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Assessing user satisfaction in construction services: Analyzing contractor performance in central Kalimantan's power projects

Asriadi Adri [1,*] and Aqli Mursadin [2]

[1] *Master Student of Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University, Banjar Baru City, Indonesia.*
[2] *Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University, Banjar Baru City, Indonesia.*

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Abstract

Background: User satisfaction is an essential indicator in assessing the quality of construction services. A deep understanding of the factors contributing to user satisfaction is crucial, especially in the context of electrical projects.

Objective: This study aims to examine the satisfaction level of PT PLN (Persero) UIP West Kalimantan towards the performance of electrical project contractors and to develop strategies for improving contractor performance based on the findings.

Methods: This research adopts an observational approach using Descriptive Analysis. A survey employing questionnaires was designed and distributed to employees of PT PLN (Persero) UIP West Kalimantan. Data analysis was conducted using the Customer Satisfaction Index (CSI) and Importance Performance Analysis (IPA) to identify key performance indicators.

Results: The study indicates a high level of satisfaction from PT PLN (Persero) UIP West Kalimantan towards the contractor's performance, with a CSI value of 70% within a 95% confidence interval (66%-81%). The IPA analysis revealed 12 performance indicators within the 'concentrate here' quadrant, indicating priority areas for improvement.

Conclusion: These findings affirm the effectiveness of the strategies and management implemented by contractors in achieving user satisfaction. This study provides valuable insights for other contractors in the construction sector to enhance service quality, especially through improvements in project managerial recruitment strategies, support for work equipment, and collaborative strategies with banking institutions for project financing.

Keywords: Contractor Performance; Customer Satisfaction Index (CSI); Importance Performance Analysis (IPA); Electrical Projects; PT PLN

1. Introduction

User satisfaction is a pivotal factor in enhancing service quality. Therefore, it is vital to consistently assess user satisfaction in post-construction activities [1]. Satisfaction, by definition, is the feeling experienced when expectations or desires are fulfilled. It is highly sought after by consumers in both product and service industries. Expectation theory posits that satisfaction or dissatisfaction results from comparing the performance of goods/service providers with pre-determined standards. Superior performance to expected standards leads to customer delight, while meeting expectations results in satisfaction, and underperformance causes dissatisfaction [2].

* Corresponding author: Asriadi Adri

There are five key factors influencing customer satisfaction. First is product quality - consumers tend to be satisfied when using high-quality products. Second, service quality - satisfactory or expected service levels lead to higher customer satisfaction. Third, the emotional factor - consumers who feel proud and believe others will admire their use of a specific brand tend to have higher satisfaction levels. Fourth is price - products of comparable quality but offered at lower prices provide greater value to customers. Lastly, the ease and cost of accessing products or services. Overall customer satisfaction depends on the evaluation of each of these components, with different weights assigned by customers [3].

Maloney (2002) identified five key drivers of customer satisfaction, the first being the contractor-customer relationship [4]. A positive relationship enhances communication and expectation fulfillment. The second is contractor project management skills, where proficient management leads to efficiency, effectiveness, and increased productivity. The third factor is contractor safety performance - critical in construction, as poor safety performance impacts employee performance and the contractor's reputation. Fourth, the skills of the contractor's workforce, where skilled labor ensures timely and possibly ahead-of-schedule project completion. Lastly, the cost factor - satisfying work quality combined with lower costs leads to higher customer satisfaction.

Previous research has extensively explored user satisfaction in various contexts. Ardhanareswari (2016) found a strong correlation between housing construction design and consumer satisfaction in South Kalimantan Province [5]. Fahmawati (2022) concluded that consumers were fairly satisfied with the performance of road contractors in Kutai Kartanegara Regency, despite a performance gap [6]. Pratiwi, A. (2020) studied construction service satisfaction in bridge contractors in Banjarmasin, showing user satisfaction with contractor performance [7]. Augusta, R. R. (2020) found that road and bridge infrastructure project owners in Gresik Regency were satisfied with contractor performance . Suhada & Syairuddin (2021) identified critical factors for customer satisfaction in construction services, including project report accuracy, on-time completion, post-construction service levels, adherence to procedures and work instructions, worker skill in equipment use, trust in communication follow-up, and project schedule compliance [8].

Prior research, such as that by Madeppungeng (2019), has linked customer satisfaction with project management in electrical projects [9], but its geographic limitation to Java ignores the unique geographical and social dynamics of regions like Kalimantan. Indeed, surveys have shown varying community dynamics in accepting power plant construction [10], which can delay construction project timelines. Another study by Nurhidayati et al. (2017) on the Customer Satisfaction Index (CSI) and Importance Performance Analysis (IPA) in university building construction reported a satisfaction level around 70% [11]. However, these findings are not universally applicable due to their focus on a specific construction type.

This research aims to analyze user satisfaction levels regarding the performance of electrical contractors and strategies for performance improvement in Central Kalimantan Province. It holds significance for the authors in providing improvement recommendations to electrical contractors. The study will analyze satisfaction levels using CSI and IPA indicators, focusing on PT. PLN (Persero) Unit Induk Pembangunan Kalimantan Bagian Barat as the service user and its evaluation of electrical contractor performance in Central Kalimantan Province.

2. Material and Method

This study adopted an observational approach using Descriptive Analysis, a methodology similar to that employed by Madeppungeng et al. (2019), albeit in a different geographic region [9]. An exploratory survey was conducted to measure and analyze the level of construction service user satisfaction with the performance of electrical project contractors in Central Kalimantan. The research variables were aligned with the performance assessment criteria of goods/service providers within PT. PLN (Persero), as per the Directorial Decision of PT. PLN (Persero) No. 271.K/DIR/2013 dated March 27, 2013, on the Guidelines for Performance Assessment of Goods/Service Providers in Electrical Construction Projects within PT. PLN (Persero). A total of 42 indicators were identified and are detailed in Table 1.

His study's sample comprised employees from PT. PLN (Persero) Unit Induk Pembangunan Kalimantan Barat and the West Kalimantan 3 Project Implementation Unit, totaling 40 individuals as construction service users.

Data collection was conducted through a questionnaire distribution designed to measure various aspects of contractor performance. These aspects included time efficiency, resource management, adherence to safety standards, and overall client satisfaction. The questionnaire consisted of Likert-scale oriented questions, allowing respondents to express their level of agreement with the provided statements. Each questionnaire underwent a validity test with a Cronbach's alpha of 0.8.

Table 1 Research Variables

Indicator	Category
X1	Compliance with Government and PLN regulations
X2	Project manager *capability & activeness* towards project problem solving
X3	Project organization and supporting personnel according to their competence
X4	Ability to solve social problems
X5	*Overall project schedule* and *S-curve* that has been approved by the Director of Works
X6	Co-operation with the Field Superintendent
X7	KSO's internal cooperative relationship
X8	Equipment of environmental documents and solving problems in the field
X9	Solving *approval drawing/design*
X10	Completeness of work methods (IK, SOP) for the implementation of work on installations
X11	Solving *As build drawing*
X12	Presentation of *engineering documents*
X13	Availability of work equipment in accordance with the field of work carried out
X14	HR's ability to inform of potential risks to work
X15	Have a competent executor squad
X16	Have a *competent* testing *and* commissioning squad
X17	Result *Factory Acceptance Test* (FAT)
X18	Result *Site Acceptance Test* (SAT)
X19	Have a type *test product certificate* from an independent national /international laboratory
X20	Quality of goods delivered according to technical specifications in the contract
X21	Refer to national/international standards according to the contract
X22	Compliance with applicable construction standards according to the contract
X23	Site test *and* commissioning *results* integrated with the system
X24	Civil/electromechanical/*steel-structure works* to contract specifications
X25	Workplace safety and hygiene
X26	Equipment fittings and K3 squad
X27	Qualified healthcare facilities
X28	Ability to bring / mobilize goods to the location (site) on time
X29	Ability to get work done on time
X30	Pending item solution service
X31	*Continuous supporting* products *and* spare parts
X32	Administration (COO, COM, supporting documents, progress reporting system, correspondence, and *monitoring of* the estimated value of progress realization)
X33	Meet the administrative requirements of shipping goods (including road letters, warranty certificates, freight forwarding insurance)
X34	Has complete brochures, *manual books, supporting* software

X35	Neatness of *packing*, mobilization and demobilization of materials
X36	Submission of labor insurance policy
X37	Accuracy of *disburse*
X38	Financial capabilities in project financing
X39	The number of *contract claims* caused by providers of goods/services
X40	Contractors meet equipment performance after *commissioning*
X41	The contractor guarantees the fulfillment of equipment performance during the maintenance period
X42	The contractor is responsible for equipment damage during the maintenance period

Additionally, in-depth interviews were conducted with selected respondents to gain further insights into the factors influencing their satisfaction with contractor performance. These interviews were instrumental in identifying potential areas for improvement and strategies for enhancing contractor performance.

Data analysis was performed using statistical methods, including descriptive analysis to provide an overview of the data. The reliability and validity of the research instruments were tested to ensure the accuracy and relevance of the findings. Through this approach, the study aims to make a significant contribution to the literature on construction management and customer satisfaction, particularly in the context of the electrical industry in Central Kalimantan.

2.1. Validity and Reliability Testing of Instruments

The process of validity and reliability testing of instruments is a fundamental step in ensuring the integrity and credibility of research data. In this study, the validity of the research instruments was meticulously measured to confirm the reliability of the data gathered. This step is crucial to guarantee that the data can be reliably used as a reference in the subsequent analysis. The determination of instrument validity in this context was based on the Cronbach's alpha coefficient, a widely recognized measure of internal consistency. A Cronbach's alpha value of 0.8 was obtained, indicating a high level of reliability and suggesting that the research instruments are suitably valid for the study's purposes. This level of alpha coefficient is generally considered acceptable in social science research, indicating good internal consistency of the instruments used and thereby bolstering the reliability of the study's findings [12]. Such a procedure is in line with best practices in research methodology, where ensuring the validity and reliability of instruments is imperative for the accuracy and applicability of research outcomes [13].

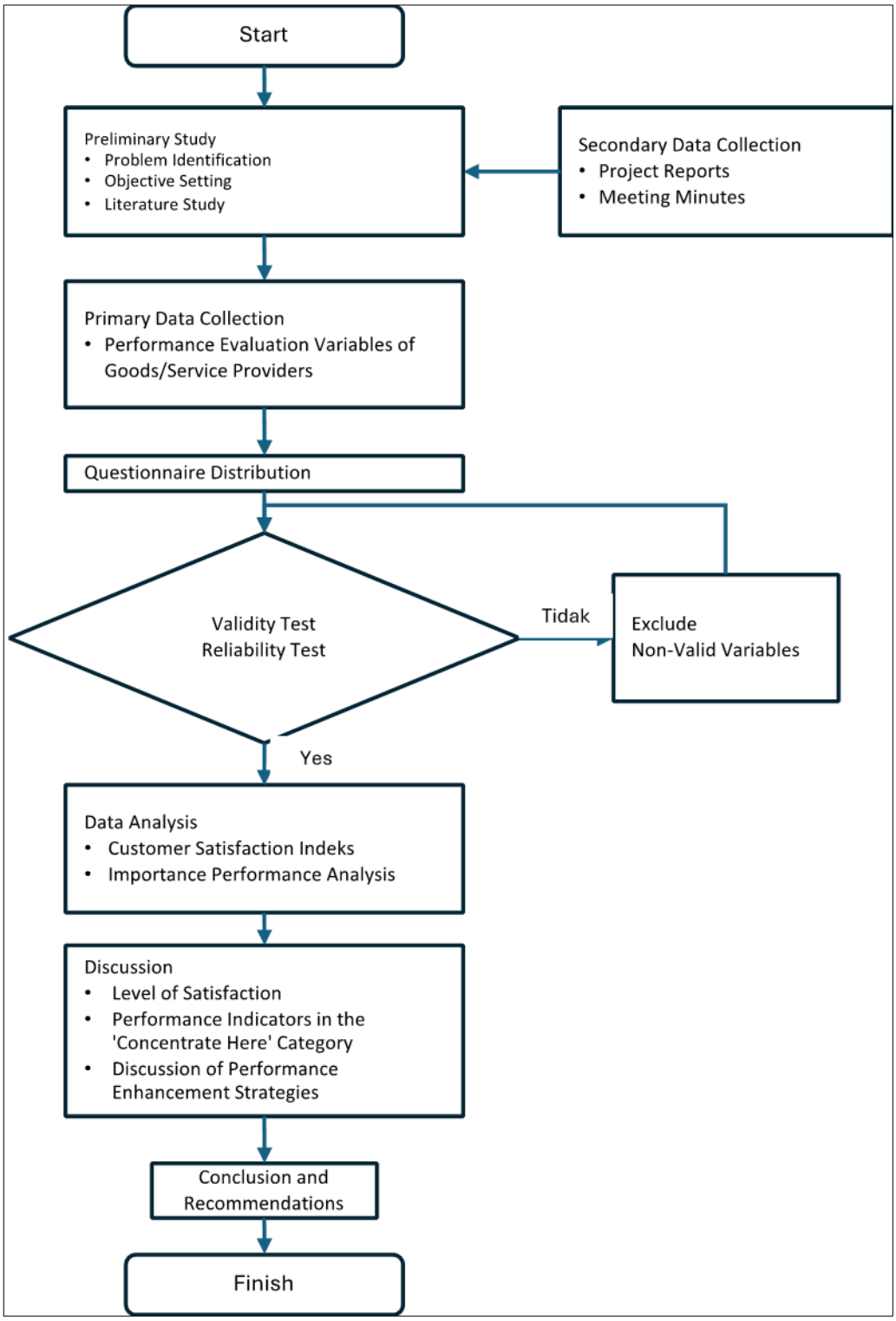

Figure 1 Research Flowchart

3. Results and Discussion

The measurement of customer satisfaction can serve as an indicator of the performance of project execution. Certainly, good performance does not arise from poor management practices [14]. This implies that the management representation of the project execution can also be reflected in customer satisfaction.

3.1. Consumer Satisfaction

Oliver (2014) posits that satisfaction or dissatisfaction is generated from the comparison of the performance of goods/service providers with previously established performance standards. If performance is considered better than the expected standards, then customers are delighted. If performance matches expectations, customers tend to be satisfied [2]. Conversely, if performance falls below expectations, it leads to customer dissatisfaction.

3.2. Customer Satisfaction Index

According to Dixon (1991), there are four steps in the calculation of the Customer Satisfaction Index [15]:

- Determine the Mean Importance Score (MIS) and Mean Satisfaction Score (MSS).
- Calculate the weight factor (WF), which is the percentage of the MIS of each attribute against the total MIS of all attributes.
- Compute the Weighting Score. This score is the product of the Weight Factor (WF) and the average level of satisfaction (Mean Satisfaction Score = MSS).
- Ascertain the CSI. The commonly used scale for interpreting the customer satisfaction index is from zero to one or zero to one hundred.

Table 2 Consumer Satisfaction Index Values (Hastuti et al., 2013)

No	Index Value	Satisfaction Level
1	81%-100%	Very satisfied
2	66%-80.99%	satisfied
3	51%-65.9%	Quite satisfied
4	35%-50.99%	Less satisfied
5	0%-34.99%	Not satisfied

3.3. Importance Performance Analysis (IPA)

Importance Performance Analysis was introduced by Martilla & James in 1977. This method is used as a technique to evaluate the elements of a company's marketing program. A company can determine customer satisfaction with the services provided by conducting surveys or questionnaires that ask customers about the importance they place on service elements and the performance of those services [16].

3.3.1. Customer Satisfaction Index (CSI)

The data from the collected questionnaires are processed to calculate the Customer Satisfaction Index (CSI). The steps to obtain the CSI value include calculating the Mean Importance Score (MIS) and Mean Satisfaction Score (MSS), then determining the Weight Factor (WF) and the Weight Score (WS). The total of all Weight Scores is computed, followed by the calculation of the Customer Satisfaction Index. The results of the CSI calculation are presented in Table 3.

Table 3 Customer Satisfaction Index (CSI) Calculation

Indikator (a)	Mean Importance Score (MIS) (b)	Mean Satisfaction Score (MSS) (c)	Weight Factor (WF) d = (b/btotal)*100%	Weight Score (WS) e = c*d
X1	4,50	3,45	2,45	8,44
X2	4,55	3,38	2, 47	8,34
X3	4,43	3,25	2,40	7,81
X4	4,30	3,25	2,34	7,59
X5	4,48	3,35	2,43	8,15
X6	4,33	3,68	2,35	8,64

X7	4,35	3,65	2,36	8,63
X8	4,23	3,38	2,30	7,75
X9	4,38	3,53	2,38	8,38
X10	4,53	3,40	2,46	8,36
X11	4,35	3,45	2,36	8,16
X12	4,20	3,50	2,28	7,99
X13	4,43	3,48	2,40	8,36
X14	4,48	3,30	2,43	8,02
X15	4,43	3,45	2,40	8,30
X16	4,50	3,68	2,45	8,99
X17	4,43	4,03	2,40	9,68
X18	4,48	4,03	2,43	9,79
X19	4,43	3,90	2,40	9,38
X20	4,60	3,93	2,50	9,81
X21	4,53	3,90	2,46	9,59
X22	4,40	3,70	2,39	8,85
X23	4,35	3,68	2,36	8,69
X24	4,50	3,73	2,45	9,11
X25	4,23	3,28	2,30	7,52
X26	4,45	3,33	2,42	8,04
X27	4,38	3,35	2,38	7,96
X28	4,48	2,98	2,43	7,23
X29	4,55	2,65	2,47	6,55
X30	4,28	3,18	2,32	7,38
X31	4,30	3,50	2,34	8,18
X32	4,18	3,53	2,27	8,00
X33	4,30	3,65	2,34	8,53
X34	4,25	3,70	2,31	8,55
X35	4,20	3,68	2,28	8,39
X36	4,35	3,53	2,36	8,33
X37	4,18	3,13	2,27	7,09
X38	4,45	3,13	2,42	7,56
X39	4,00	3,40	2,17	7,39
X40	4,40	3,65	2,39	8,73
X41	4,45	3,68	2,42	8,89
X42	4,50	3,65	2,45	8,93
Total	184,03			350,01
Customer Satisfaction Index =(WStotal/5)*100%				70,003%

It can be observed in Table 3 that the calculated value of the Customer Satisfaction Index is 70.003%. Based on the customer satisfaction levels in Table 1, the customer satisfaction rating falls within the range of 66%-80.99%, categorized as "satisfied".

A "satisfied" rating implies that the performance is considered to match consumer expectations precisely but has not yet exceeded consumer expectations. Therefore, it is anticipated that contractors will continue to improve their performance. The researchers then conducted interviews with the management of PT. PLN (Persero) Unit Induk Pembangunan Kalimantan Barat to confirm the assessment results corresponding to the "Satisfied" level. The interview findings revealed that with such a satisfaction level assessment, PT. PLN (Persero) Unit Induk Pembangunan Kalimantan Barat expects the contractor to continuously improve their performance so that service users can experience a better satisfaction level.

Given the service users' expectations for the contractor to enhance their performance, the researchers carried out an analysis to improve the contractor's performance. To identify which indicators should be prioritized for performance improvement, the Importance Performance Analysis method was utilized.

3.3.2. Importance Performance Analysis (IPA)

The primary performance indicators that need to be improved by the contractor based on survey results are determined using the Importance Performance Analysis method. The use of IPA is crucial in identifying and evaluating project performance [9]. Due to the significance of this analysis, Salah Zamin, an expert in construction planning, stated that the early identification of "this performance" would impact when the project is implemented [14].

The Mean Importance Score (MIS) and Mean Satisfaction Score (MSS) values from the Customer Satisfaction Index calculation are plotted in a Cartesian diagram of importance and performance levels in Figure 2.

Table 4 Importance and Performance Values

Indikator	***Importance* (MIS)**	***Performance* (MSS)**
X1	4,50	3,45
X2	4,55	3,38
X3	4,43	3,25
X4	4,30	3,25
X5	4,48	3,35
X6	4,33	3,68
X7	4,35	3,65
X8	4,23	3,38
X9	4,38	3,53
X10	4,53	3,40
X11	4,35	3,45
X12	4,20	3,50
X13	4,43	3,48
X14	4,48	3,30
X15	4,43	3,45
X16	4,50	3,68
X17	4,43	4,03
X18	4,48	4,03

X19	4,43	3,90
X20	4,60	3,93
X21	4,53	3,90
X22	4,40	3,70
X23	4,35	3,68
X24	4,50	3,73
X25	4,23	3,28
X26	4,45	3,33
X27	4,38	3,35
X28	4,48	2,98
X29	4,55	2,65
X30	4,28	3,18
X31	4,30	3,50
X32	4,18	3,53
X33	4,30	3,65
X34	4,25	3,70
X35	4,20	3,68
X36	4,35	3,53
X37	4,18	3,13
X38	4,45	3,13
X39	4,00	3,40
X40	4,40	3,65
X41	4,45	3,68
X42	4,50	3,65
Jumlah	184,03	146,98

The calculation of the average Mean Importance Score (MIS) and Mean Satisfaction Score (MSS) is a critical step in the process of Importance Performance Analysis (IPA). The average MIS is derived by dividing the total MIS, as shown in Table 4, by the number of variables, which in this case is 42. This results in an average MIS value of 4.38. This average MIS value is crucial as it serves as a benchmark for determining the level of importance assigned to each variable in the analysis. It is utilized as the threshold for importance on the y-axis of the IPA matrix. This method of calculating the average MIS is consistent with the approach outlined in previous studies, where the importance of various attributes is quantified and then used for further analysis in the IPA framework [17], [18].

n the other hand, the average Mean Satisfaction Score (MSS) is calculated in a similar manner. The total MSS for the 42 variables, also presented in Table 4, is averaged, resulting in a value of 3.50. This average MSS is significant as it sets the standard for performance on the x-axis of the IPA matrix. The use of average MSS as a performance threshold has been recognized as an effective way to understand how well the attributes or variables are performing against the expectations [19]. By plotting these average values on the IPA matrix, researchers and practitioners can effectively identify which attributes fall into categories like 'Concentrate Here', 'Keep Up The Good Work', 'Low Priority', or 'Possible Overkill', providing a clear direction for strategic improvements and resource allocation.

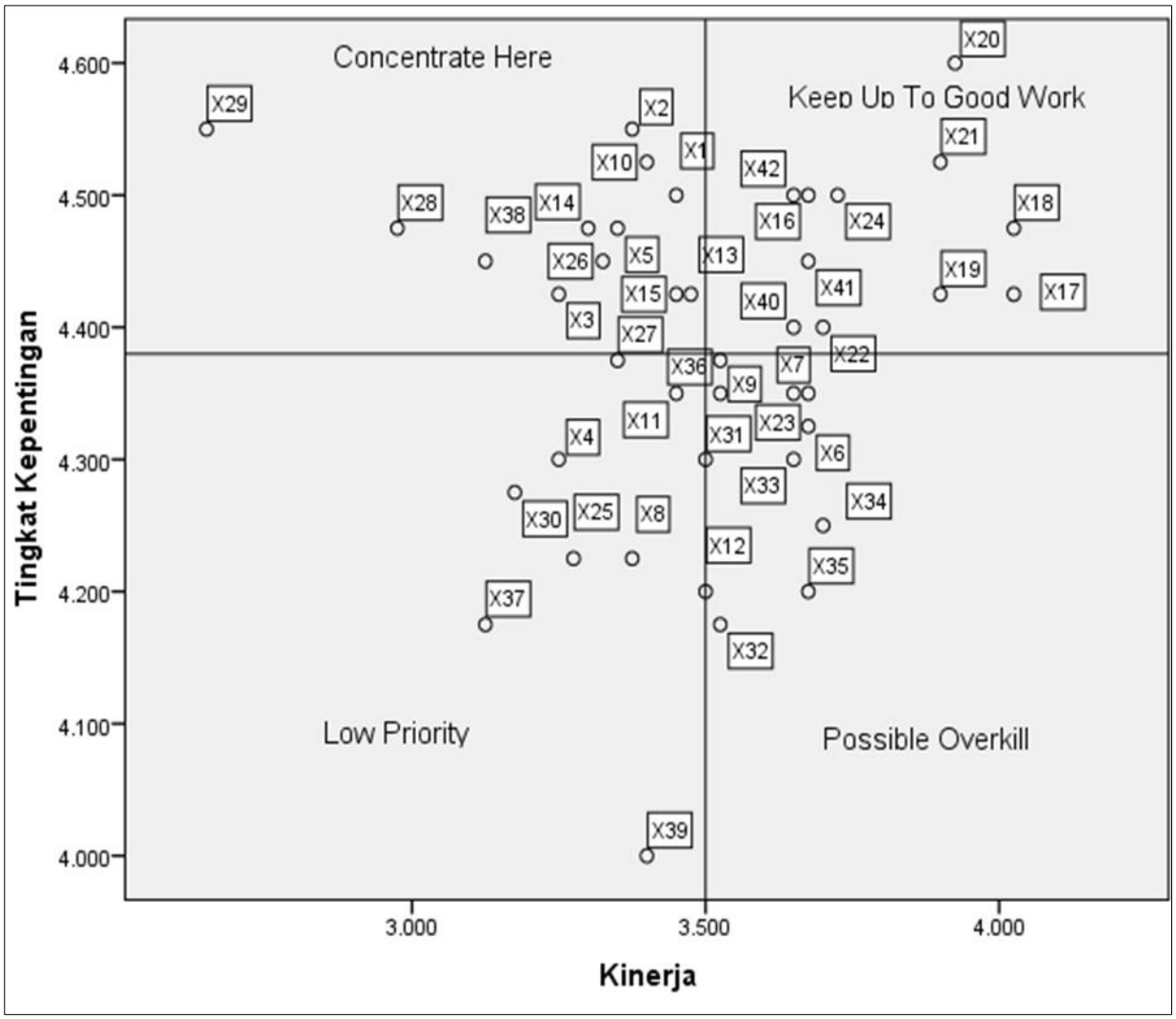

Figure 2 Importance-Performance Level Diagram

It can be observed in Figure 2 that there are four areas in the importance-performance level diagram: Low Priority, Possible Overkill, Concentrate Here, and Keep Up The Good Work. The category of each indicator can be seen in Table 5.

Table 5 Performance Indicator Categories

Indikator	Kategori
X1	*Concentrate Here*
X2	*Concentrate Here*
X3	*Concentrate Here*
X4	*Low Priority*
X5	*Concentrate Here*
X6	*Possible Overkill*
X7	*Possible Overkill*
X8	*Low Priority*
X9	*Possible Overkill*

X10	*Concentrate Here*
X11	*Low Priority*
X12	*Low Priority*
X13	*Concentrate Here*
X14	*Concentrate Here*
X15	*Concentrate Here*
X16	*Keep Up To Good Work*
X17	*Keep Up To Good Work*
X18	*Keep Up To Good Work*
X19	*Keep Up To Good Work*
X20	*Keep Up To Good Work*
X21	*Keep Up To Good Work*
X22	*Keep Up To Good Work*
X23	*Possible Overkill*
X24	*Keep Up To Good Work*
X25	*Low Priority*
X26	*Concentrate Here*
X27	*Low Priority*
X28	*Concentrate Here*
X29	*Concentrate Here*
X30	*Low Priority*
X31	*Low Priority*
X32	*Possible Overkill*
X33	*Possible Overkill*
X34	*Possible Overkill*
X35	*Possible Overkill*
X36	*Possible Overkill*
X37	*Low Priority*
X38	*Concentrate Here*
X39	*Low Priority*
X40	*Keep Up To Good Work*
X41	*Keep Up To Good Work*
X42	*Keep Up To Good Work*

From Table 5, the performance indicators that fall into the Low Priority category include the ability to resolve social problems (X4), completeness of environmental documents and their resolution in the field (X8), completion of As Built Drawing (X11), delivery of engineering documents (X12), safety and cleanliness of the workplace (X25), qualified health facilities (X27), service for resolving pending items (X30), continuous support for products and spare parts (X31), accuracy in disbursements (X37), and the number of contract claims (X39).

Performance Indicators categorized under Possible Overkill include cooperation with field supervisors (X6), internal KSO cooperation relationship (X7), resolution of approval drawing/design (X9), results of site tests and commissioning (X23), Administration (X32), meeting the administrative requirements for shipping goods (X33), having complete brochures, manual books, supporting software (X34), neatness in packing, mobilization, and demobilization of materials (X35), submission of labor insurance policy (X36).

Performance Indicators in the Keep Up The Good Work category are having a competent testing and commissioning squad (X16), results of Factory Acceptance Test (X17), results of Site Acceptance Test (X18), possessing a type test product certificate (X19), quality of goods (X20), adherence to national/international standards (X21), compliance with applicable construction standards (X22), contract specification-compliant work (X24), equipment performance post-commissioning (X40), equipment performance during the maintenance period (X41).

Performance Indicators in the Concentrate Here category are adherence to government and PLN regulations (X1), project manager capability & activeness towards project problem-solving (X2), project organization and supporting personnel (X3), overall project schedule and S-curve (X5), completeness of work methods (X10), availability of work equipment (X13), implementation of risk management (X14), having a competent execution squad (X15), occupational health and safety aspects (X26), accuracy in mobilizing goods to the location (X28), ability to complete work on time (X29), and financial capabilities in project financing (X38).

3.4. Contractor Performance Improvement Strategies

Strategies play a crucial role in project management. The urgency of this relationship is explained by Martin Skitmore and colleagues, highlighting the importance of strategies in enhancing satisfaction [20]. Based on the assessment of performance indicators categorized under 'Concentrate Here', interviews were conducted with contractors and officials from PT PLN (Persero) Unit Induk Pembangunan Kalimantan Barat who have project experience to devise strategies for improving contractor performance. The interviews yielded the following strategy recommendations for performance improvement:

- Pursue proficiency and skill certification in the relevant professions.
- Recruit human resources, particularly in project managerial roles such as project managers and site managers, who are certified and experienced in handling electrical projects.
- Own or rent work equipment as per the needs and specifications of electrical project works.
- Plan for progress bill payments and have administrative staff at the project location.
- Collaborate with banks for project financing.
- Partner with subcontractors who have strong financial capabilities.
- Conduct evaluations of project execution in terms of project management, project costs, equipment provision, project completion time, labor, and occupational health and safety (K3) implementation at the end of the project.

This research yields significant findings regarding the satisfaction level of construction service users in Central Kalimantan. Statistical analysis indicates a significant relationship between time efficiency and user satisfaction. Users tend to be more satisfied when projects are completed on or ahead of schedule, underscoring the importance of effective time management in construction projects.

In terms of resource management, results show that efficiency in the use of materials and human resources positively influences user satisfaction. Respondents gave high ratings to contractors who managed resources effectively, indicating that resource efficiency is a key factor in project success. These findings align with research by Hermerilia, highlighting the importance of project manager quality and qualifications in construction project performance [21].

Regarding compliance with safety standards, this study reveals that workplace safety is a highly valued aspect by service users. Projects adhering to high safety standards tend to achieve better satisfaction ratings, suggesting that safety aspects must not be overlooked in construction projects.

Further discussion in this research also identifies several challenges faced by contractors in enhancing their performance. One such challenge is limitations in managing quality human resources. This finding suggests the need for increased competency and training for the construction industry workforce to achieve optimal results.

From in-depth interviews, it is understood that communication between contractors and clients plays a vital role in achieving user satisfaction. Projects with good communication among all stakeholders tend to yield more satisfactory outcomes, indicating that the aspect of communication needs further enhancement in construction projects.

Overall, the results of this study provide new insights into the factors influencing user satisfaction in electrical construction projects. These findings can serve as a basis for improving practices in the construction industry, particularly in Central Kalimantan, and contribute significantly to the literature on construction management and customer satisfaction.

4. Conclusion

Satisfaction Level and Priority Areas for Performance Improvement: The study reveals that the satisfaction level of PT PLN (Persero) Unit Induk Pembangunan Kalimantan Bagian Barat towards contractor performance is at 70.003%, which falls within the "Satisfied" range. The Importance Performance Analysis identifies several key performance indicators needing enhancement, including adherence to regulations, project management capabilities in problem-solving, project organization, scheduling, completeness of work methods, equipment availability, human resource competency, and logistical abilities.

Contractor Performance Enhancement Strategies: To improve performance, contractors are advised to pursue professional certifications, recruit human resources with competency certifications and experience in electrical projects, provide adequate work equipment, plan finances efficiently, collaborate with banks and subcontractors with sound financial conditions, and conduct comprehensive project evaluations at the end of the project.

The Importance of Project Management and Workplace Safety: The research emphasizes the importance of effective project management and adherence to workplace safety standards (K3). These factors not only contribute to client satisfaction but also affect the efficiency and overall success of the project. Thorough project evaluations, including managerial aspects, costs, equipment provision, completion time, labor, and K3 implementation, are crucial for continuous improvement in the electrical construction industry.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

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