This poses a new challenge for the company, namely the need to build a more objective and comprehensive internal evaluation system to measure the performance of external partners periodically and strategically. Therefore, it is necessary to design a quantitative and integrated evaluation-based model, which is able to assess the performance of Sub-providers from various dimensions such as service speed, reporting accuracy, compliance with operational standards, and efficiency of processing time.

Departing from these needs, Analytic Network Process (ANP) approach is used in this study to formulate weights between evaluation criteria that depend on each other. ANP as a development of the Analytic Hierarchy Process (AHP) method is considered more representative in solving problems involving reciprocal relationships between assessment elements (Mantjanegara 2024). In the context of Sub-Provider evaluation, the use of ANP allows the determination of the weight of each indicator such as service interruption, duration of work, suitability of reports and number of customer complaints. Thus, the final result is not only based on a single dimension of assessment, but is the result of the aggregation of various relevant

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indicators.

In addition to ANP, this study also modifies the approach of Customer Satisfaction Index (CSI) into Internal Performance Index (IPI). This modification was made to adapt the measurement method to the scope of the company's internal evaluation, which does not directly involve the opinions of external customers, but is based on internal technical observations and operational data records (Masriyatun 2022). IPI assesses aspects of efficiency, compliance with procedures, as well as the quality of Sub-Provider reports. The combination of ANP and IPI in one evaluation framework allows the company to measure the performance of partners more objectively and systematically.

Theoretically, this study has an important position in filling the gap between partner evaluation practices that tend to be subjective and the need for quantitative data-based assessment systems that can be accounted for. The Gap found is the difference between Das sollen which is the expectation of a fair, measurable, and sustainable partner performance evaluation system with das sein or the reality in the field that shows the lack of objective measurement tools in evaluating partners. With the ANP and IPI framework applied to the specific context of telecommunications network Sub-providers, this study presents an approach that can be used as a new standard in the evaluation of strategic partnerships in the digital infrastructure sector.

The novelty (state of the art) of this research lies in combining ANP method with CSI modification into IPI that is contextually adjusted to the needs of internal evaluation of network service provider companies. Previous studies that examined the performance of partners generally relied on only one method, either qualitative (interviews or observations) or quantitative (eg ordinary CSI for external customers). Meanwhile, this approach not only combines two powerful methods, but also performs modifications of indicators in accordance with the needs of the company's technical operations. In addition, this study also targets the segmentation of specific partners, namely Network Sub-providers, which have not been widely studied in the performance evaluation literature based on multi-criteria methods.

This study also fills a gap in the literature on the importance of data-driven internal performance measurement tools for companies that depend on many operational partners. In an increasingly competitive and digital business landscape, strategic decision-making must be based on objective and robust data-driven evaluation (Dr. Sitta Kusuma 2025). With this model, it is expected that the company can conduct Sub-Provider ratings periodically, as well as provide a basis for decision-making in cooperation contracts that are more transparent and fair.

The main purpose of this study is to develop an internal evaluation model of the performance of Sub-providers in PT XYZ by combining the ANP approach and CSI modification into an Internal Performance Index (IPI). Through the application of this model, the study aims to provide strategic recommendations for management in choosing the most optimal partner based on the results of a comprehensive evaluation. In addition, this model can also be a decision - making tool in extending cooperation contracts, making service improvements, and improving the overall operational efficiency of the company.

## METHOD

This study is a quantitative research with a descriptive approach conducted at PT XYZ, which aims to evaluate and determine the best Sub-Provider based on work performance. The types of data used include primary data, obtained through in-depth interviews and questionnaires to five internal respondents from the technical and supervisory division, as well as secondary data taken from the company's operational reports. Data collection techniques include interviews, filling pairwise comparison criteria through ANP questionnaires, as well as documentation of Sub-Provider performance. The data analysis method uses Analytic Network Process (ANP) approach to determine the weight of each performance criterion, and then the calculation of Internal Performance Index (IPI) as a modification of the Customer Satisfaction Index (CSI) method to obtain the final value of the performance of each Sub-Provider. Data validation is carried out by triangulation and cross-check between respondents to maintain the reliability of the results, so

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that the rating results can be an objective basis in making company managerial decisions.

## RESULTS AND DISCUSSION

### Analysis of the Effectiveness of Handling Customer Complaints by Sub-Providers

PT XYZ is a company engaged in fiber optic-based network services and cooperates with several Sub-providers to support the implementation of technical operations in the field. The company relies on sub-Provider performance to handle a variety of critical activities, including network installation and handling customer complaints.

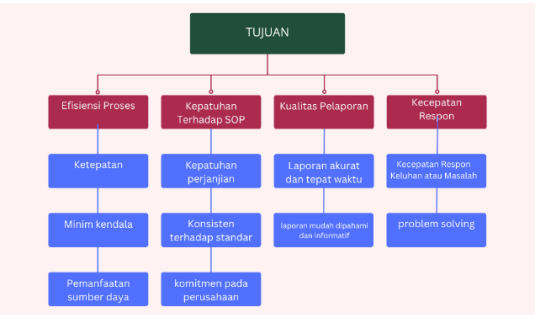
In practice, the ineffectiveness of Sub-providers in dealing with customer complaints was found. Based on 2024 ticketing data, the average handling time reached 35 hours 16 minutes 21 seconds, exceeding the industry standard of 1x24 hours. This condition shows a slow response and has an impact on the accumulation of complaints and customer dissatisfaction. In terms of sales performance, PT XYZ recorded a sales surge of 70.26% in 2023 compared to 2022. However, in 2024 there was a decrease of 18,23%. Despite surpassing competitors such as IndiHome and Biznet in 2023, the trend has not continued. In 2024, IndiHome only decreased by 5% and Biznet actually grew by 5%, while XYZ experienced a significant decrease. This indicates high growth potential, but has not been matched by stable performance.

These fluctuations reinforce the indication that the quality of service, in particular the effectiveness of complaint handling, greatly affects business performance. For this reason, an objective evaluation of the performance of Sub-providers using ANP and IPI methods is needed to support service improvements and maintain the company's competitiveness.

### Determination and Analysis of Evaluation Criteria and Sub-Criteria

Customer Satisfaction Index (CSI) is a method to measure customer satisfaction based on the conformity between expectations and service experience. According to (Ayu Nuriyana 2022), this index is calculated from the average result of the multiplication between the level of importance and the level of satisfaction. CSI is commonly used in external surveys to assess the quality of an organization's services. In the study (Masriyatun 2022) CSI was applied at Lubuk Besar health centers to evaluate services from the patient's point of view. Although the respondents are customers, the study also highlights internal aspects that need to be improved, proving that the CSI can be modified to assess internal performance, especially if the indicators are directed towards procedural and operational aspects. Referring to the approach, this study developed CSI into an Internal Performance Index (IPI), whose focus shifted from external customer satisfaction to internal evaluation of Sub-Provider performance at PT XYZ. Changes are made by adjusting the indicators and respondents. IPI indicators include: process efficiency (timeliness and minimal constraints), compliance with SOP (work suitability and commitment), reporting quality (accuracy and speed), and response speed in dealing with disturbances.

Figure 1 Graph of Criteria and Sub-Criteria



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**Relationship Analysis Between Variables using Dematel**

Before weighting using Analytic Network Process (ANP) method, the relationship between sub-criteria is analyzed by DEMATEL (Decision Making Trial and Evaluation Laboratory) method. This approach aims to identify cause-and-effect relationships between variables so that the structure of the ANP network contains only elements that affect each other. The use of Dematels helps simplify the pairwise comparison process in ANP, avoids redundant questions, and ensures focus only on significant relationships. The analysis was performed using Excel with the results of the total Relation matrix of the Dematel questionnaire shown as follows :

*Table 1 Total Relation Matriks*

| SUBKRITERIA | Ketepatan | Minim Kendala | Pemanfaatan Sumber Daya | Kepatuhan Perjanjian | Konsisten Terhadap Standar | Komitmen pada Perusahaan | Laporan Akurat dan Tepat Waktu | Laporan Mudah Dipahami dan | Kecepatan Respon Keluhan atau | *Problem Solving* | VEKTOR D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ketepatan | 0,326769672 | 0,51384 | 0,509503 | 0,214345 | 0,189839 | 0,131698 | 0,169297 | 0,1711 | 0,281279 | 0,24914 | 2,756811 |
| Minim Kendala | 0,564956046 | 0,340339 | 0,556469 | 0,217536 | 0,203049 | 0,143038 | 0,210002 | 0,212842 | 0,297422 | 0,263933 | 3,009585 |
| Pemanfaatan Sumber Daya | 0,594227543 | 0,568399 | 0,378129 | 0,30952 | 0,275684 | 0,184852 | 0,262952 | 0,253934 | 0,353174 | 0,309246 | 3,490118 |
| Kepatuhan Perjanjian | 0,218040634 | 0,209571 | 0,277606 | 0,12855 | 0,276566 | 0,167876 | 0,151354 | 0,135502 | 0,228291 | 0,237148 | 2,030504 |
| Konsisten Terhadap Standar | 0,223519662 | 0,214755 | 0,222369 | 0,243196 | 0,137211 | 0,225797 | 0,187564 | 0,182332 | 0,228078 | 0,214293 | 2,079114 |
| Komitmen pada Perusahaan | 0,213520897 | 0,179487 | 0,16922 | 0,146118 | 0,248167 | 0,104428 | 0,247575 | 0,165564 | 0,196625 | 0,224194 | 1,894899 |
| Laporan Akurat dan Tepat Waktu | 0,233324066 | 0,204764 | 0,203121 | 0,177243 | 0,190989 | 0,229548 | 0,152291 | 0,296512 | 0,454836 | 0,473141 | 2,615768 |
| Laporan Mudah Dipahami dan Informatif | 0,202737769 | 0,223991 | 0,215251 | 0,212262 | 0,17924 | 0,135362 | 0,224668 | 0,152472 | 0,450176 | 0,452015 | 2,448175 |
| Kecepatan Respon Keluhan atau Masalah | 0,145920894 | 0,167757 | 0,156819 | 0,123148 | 0,119439 | 0,105266 | 0,137945 | 0,200247 | 0,152418 | 0,256619 | 1,565558 |
| *Problem Solving* | 0,159408825 | 0,143416 | 0,145637 | 0,121371 | 0,094925 | 0,107583 | 0,106996 | 0,110531 | 0,206206 | 0,114702 | 1,310775 |
| VEKTOR R | 2,882426007 | 2,76632 | 2,834124 | 1,893289 | 1,915108 | 1,535448 | 1,850644 | 1,881036 | 2,848504 | 2,794431 | |
| TRESHOLD | 0,232013291 | | | | | | | | | | |

The Total Relation Matrix was obtained from the data processing of five respondents through several stages, namely normalization Matrix (D), identity matrix formation, calculation of i-D matrix, and inverse Matrix. The value of the vector D is the total of the rows (horizontal), while the Vector R is the total of the columns (vertical). The threshold value is determined by calculating the average of all elements in the total Relation Matrix.

Table 2 Calculation of D, R, D+R, and D-R

| sub-kriteria | D+R | D-R | D | R |
|---|---|---|---|---|
| Ketepatan | 5.639237 | -0.12562 | 2.756811 | 2.882426 |
| Minim Kendala | 3.009585 | 3.009585 | 3.009585 | 2.76632 |
| Pemanfaatan Sumber Daya | 3.722131 | 3.258104 | 3.490118 | 2.834124 |
| Kepatuhan Perjanjian | 2.030504 | 2.030504 | 2.030504 | 1.893289 |
| Konsisten Terhadap Standar | 2.079114 | 2.079114 | 2.079114 | 1.915108 |
| Komitmen pada Perusahaan | 1.894899 | 1.894899 | 1.894899 | 1.535448 |
| Laporan Akurat dan Tepat Waktu | 2.615768 | 2.615768 | 2.615768 | 1.850644 |
| Laporan Mudah Dipahami dan Informatif | 2.448175 | 2.448175 | 2.448175 | 1.881036 |

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| | | | | |
|---|---|---|---|---|
| Kecepatan Respon Keluhan atau Masalah | 1.56558 | 1.56558 | 1.56558 | 2.848504 |
| *Problem Solving* | 1.310775 | 1.310775 | 1.310775 | 2.794431 |

The main results of the Dematel method are obtained through data processing in Table 2. This analysis includes four main components: D (Influence Given) shows how much influence given by one sub-criterion to other sub-criteria, calculated from the total rows in the Matrix, R (Influence Received) reflects the amount of influence received from other sub-criteria, taken from the total columns, D + R indicates the level of relevance (prominence), where the higher the value, the more central the role of sub – criteria in the system, D-R is used to determine whether a sub-criterion acts as a cause (if positive) or effect (if negative).

For example, the sub-criterion “accurate and timely report” has a D – R value of 0.765124, which places it as a causal variable. Meanwhile “ "Problem Solving" with a D – R value of -1.483656 was categorized as a consequence variable because it received more influence from other sub-criteria.

Table 3 Interpretation Of Connectedness Matrices

| | Ketepatan | Minim Kendala | Pemanfaatan Sumber Daya | Kepatuhan Perjanjian | Konsisten Terhadap Standar | Komitmen pada Perusahaan | Laporan Akurat dan Tepat Waktu | Laporan Mudah Dipahami dan Informatif | Kecepatan Respon Keluhan atau Masalah | *Problem Solving* | TOTAL AD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ketepatan | Ada | Ada | Ada | Kosong | Kosong | Kosong | Kosong | Kosong | Ada | Ada | 5 |
| Minim Kendala | Ada | Kosong | Ada | Kosong | Kosong | Kosong | Kosong | Kosong | Ada | Ada | 4 |
| Pemanfaatan Sumber Daya | Ada | Ada | Kosong | Ada | Ada | Kosong | Ada | Ada | Ada | Ada | 8 |
| Kepatuhan Perjanjian | Kosong | Kosong | Ada | Kosong | Ada | Kosong | Kosong | Kosong | Kosong | Ada | 3 |
| Konsisten Terhadap Standar | Kosong | Kosong | Kosong | Ada | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | 1 |
| Komitmen pada Perusahaan | Kosong | Kosong | Kosong | Kosong | Ada | Kosong | Kosong | Kosong | Kosong | Kosong | 1 |
| Laporan Akurat dan Tepat Waktu | Ada | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Ada | Ada | Ada | 4 |
| Laporan Mudah Dipahami dan Informatif | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Ada | Ada | 2 |
| Kecepatan Respon Keluhan atau Masalah | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Ada | 1 |
| *Problem Solving* | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | Kosong | 0 |

To identify the relationship between sub-criteria that are really significant, screening is carried out using threshold values. The Threshold is calculated as the average of all elements in the matrix of total direct influence, by the formula:

$$\text{Threshold} = \frac{Total\ of\ All\ Values\ Between\ Sub\text{–}Criteria}{Number\ of\ Cells}$$

Processing results showed a threshold of 0.232013291. This filtering is then used to create an empty table, which shows whether there is a relationship between sub-criteria using Excel formulas:

=IF (cell>0.232013291; "exists";"empty")

If the cell value is greater than the threshold, then it is considered that there is a relationship ("exists"); otherwise, it is declared insignificant ("empty"). From the results of Table

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4.4, only sub-criteria with the number of “existing " relationships of 2 are continued to the Node Comparison stage in superdecisions software.

**Weighting with Analytic Network Process (ANP)**

After the influential sub-criteria are identified through Dematel method, the next step is to perform weighting using Analytic Network Process (ANP) method. The purpose of this weighting is to determine the relative importance of each sub-criterion in evaluating the performance of Sub-providers.

ANP processing is carried out through several stages, namely: preparation of pairwise comparison, where respondents are asked to compare sub-criteria based on the level of influence and importance using a scale of 1-9 (Saaty scale); preparation of network structures in SuperDecisions software; filling in judgments according to the results of respondent questionnaires; and calculation of the geometric mean of all priorities to obtain the final weight of each sub-criterion.

Figure 2 Hierarchy on Superdecision

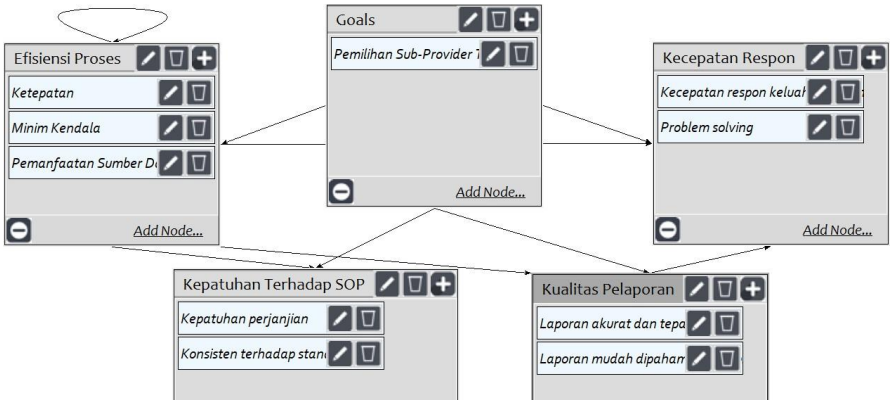


Figure 3 Priorities Responden 1

Here are the priorities.

| Icon | Name | Normalized by Cluster | Limiting |
|---|---|---|---|
| No Icon | Ketepatan | 0.40914 | 0.165780 |
| No Icon | Minim Kendala | 0.39130 | 0.158553 |
| No Icon | Pemanfaatan Sumber Daya | 0.19957 | 0.080863 |
| No Icon | Pemilihan sub-provider Terbaik | 0.00000 | 0.000000 |
| No Icon | Kecepatan Respon Keluhan atau Masalah | 0.75329 | 0.380397 |
| No Icon | Problem Solving | 0.24671 | 0.124582 |
| No Icon | Kepatuhan Perjanjian | 0.66667 | 0.029942 |
| No Icon | Konsisten Terhadap Standar | 0.33333 | 0.014971 |
| No Icon | Laporan Akurat dan Tepat Waktu | 0.66667 | 0.029942 |
| No Icon | Laporan Mudah Dipahami dan Informatif | 0.33333 | 0.014971 |

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Figure 4 Priorities Responden 2

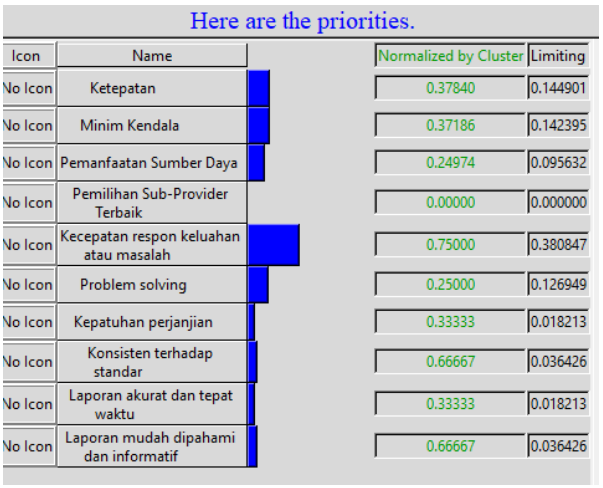


*Figure 5 Priorities Responden 3*

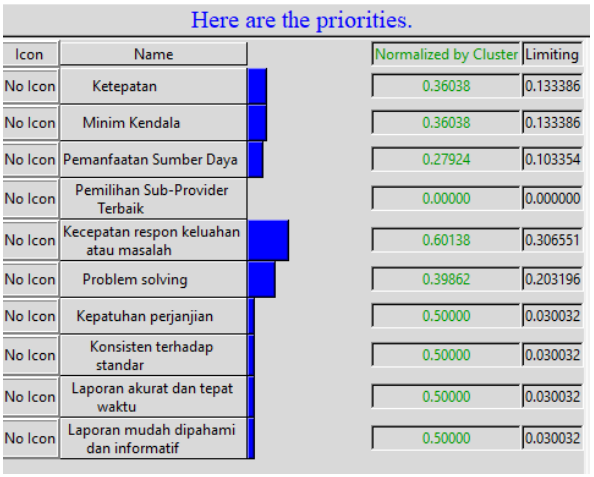


Figure 6 Priorities Responden 4

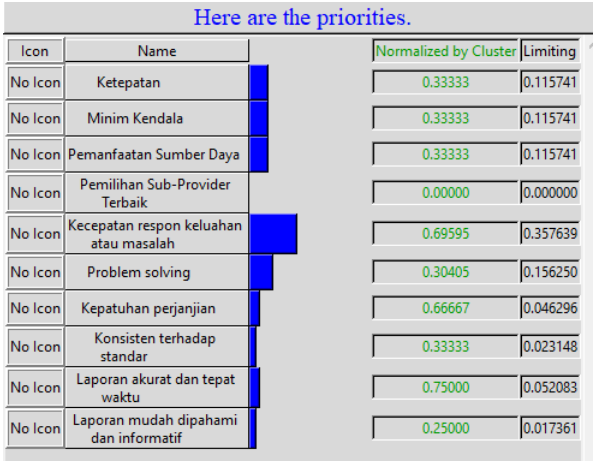


*Figure 7 Priorities Responden 5*

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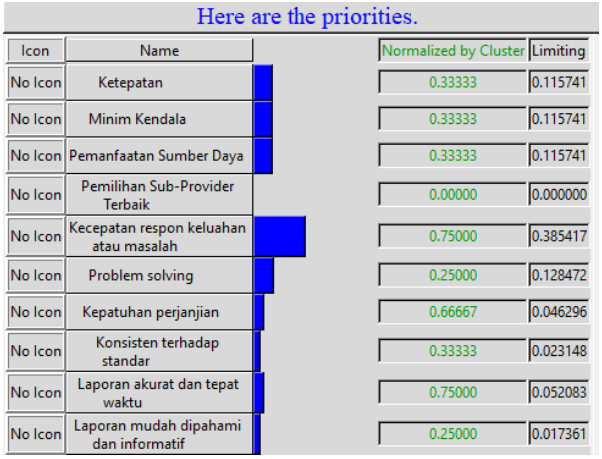


One of the main results of processing in software SuperDecisions is the value of Priorities, the final weight of each sub-criteria obtained through the synthesis process, ranging from the calculation of eigenvectors, supermatrix preparation, normalization, to reach the limit supermatrix. This value reflects the relative contribution of each sub-criterion to the main objective, which is to evaluate the performance of the Sub-Provider. The higher the priority value, the greater the role of these sub-criteria in determining the evaluation results. In contrast, low-weighted sub-criteria have less influence on the final assessment.

Table 4 Inverse Geometric Mean of Five Respondents

| **INVERSE** | | | | | | |
|---|---|---|---|---|---|---|
| | **R1** | **R2** | **R3** | **R4** | **R5** | **GMEAN** |
| EP-KT SOP | 4 | 3 | 2 | 1 | 1 | 1,89 |
| EP-KP | 4 | 3 | 1 | 2 | 1 | 1,89 |
| EP-KR | 1 | 2 | 1 | 1 | 1 | 1,15 |
| KT SOP-KP | 3 | 4 | 1 | 1 | 1 | 1,64 |
| KT SOP-KR | 1 | 4 | 2 | 1 | 1 | 1,52 |
| KP-KR | 1/2 | 4 | 2 | 1 | 1 | 1,32 |
| | | | | | | |
| MK-PSD | 4 | 3 | 2 | 2 | 2 | 2,49 |
| KRKM-PS | 3 | 3 | 2 | 1/2 | 3 | 1,93 |
| | | | | | | |
| K-PSD | 3 | 2 | 2 | 1 | 1 | 1,64 |
| KRKM-PS | 3 | 3 | 2 | 2 | 3 | 2,55 |
| | | | | | | |
| K-MK | 2 | 2 | 1 | 1 | 2 | 1,52 |
| KP-KTS | 2 | 1/2 | 1 | 2 | 2 | 1,32 |
| LATP-LMDI | 2 | 1/2 | 1 | 3 | 3 | 1,55 |
| KRKM-PS | 2 | 3 | 1 | 1 | 1 | 1,43 |
| | | | | | | |
| KRKM-PS | 3 | 3 | 1 | 2 | 3 | 2,22 |
| | | | | | | |
| KRKM-PS | 4 | 3 | 1 | 2 | 2 | 2,17 |

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In Analytic Network Process (ANP) method, before the data is entered into the SuperDecisions software, it is necessary to combine the results of paired comparisons of all respondents. Due to the ratio-scale nature of the data and the interdependence between elements, the Geometric Mean method is used as an aggregation technique, not an arithmetic average. Table 4 shows the results of calculating the Geometric Mean of five respondents for each pair of sub-criteria.

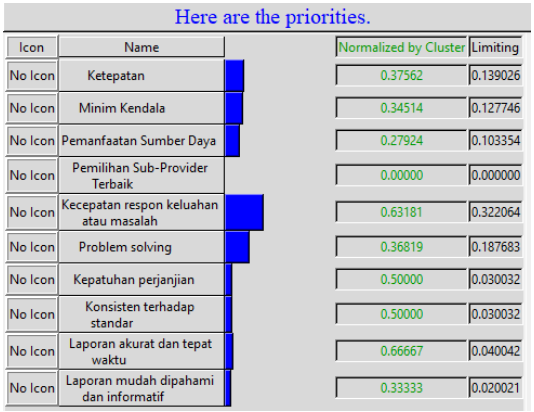
The calculation step is done by multiplying all the comparison values from the respondents and taking the Nth Power Root (number of respondents), using the formula (Anis Suryatri 2019):

$$GM= (X1 . X2 . Xn)^1/n$$

This result is used as the input of pairwise comparison values in SuperDecisions. If the GM value is < 1, then it is reversed (inverse) and placed logically in the appropriate Matrix position in order to maintain consistency between elements.

Through this approach, the perceptions of all respondents are proportionally unified, so that the resulting weight reflects a more objective and analytically valid collective view.

Figure 8 Priorities Geometric Mean




After the comparison values between sub-criteria are combined using Geometric Mean, the data is entered into the SuperDecisions application for weighting based on the ANP principle. This application automatically processes the data through several steps, namely: forming an initial supermatrix from the results of pairwise comparisons, normalizing each column so that the total is one, and then performing repeated powers until reaching the supermatrix limit, a stable condition in which the weight of each element no longer changes.

The main Output of this process is the priority value of each sub-criterion, which represents the degree of its importance to the evaluation objectives. Based on the results in Figure 8, the sub-criterion "speed of response to complaints" obtained the highest weight of 0.63181. This shows that based on the synthesis of the perceptions of the five respondents and the analysis of the ANP network, response speed is the most dominant factor in assessing the performance of Sub-providers at PT XYZ.

Figure 9 Consistency Ratio

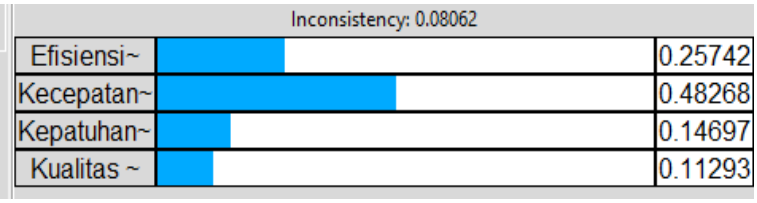


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Figure 9 shows the value of the Consistency Ratio (CR) of the results of comparison in pairs that have been combined using the Geometric Mean method. The CR value of 0.08062 indicates that the collective assessment of the five respondents is within acceptable consistency limits. Refers to the standard of Thomas L. At the time and in the study (Fatimah Kalitdyah 2024), the maximum cr threshold in the AHP/ANP method was 0.1. A CR value higher than that indicates inconsistency in filling out the questionnaire, but because the CR in this study is below the threshold, the assessment is considered logical and valid.

The highest priority value of the ANP result, which is 0.63181 in the sub-criterion " speed of response to complaints", is then used as a Weight factor in the calculation of the Internal Performance Index (IPI). This integration creates a more targeted evaluation approach, since the assessment scores of the questionnaires are not only calculated on average, but are also weighted based on the relative importance of each indicator. Thus, the merging of ANP and IPI results in a more accurate and methodologically weighted evaluation of Sub-Provider performance.

**Calculation *Internal Performance Index* (IPI)**

After the weights are obtained through ANP, the next step is to calculate the Internal Performance Index (IPI) for each Sub-Provider. This IPI is a modification of the Customer Satisfaction Index (CSI) method, but is focused on evaluating internal performance. Although the context is different, the calculation structure still refers to the basic principle of CSI, which is to combine the weight of importance with the realization of actual performance.

This approach is in line with research (Masriyatun 2022), which also modified the CSI to assess internal services in the health sector. Therefore, the use of IPI in this study is considered valid academically and methodologically, because: (1) still follow the principles of valid statistical calculations; (2) supported by relevant previous literature; and (3) tailored to the purpose of internal evaluation of the performance of Sub-providers, not the perception of external customers. In addition, the data used came from competent internal respondents, namely personnel with 3-5 years of experience in monitoring and handling complaints. With a strong theoretical foundation and contextual application, this IPI model can be considered as an appropriate and reliable evaluation method.

The formula used by IPI (Ayu Nuriyana 2022): IPI = $\left(\frac{\sum(Wi\ x\ Si)}{HS}\right)$x 100%

Description:

Wi = weight of the attribute (in this study the weight is filled with the results of weighting the most influential sub-criteria in accordance with the ANP data processing using superdecision Software with a value of 0.63181)

Si = satisfaction score given to attribute respondents

∑(Wi) =1 or 100% (weights are usually normalized) Maximum value of the scale = the highest value of the assessment scale (in this study the authors used a likert scale 1-5)

Table 5 Total Average Score Of Each Sub-Provider

| | Efisiensi Proses | Kepatuhan SOP | Kualitas Pelaporan | Kecepatan Respon | TOTAL RATA-RATA SKOR |
|---|---|---|---|---|---|
| *Sub-Provider* A | 2,67 | 3,60 | 3,30 | 3,20 | 3,19 |
| *Sub-Provider* B | 3,20 | 3,93 | 4,30 | 3,40 | 3,71 |
| *Sub-Provider* C | 2,07 | 3,33 | 3,00 | 2,90 | 2,83 |
| *Sub-Provider* D | 3,67 | 4,73 | 4,80 | 4,40 | 4,40 |

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The average score in Table 5 is obtained from the answers of each respondent to the IPI questionnaire prepared by the researcher. The value of each respondent is calculated on average using Microsoft Excel for each assessment indicator. The final result in the form of total average score of each Sub-Provider is used as the realization value (Si) in the calculation of IPI. Calculation of IPI of each Sub-Provider:

1. *Sub-Provider* A

$$IPI = \left(\frac{\sum (0.63181 \times 3{,}19)}{5}\right) \times 100\%$$

$$= 0{,}403094$$

2. *Sub-Provider* B

$$IPI = \left(\frac{\sum (0.63181 \times 3{,}71)}{5}\right) \times 100\%$$

$$= 0{,}468802$$

3. *Sub-Provider* C

$$IPI = \left(\frac{\sum (0.63181 \times 2{,}83)}{5}\right) \times 100\%$$

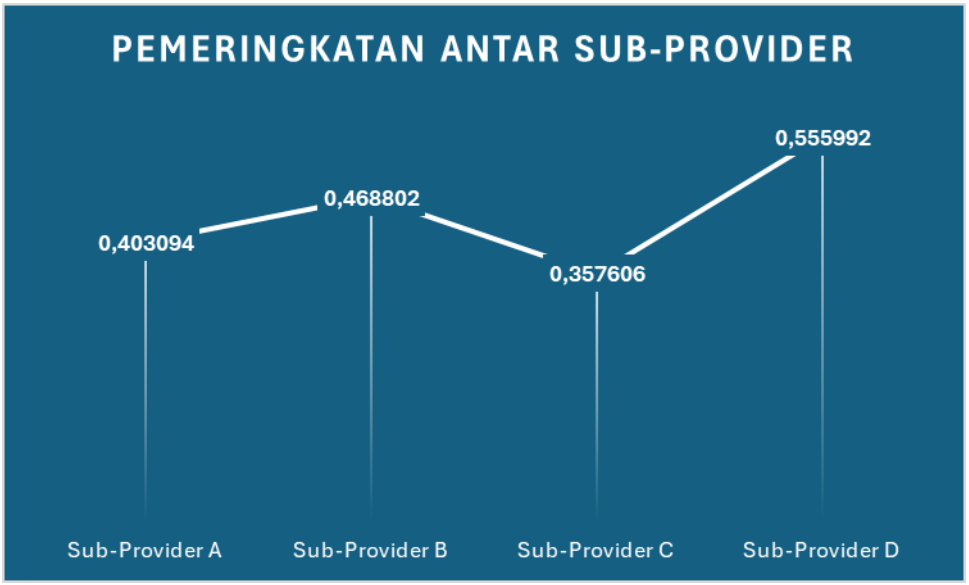
$$= 0{,}357606$$

4. *Sub-Provider* D

$$IPI = \left(\frac{\sum (0.63181 \times 4{,}40)}{5}\right) \times 100\%$$

$$= 0{,}555992$$

Figure 10 Ranking Between Sub-Providers




The results of the IPI calculation show an overview of the overall performance of each Sub-

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Provider. The Sub-Provider with the highest IPI score is considered to have the best performance. Based on these results, Sub-Provider D obtained the highest value of 0.555992, indicating the most

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optimal performance, while Sub-Provider C recorded the lowest value of 0.357606, which indicates the lowest performance among all partners evaluated.

**Discussion on the Effectiveness of Handling Customer Complaints by Sub-Providers**

This research was conducted at PT XYZ, an internet service provider company in East Java that cooperates with Sub-providers in the installation, maintenance, and handling of network disruptions. In 2024, the company experienced an increase in customer complaints due to slow handling of disruptions, so an objective evaluation of Sub-Provider performance is needed.

The method used is a combination of Analytic Network Process (ANP) and modification of Customer Satisfaction Index (CSI) into Internal Performance Index (IPI). The ANP approach is used to identify priority weights between sub-criteria, while IPI measures internal perceptions of Sub-Provider performance. The use of IPI refers to the adaptation of CSI as it is done (Masriyatun 2022), and is considered theoretically valid because it considers the weight of importance and the realization score.

The study respondents came from internal personnel who are competent in the field of technical supervision, so internal perception is considered a valid proxy for customer expectations. This is in line with The Theory of Internal Service Quality (ISQ) and a service quality approach that recognizes the role of internal perceptions in reflecting customer expected service standards (Ismi 2024).

The results showed that Sub-providers with high priority weights on important indicators such as “response speed” also showed high IPI scores, strengthening the relationship between service effectiveness and partner performance. These findings support the integration of multicriteria methods and evaluation of service quality as asserted in decision-making theory (e.g. Purwanto 2018)., where process and perception play an important role in determining the best alternative.

As a recommendation, companies need to routinely implement Sub-Provider performance evaluations based on data and internal perceptions. The ANP–IPI approach can be a responsive and scalable decision-making tool, and is in line with the principles of Total Quality Management (TQM) in encouraging continuous, collaborative, and quality-based improvements (Mahmudah 2025).

## CONCLUSION

Based on the results of the study, it can be concluded that the Analytic Network Process (ANP) method combined with the modification of the Customer Satisfaction Index (CSI) into an Internal Performance Index (IPI) is able to provide a comprehensive and objective evaluation of the performance of Sub-providers at PT XYZ. The results of weighting using ANP showed that the sub-criterion " speed of response to complaints” has the greatest influence in determining the quality of Service of Sub-providers. Furthermore, the IPI calculation shows the difference in performance between Sub-providers, with Sub-Provider D getting the highest score, indicating superior service effectiveness. The implication of this finding is that it is important for companies to implement data-based evaluation systems and internal perceptions on a regular basis to support more accurate strategic decision making. As a suggestion, the company is advised to use the ANP–IPI approach in the selection process and monitoring the performance of Sub-providers, as well as expand the application of this method to other aspects of service in order to encourage continuous improvement in quality and competitiveness.

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