Customer Loyalty Behaviour Brand Air Conditioner XYZ: Combination of Expectation-Confirmation Theory, Satisfaction – Loyalty, and Brand Reputation

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***Abstract*— List of Selected Providers (LSP) is a list stating that goods/ service providers have passed the qualification assessment mechanism at PT XYZ. The qualification assessment process is an important stage in the process of goods/ service procurement because it affects the success of a project. Up to now, the qualification assessment process at PT XYZ has not been managed comprehensively, resulting in delays or failure of project completion. Therefore, to get a qualified and best provider of goods/ services, the qualification assessment process using the Analytic Network Process (ANP) is necessary to be carried out. The process of this research started from selecting criteria through the Delphi method, then performing a pairwise comparison using questionnaires on each of the criteria identified. Subsequently, the data were processed using the ANP software, namely Super Decisions Version 3.2.0 to obtain the weight of each criterion. The next stage was to carry out an assessment of the goods or service providers following the LSP process. The final result of this research was to obtain the weight of each qualification criterion to determine a competent and threshold-passing provider projected to be included in the LSP.**

***Keywords*—Qualification, Analytic Network Process, List of Selected Providers.**

I. INTRODUCTION

PROCUREMENT of goods/ services plays an important role because it is part of an organization whose budget use is significant to obtain goods/ services required in carrying out the organization's mission. In this regard, PT XYZ needs to select prospective providers of goods/ services to get the List of Selected Providers (LSP).

The use of LSP aims to accelerate the process of selecting Goods/ Service Providers and to get a qualified and best Goods/ Service Provider.

Goods/ Service Contractors or Providers have a major role in overall project performance. Therefore, selecting the best contractor is a crucial challenge for the owner of a construction project [1]. The selection of contractors has long been based on bid prices [2].

Contractors, when dealing with job shortage, tend to take low bids to keep the business going and will increase additional revenue through construction claims as compensation [3].

So far, there are still around 15% selected providers in PT XYZ whose performance is not following the applicable regulations. To avoid these risks, we need a decision-making model to help get qualified contractors.

The criteria to consider in making decisions to evaluate the results of LSP qualification on the 150 kV SUTT construction project are often interrelated.

In most decision problems involving interrelationships, the Analytical Network Process (ANP) so far is the most feasible method for validating decision making by maintaining impartiality between assessed criteria [4].

The objectives of this research are:

1. To identify priority criteria in assessing the LSP qualification
2. To obtain the weights of LSP criteria based on the results got from the ANP method
3. To identify suitable respondents
4. To find out factors causing the ANP reliable in the decision-making process of selecting prospective goods/ service providers.

A. Qualification

Contractor qualification can be done before or after the contract. Some owners require contractors to meet the requirements before making the contract document (pre-qualification) while other owners may allow anyone bidding by only meeting the requirements of the low or even lowest bid (post-qualification) [5].

Qualification methods consist of two types, namely pre-qualification and post-qualification. Pre-qualification is an assessment of business capability/ corporate competence and fulfilment of requirements before submitting bid documents. Post-qualification is an assessment of business capability/ corporate competence and fulfilment of requirements to the company after submitting bid documents [6].

B. Delphi Method

Delphi is a method of group knowledge acquisition, also used for qualitative problem decision-making. This Delphi technique can be used for explorative-qualitative research and used to identify the fundamental characteristics and elements of a basic phenomenon study [7].

The Delphi method is a proven and popular research technique, used to identify and prioritize problems in managerial decision-making [8].

The stages in the Delphi method start from preparing the process (setting goals and selecting experts), developing questions and answer scales, conducting surveys and

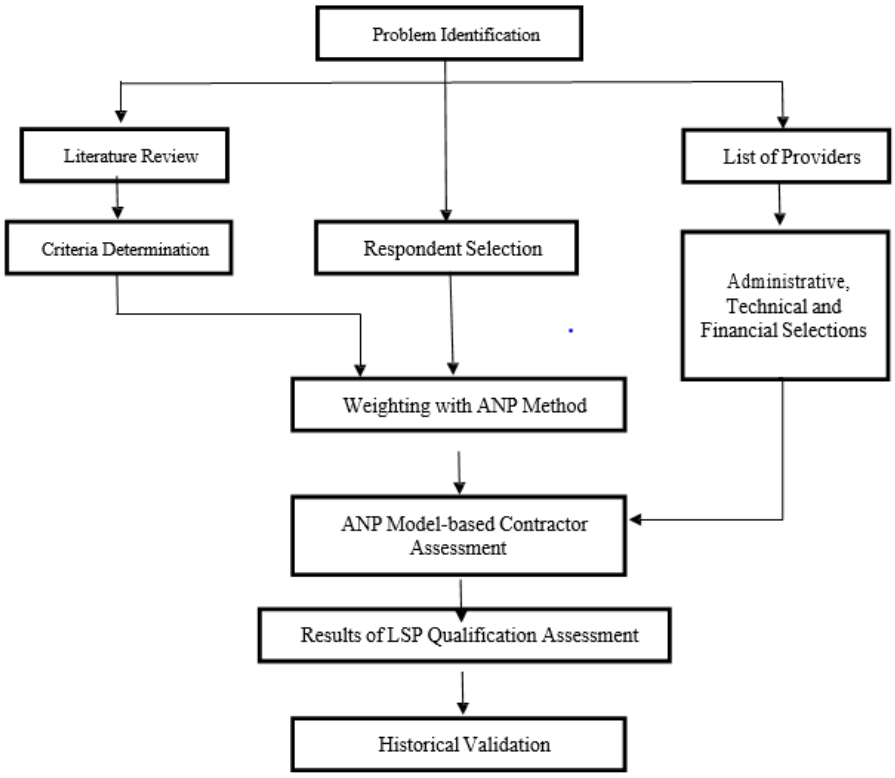

Figure 1. Research Flow Diagram.

Here are the priorities.

Name	Normalized by Cluster	Limiting
IUJK	0.14605	0.021652
IUJPTL	0.15838	0.023481
SBUJK	0.30479	0.045186
SMK3/OHSAS	0.39078	0.057935
Financial Statement	0.16667	0.046511
Financial Rating	0.83333	0.232556
Work Experience	0.33333	0.190893
Equipment	0.33333	0.190893
Personnel	0.33333	0.190893

Figure 2. Weight (Limiting) Score of Each Criterion.

providing feedback to experts, and, lastly, analyzing and presenting Delphi data [9].

C. Analytic Network Process (ANP)

The Analytical Network Process (ANP) is the development of the Analytical Hierarchy Process (AHP) which considers the dependence between hierarchical elements. Many decision problems cannot be managed hierarchically because the hierarchy process tends to involve more interactions and dependence of higher-level elements in the hierarchy on lower-level elements. Therefore, ANP is represented by a network, not a hierarchy [10].

The ANP method is one method that can represent the interest levels of various parties by accommodating the interrelationships between sub-criteria and existing criteria. ANP is the development of AHP, so it is more complex than the AHP method [11].

The ANP accuracy can be determined by calculating the consistency index/ C.I = $(\lambda max - n)/(n-1)$, then comparing the

Table 1.
Priority Criteria and Sub-Criteria

Criteria	Sub-Criteria	ETM	AJW	AN	Total	Score
Administrative	Electricity Supporting Services Business License (***IUJPTL***)	50	60	100	210	70
	Construction Services Business License (***IUJK***)	50	60	100	210	70
	Construction Services Business Entity Certificate (***SBUJK***)	50	90	100	240	80
	SMK3 or equivalent	50	85	100	235	78
Technical	Similar work experience	90	80	50	220	73
	Ability to provide equipment	90	90	100	280	93
	Ability to provide personnel	90	90	100	280	93
Financial	Corporate Financial Rating	90	80	80	250	83
	Audited Corporate Financial Statement	70	80	80	230	77

Table 2.
Qualification Score of Prospective Goods/ Services Providers

No	Prospective Goods/ Service Providers	Score
1	PT A	100
2	PT B	67.32

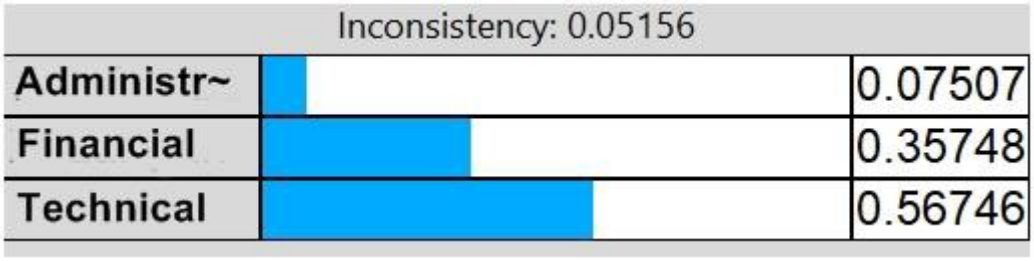

Figure 3. Consistency Ratio (CR).

CI with RI to obtain the consistency of a matrix, namely the Consistency Ratio (CR). Inconsistencies coming from decision- makers can still be accepted if the paired comparison matrix has a Consistency Ratio (CR) of less than 10% [10].

II. METHOD

A. Data/ Variable Collection

The process of problem-solving in this research required several supporting things, namely data/variables from the Qualification Documents. The Qualification Documents were a reference for prospective goods/ service providers in preparing the LSP Qualification Application Documents of PT XYZ. containing several variables or criteria used to assess all LSP Qualification Application Documents submitted to the Procurement Bureau, starting from the administrative data, technical data, and financial data. In this research, after the data/ variables for the assessment of LSP qualification were collected, the next stage was determining the criteria, continued with comparing the ANP expert judgement to obtain the weight of each variable.

1) Criteria Determination Stage

The criteria and sub-criteria were determined through the Delphi method with respondents related to the field of construction project auctions at PT XYZ.

2) Questionnaire Pairwise Comparison Stage

After determining the criteria and subcriteria, we prepared and distributed questionnaires to weight the identified variables. The questionnaires were prepared based on the pairwise comparison method to find out the weight of each criterion with a comparison scale from 1 to 9. This weighting was following the interest levels between them.

B. Data Processing

All data collected from the questionnaires were then recapitulated using the Spreadsheet. The recapitulated data were then weighted using the Analytical Network Process (ANP) method using the help of Super Decisions Version 3.2.0 to get the weight of each of the existing criteria.

C. Assessment of Goods/ Service Providers

After obtaining the criteria weights, an assessment was conducted based on data from the qualification application documents that had been submitted by prospective goods/ service providers. The results of the assessment were then applied to the ANP model to obtain the weight of each prospective goods/ service provider. Based on the specified minimum score, only prospective goods/ service providers with a score above the threshold are entitled to be invited in the next stage, namely the stage of taking tender documents.

D. Determination of LSP Qualification Threshold Score

This research used a minimum reference score of 70 because so far it is the most often-used threshold score in determining whether a prospective goods/ service provider passes the procurement method whose work is not complex.

The construction of 150 kV High Voltage Air Transmission Line in this research was categorized as incomplex work.

E. Research Historical Validation

Historical Validation is used to see whether the research results are consistent with reality so far [12]. In this research, a historical validation was conducted on the results of the LSP selection using the ANP method, to be then compared with the historical results that have been obtained so far by the Procurement Bureau of PT XYZ. This stage aimed to test the reliability of the ANP method to select the LSP qualification.

F. Research Flow

This research needed a structured and systematic flow to determine the research direction in achieving the expected goals. The flow of this research is depicted in Figure 1.

III. RESULT AND DISCUSSION

A. Criteria Determination

The Delphi method is used to analyze the most influential variables. This analysis process starts with preparing survey questionnaires. In this research, the questionnaires were distributed to respondents to identify the priority criteria and sub- criteria in the LSP qualification assessment. This analysis also aimed to eliminate the sub-criteria excluded in the assessment process. Table 1 presents the results of the analysis of priority criteria and sub-criteria for determining the LSP qualification assessment.

B. Weighting with ANP Method

After obtaining priority criteria based on the Delphi method, the subsequent stage was to weight each criterion with the ANP method. This weighting was performed using Super decision software. Based on the questionnaires processed using the Super decision software, we obtained the weight (limiting) score of each criterion as in Figure 2 and also the consistency ratio (CR) of 0.05 as in Figure 3.

C. Assessment of the Capability of Prospective Goods/ Services Providers

After obtaining the weight of each criterion, we entered data on prospective goods/ service providers to obtain a score from each provider. Based on the calculation on each criterion owned by the prospective goods/ service providers, the following qualification scores are obtained can be seen on Table 2.

D. Discussion

The qualification criteria used in this research were 9 (nine) items, consisting of IUJPTL (Electricity Supporting Services Business License), IUJK (Construction Services Business License), SBUJK (Construction Services Business Entity Certificate), SMK3 (Occupational Health and Safety Management System) or equivalent, similar work experience, equipment, personnel, corporate financial ratings, and corporate finance (current ratio/ CR). For illustration, 2 (two) prospective Goods/ Service Providers were used, namely PT. A and PT. B

Data for determining priority criteria and weighting scores of comparison between criteria were obtained from the questionnaires filled out by the General Planning Manager, Procurement Planning Officer, and Executive Procurement Officer of PT. XYZ. The weighting was done using the ANP method, resulting in a consistency ratio (CR) of < 0.10. This indicates that the results of the criteria weighting can be accepted since the ANP calculation matrix is declared consistent. After obtaining the accuracy of the criteria weights, we assessed the qualification application documents of PT. A and PT.

B. In this research, the reference score used was a minimum of 70. Therefore, only Prospective Goods/ Service Providers with a score above 70 are entitled to be invited in the next stage, namely the stage of taking Documents/ Work Plans and Terms.

From the assessment results of the 2 (two) companies, PT. A and PT. B obtained scores of 100 and 67.32 respectively. Thus, it can be concluded that PT. A was declared to pass the LSP qualification assessment of the 150 kV High Voltage Air Transmission Line (SUTT) construction while PT. B showed the opposite result.

The outputs in this research are consistent with the real results already obtained by the Procurement Bureau of PT. XYZ.

Thus, the ANP method can be said reliable for carrying out LSP qualification assessment processes.

IV. CONCLUSION AND SUGGESTION

A. Conclusion

1. From this research, there are 3 (three) priority criteria items and 9 (nine) priority sub-criteria items to determine the LSP qualification assessment. The three criteria items and nine sub-criteria items include administrative criteria (IUJPTL, IUJK, SBUJK, SMK3 or equivalent), technical criteria (similar work experience, equipment, and personnel), financial criteria (corporate financial ratings, audited corporate financial statement).
2. The results of sub criteria weighting based on the ANP expert judgement are as follows: IUJPTL (0.02) ; IUJK (0.02) ; SBUJK (0.05); SMK3 or equivalent (0.06); Similar Work Experience (0.19); Equipment (0.19); Personnel (0.19); Corporate Financial Rating (0.23); and Financial Statement/ CR (0.05).
3. Respondents in this research consisted of the General Planning Manager, Procurement Planning Officer, and Executive Procurement Officer. Based on their positions and authorities, these respondents' responsibilities are related to the construction project auction process at PT. XYZ.
4. The results of this research are reliable because the LSP qualification assessment of the 150 kV High Voltage Air Transmission Line Construction using the ANP method shows a consistent result with the real results already obtained by the Procurement Bureau of PT. XYZ.

B. Suggestion

1. The Procurement Bureau of PT. XYZ should carry out the criteria weighting on qualification documents by involving many fields and convey the weight of each criterion to prospective goods/ service providers.
2. Further research is expected to continue with the assessment of bid documents in the limited tender/ auction process to get the most appropriate goods/

service provider for the 150 kV High Voltage Air Transmission Line (SUTT) Construction.

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