

Performance Analysis of Implementation of Construction Projects with Customer Satisfaction Index (CSI) in Building Projects

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Abstract: *Construction projects with different backgrounds and interests determine the overall performance of the project. Due to the different interests of contractors and service users can cause problems during construction, one of the problems caused by service users such as poor communication, late payment and final design changes. This study aims to determine the variables that affect the level of service user performance and satisfaction level perceived contractor to service users in a multi-storey building project. The study consisted of 6 variables on project performance, finance, decision making, management capability, contractor support and attitude developed into 37 questions on 30 (thirty) respondents. The method used is Customer Satisfaction Index (CSI). Based on the results of data processing using Customer Satisfaction Index (CSI) obtained by the contractor's satisfaction level of 73.40%, it is categorized that the contractor is satisfied with the service user's performance in the multi-storey building project in Palu City. In this case the satisfied category is included in the value of the satisfaction index. Contractor's satisfaction ranges from 66% - 80.90%. Thus, CSI is used to calculate all contractor satisfaction to service users in general by looking at two sides: the level of importance and the level of satisfaction*

Keywords: Performance, Satisfaction, Project, Building

1. Introduction

A construction project cannot be separated from the parties involved either directly or indirectly. From a series of stages of the construction process, will certainly involve various elements that work together. The interactions and relationships between relevant stakeholders in the organization determine the overall performance of the construction project, each party requiring the other party to execute that level of performance with the same objective so that the project can proceed as planned. [2,8].

The cooperation between the parties involved in a construction project that is the user services and service providers or contractors, in this case the service user as the owner of the project is the party who gives the job or have to give work to the service provider and pay the cost of the work in accordance with the contract has been agreed upon by both parties [4,9] while a contractor is responsible for the means and methods he will use to carry out the construction project in accordance with the articles and verses contained in the contract documents. These contract documents typically include contractual agreements containing project budgets, general conditions, and project-specific conditions and project plans and specifications previously prepared by professional designers, such as an architect. A contractor is usually also responsible for the procurement of materials to be used. In addition, he also has to provide manpower to run the project.[10,11]

Interactions and relationships between stakeholders in the organization of a project have different backgrounds and interests determine the overall performance of the project. Due to the different interests of contractors and service users can cause problems during construction, one of the problems

caused by service users is poor communication, late payment and final design changes. Therefore, the required performance standards for service users and contractors because the performance of service users will affect the effectiveness of contractor performance. [4,11]

Performance standards are benchmarks against which performance is measured to be effective. Performance standards should be linked to the desired outcomes of each job while performance itself is the result of work that has strong relationships with organizational strategic goals, consumer satisfaction, and contributes to the economy [8, 16].

This research is conducted to know the variables that influence the level of importance and the level of contractor satisfaction to the service users in the multi-storey building project in Palu City and know the percentage of contractor's satisfaction level to the service user in order to optimize the project performance. Benefits that can be applied from the results of this study, service users and contractors will know the limitations of performance and sebagai performance evaluation service users and contractors.[17]

2. Literature Review

2.1 Contractor's satisfaction with service users on a construction project is influenced by several variables.

a) According to Bryde and Robinson[4] performance satisfaction from a contractor perspective is an ideal assessment used to improve project quality. The level of contractor satisfaction can be influenced by cultures related to motivation, efforts to innovate, incentives offered and implementation of new technologies. There

- are several variables about satisfaction, understanding project needs, finance, decision makers, management skills, support for contractors, attitude.
- b) According to Nzekwe-Excel [11,12] states that there are 4 categories that determine the contractor's satisfaction to the client, among others:
 - Fee category is valuation based on the criteria of contractor satisfaction associated with budget, variation of costs or changes.
 - Category of quality of work assessment is based on criteria related to features, design and how much service has been done by the contractor.
 - Category of safety and impact: The environmental assessment consists of criteria related to risk, the safety of workers in the field and their impact on the environment.
 - The time category assessment consists of criteria relating to consistency, duration of employment and provision of sample work.
 - c) According to Fitriana, Florencia and Hatmoko [6] describe job satisfaction as a positive or negative attitude that individuals do to their work. In addition Herzberg [8] expressed job satisfaction as the attitude that workers have about their work. It is the result of their perception of work.
 - d) According to Jocom and Joice[9] argue that satisfaction is a concept that is much broader than just an assessment of service quality, but also influenced by other factors. Quality of service or service, Price, Situation factors, and Personal factors.
 - e) According Karna [10] Job satisfaction will be obtained when employees are also involved in decision-making and corporate policy. Job involvement is a psychological measure of a person's work and regards his performance as a measure of self-esteem. Job involvement affects employee attitude and behavior. High levels of job involvement play a role in shaping performance, improving the quality and quantity of work, high work efficiency, and job satisfaction.

2.2 Customer Satisfaction Index (CSI)

Customer Satisfaction Index (CSI) is used to determine the overall level of user satisfaction by taking into account the importance of the product or service attributes. The level of user satisfaction is assessed by comparing performance (*performance* the perceived) of customers with their expectations of service or product quality. The quality of a product or service can be measured by several indicators of the index of satisfaction of the product or service. According to Dickson[5] there are four steps in CSI calculation:

- a) Determining Mean Importance Score (MSI) and Mean Satisfaction Score (MSS). This value is derived from the average level of importance and performance of each respondent.

$$MSI = \frac{\sum_{i=1}^n Yi}{n} \tag{1}$$

$$MSS = \frac{\sum_{i=1}^n Xi}{n} \tag{2}$$

Description:

n = Number of Respondents

Yi = Value of Interest Attribute to i

Xi = Value of Attribute Performance to i

- b) Create *Weight Factor* (WF), this weight is the percentage of MIS value per attribute to total MIS of all attributes:

$$WF = \frac{MSI}{\sum_{i=1}^p MISi} \times 100\% \tag{3}$$

Description:

P= Number of Attributes of Interest

I= Service Attribute i

- c) Make *Weighting Score*: This weight is the multiplication of Weight Factor (WF) with the mean satisfaction score (MSS)

$$WSi = Wfi \times MSSi \tag{4}$$

Where: I = Attribute Servers

- d) Determine CSI. The scale of customer satisfaction commonly used in the interpretation of the index is the scale of zero to one or zero to one hundred.

$$CSI = \frac{\sum_{i=1}^n WSi}{5} \times 100\% \tag{5}$$

CSI value in this study is divided into 5 categories ranging from not satisfied to very satisfied, 5 categories are as follows:

Table 1: Value of Contractor Satisfaction Index

Number	Index Value	Information
1	81%-100%	Very Satisfied
2	66%-80,99%	Satisfied
3	51%-65,99%	Quite Satisfied
4	35%=50,99%	Less Satisfied
5	0-34,99%	Not Satisfied

Source: *Customer Satisfaction Survey Guide PT. Sucofindo in Aditiawarman (2000)*

3. Methodology

3.1 Data

Collection This research population is the implementer of construction services registered in LPJK Central Sulawesi and LPJK national with building classification (BG) and does not limit the type of classification. The population of this study is a construction service that handles the multi-storey building project in Palu City in fiscal year 2014 - 2017 with project budget value above 1 Billion. The number of building service executors in multi-storey buildings in Palu City is 57 companies. The sample of this research is construction service company with building classification in this case building of storey building. The sample technique uses *Simple random sampling*. The number of respondents taken in this study consisted of 30 respondents namely, contractors handling multi-storey building projects in Palu City budget year 2014 - 2017 with project budget value above 1 billion. Respondents' answers collected in this study using quantitative data based on Likert scale 1-5 [14,15].

3.2. Analysis Method

According Sugiyon [15], Descriptive method is a method used to describe or analyze a research results but not used to make wider conclusions.

Reliability Testing Answers from Research Instruments (*Reability Analysis*).

Reliability can be interpreted as how far the results of a measurement can be trusted. Understanding reliability, According Sugiyono (2005) is a series of measurements or a series of measuring tools that have a consistency when measurements made with the measuring instrument is done repeatedly.

Testing the validity of the questionnaire (*Validity Analysis*) Validity is the accuracy or accuracy of an instrument in measuring what you want measured. In testing the data collection instrument, the validity test using correlation coefficient 0.05 (5% significance or 0.05 is the standard measure often used in research).

Relative Rank Index (RRI)

At this stage the data is analyzed using Microsoft Excel to get the *Relative Rank Index value*. This method is used to determine which factors are most influential in sequence or ranking to gain the purpose of this study.

Customer Satisfaction Index (CSI)

Customer Satisfaction Index (CSI) is used to determine the overall level of user satisfaction by taking into account the importance of the product or service attributes. The level of user satisfaction is assessed by comparing performance (*performance* the perceived) of customers with their expectations of service or product quality. The quality of a product or service can be measured by several indicators of the index of satisfaction of the product or service. [3,12,17]

4. Results and Discussion

This study takes a case study on a multi-story building project located in Palu City. The number of respondents came from 30 different contractor companies. In this research, the respondent is a contractor working on a multi-storey building project in Palu City. Samples and objects were obtained from the LPJK official website of Central Sulawesi Province and project data obtained from the official website of LPSE Kota Palu. Reliability value obtained from SPSS is for the importance of 0.912 and the satisfaction level 0.933 so that the results of the questionnaire can be used and reliable.

4.1 Respondent's Characteristics

The type of respondent company in this research is dominated by type of CV company by 57%. For the position in the company responseh office director of the company as much as 16 respondents with a percentage of 53%. The price of the projects handled by respondents last 3 years is dominated by prices ranging from 1M-5M as much as 70%. And year is the project budget dominated by 2014 as many as 11 projects with a percentage of 36%.

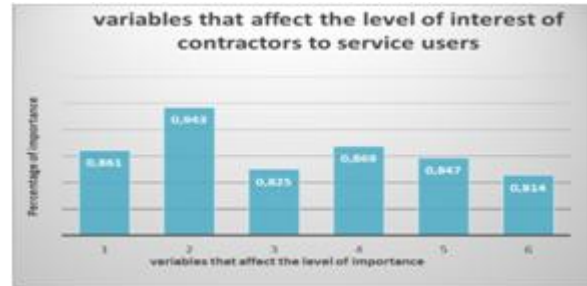


Figure 1: Percentage of variables affecting contractor's interest to service user

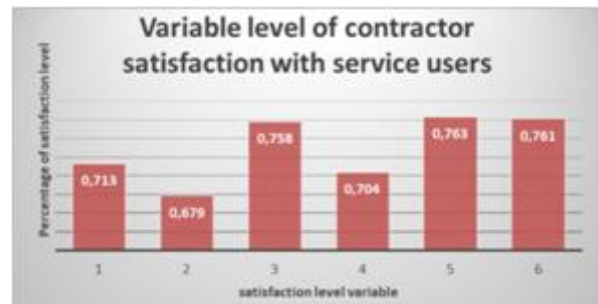


Figure 2: Percentage of contractor's satisfaction variable to service user.

4.2 Relative Rank Index

From the graph in figure 1 and figure 2 then the author discusses the 6 main variables to facilitate data analysis.

Finance

of first variable that influence contractor satisfaction seen from level of interest in figure 1, that is financial variable with *relative rank index value equal to 94,3%* and is in first rank. While in Figure 2, based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, financial variables with a *relative rank index value of 67.9%* and is ranked sixth or last rank. This shows that the financial variable is considered important by the contractor while in this study the contractor has not been satisfied with the financial variables. The financial variable consists of five sub-variables, namely the owner owner's appropriateness to the price of the tire, which means the project owner estimates the reasonable estimate cost used by the contractor to bid on the auction process, the sub-variable of the payment accuracy by the client in accordance with the contract that the client pays the contractor accordingly by agreement on the contract document agreement, the sub-variable of easy approval of payment on the project that does not complicate the contractor ie the project owner does not delay payments to the contractor at the time of billing, the client sub-variable has a clear and secure payment system that is payment system is set up in contracts ranging from down payments to maintenance costs, the fifth sub-variable of more properly structured client payment agreements in which this payment agreement is also set out in the contract regarding the payment chapter.

4.3 Management Ability

Second variable that affect contractor satisfaction seen from the level of importance in the figure 1 is a variable

management ability with a *relative rank index value* of 86.9% and is in the second rank. While in figure 2, based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, the variable management ability with the *relative rank index value* of 70.4% and is in the fifth rank. According to the contractor variable management capability is considered important in a project, this management capability including the administrative system in which a good administrative system will simplify any process that is written form, but in this case the contractor also felt not satisfied. The variable of management capability consists of five sub-variables: delegation (client gives sufficient authority to the Constitutional Court and consultant planner), sub-variable of client's quality / competence in technical and project administration, sub-variable good client organizational capability, sub-variable good client administration systems, and sub-variables of project management and handling capabilities, including managing the administration including the making of a book of the board of directors.

4.4 Aderstanding Project Requiremeny

The third variable affecting contractor satisfaction seen from the level of importance in Figure 1, is the variable understand the project needs with a *relative rank index value* of 86.1% and is in the third rank. While in Figure 2, based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, the variable understands the needs of the project with the *relative rank index value* of 71.3% and is in the fourth rank. According to the client contractor who understands the needs of the project is considered to be influential in assisting the project work. Variables understand the project need consists of five sub-variables, the contract documents clearly explain and complete the scope of work covering the procedure of determining the time the project starts, project planning and so on, sub-variable client understand the process of construction project construction that the Court manages the project start from planning to implementation stage, client sub-variables have clear thinking on the design so that there is no job change, client sub-variables are able to explain the work limits, and finally the client sub-variables understand the needs of the contractor in terms of meeting the needs of the project such as the budget enough.

4.5 Support of Contractor

The fourth variable affecting contractor satisfaction when viewed from the level of interest is the variable support to the contractor with a *relative rank index value* of 84.7% and is in the fourth rank. While based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, the variable support to the contractor with a *relative rank index value* of 76.3% and is in the first rank. In this case the level of satisfaction that has been perceived by the respondent has felt satisfied when compared with the other five variables of satisfaction level. The variables of support to the contractor consist of eight sub-variables: sufficient information support, sub-variable sufficiency of project implementation

duration, sub-variable of land readiness ie no disputes during development, routine client sub-variable monitoring progress / performance, sub-variable the client does not intervene too much on the contractor's territory, the sub-variable support if necessary addendum, sub-variables more support to the contractor, and the client sub-variable has a regular monitoring schedule ie the project owner monitors the implementation in accordance with the work schedule.

4.6 Decision Making

The fifth variable affecting contractor satisfaction when viewed from the importance level of decision-making variable with the *relative rank index value* of 82.5% and is in the fifth rank. While based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, decision-making variables with the *relative rank index value* of 75.8% and are in the third rank. In this case the decision-making variables for the satisfaction level of respondents already feel satisfied while for the importance of decision-making variable has not become a priority that is in the fifth rank of the six variables. The decision-making variable consists of four sub-variables: the client is able to make decisions / solutions quickly and accurately to the problem, the client's sub-variable decisions are in line with the contractor, the sub-variable of the client's opinion, and the client sub-variable make the decision quickly and precisely by considering the interests of the contractor.

Attitude of the sixth variable affecting the contractor's satisfaction when viewed from the importance level is the attitude variable with the *relative rank index value* of 81.4% and is in the sixth rank. While based on the results of data processing for the level of satisfaction perceived by the contractor based on the results of the questionnaire, attitude variable with the *relative rank index value* of 76.1% and is in the second rank. In this case, the attitude variable for the satisfaction level of the respondent has been satisfied while for the level of importance of the attitude variable also not become the main priority which is in the sixth rank or last rank. The attitude variable consists of ten sub-variables of integrity and honesty of the client, coordination (meetings) of quality, client discipline coordinate, client committed to the project in quality, time, and cost, the client empathize with the difficulty of the contractor by providing alternatives, solutions to emerging problems, clients execute agreements that have been agreed with the contractor, the client is able to activate the proactive attitude, the client respects the advice of the contractor, the client trusts the contractor and the lien shows a good interaction that is when communicating.

4.6. Customer Satisfaction Index (CSI)

4.6.1 Determines Mean Importance Score (MSI) and Mean Satisfaction Score (MSS). This value is derived from the average level of importance and performance of each respondent.

Given:

$n = 30$ (respondents)

$Y_i = 121$ (number of interest values)

$X_i = 116$ (amount of satisfaction value)

$$MSI = \frac{\sum_{i=1}^n Y_i}{n} = \frac{121}{30} = 4,03$$

$$MSS = \frac{\sum_{i=1}^n X_i}{n} = \frac{116}{30} = 3,87$$

4.6.2 Creating *Weight Factor (WF)*, this weight is the percentage of MIS value per attribute to the total MIS of all attributes.

Given:

$$MSI = 4,03$$

$$\sum_{i=1}^p MIS_i = 157,90$$

$$WF = \frac{MSI}{\sum_{i=1}^p MIS_i} \times 100\%$$

$$WF = \frac{4,03}{157,9} \times 100\% = 0,026$$

4.6.2. Creating a *Weighting Score*. This weight is the multiplication of *Weight Factor (WF)* with *Mean Satisfaction score (MSS)*

Known:

$$W_{fi} = 0.026$$

$$MSS_i = 3.87$$

$$WS_i = W_{fi} \times MSS_i$$

$$WS_i = 0.026 \times 3.87 = 0.099$$

4.6.4 Specifies *CSI*. The scale of customer satisfaction commonly used in the interpretation of the index is the scale of zero to one or zero to one hundred.

Given:

$$\sum_{i=1}^n WS_i = 366,98$$

$$CSI = \frac{\sum_{i=1}^n WS_i}{5} \times 100\%$$

$$CSI = \frac{366,98}{5} \times 100\% = 73,40\%$$

For the next calculation result can be labeled as in table 4.9 below:

Table 2: Data Analysis Customer Satisfaction Index

Sub-Variable	Mean Importance (MIS)	Weighted Factors (WF)	Mean Satisfaction Score (MSS)	Weighted Score (2X3)
1	4.03	0.026	3.87	0.099
2	4.73	0.030	3.43	0.103
3	4.70	0.030	3.17	0.094
4	4.30	0.027	3.53	0.096
5	3.77	0.024	3.83	0.091
6	4.83	0.031	3.27	0.100
7	4.87	0.031	3.37	0.104
8	4.90	0.031	3.10	0.096
9	4.47	0.028	3.40	0.096
10	4.50	0.028	3.83	0.109
11	4.37	0.028	3.33	0.092
12	3.90	0.025	4.07	0.100
13	4.17	0.026	4.03	0.106
14	4.07	0.026	3.73	0.096
15	4.63	0.029	3.93	0.115
16	4.40	0.028	3.57	0.099
17	4.10	0.026	3.50	0.091
18	4.70	0.030	3.27	0.097

19	3.90	0.025	3.33	0.082
20	4.43	0.028	3.50	0.098
21	4.60	0.029	3.40	0.099
22	4.50	0.028	4.67	0.133
23	3.77	0.024	4.10	0.098
24	4.23	0.027	4.17	0.112
25	4.07	0.026	3.63	0.094
26	3.90	0.025	3.37	0.083
27	4.37	0.028	3.70	0.102
28	4.33	0.027	3.83	0.105
29	3.90	0.025	3.70	0.091
30	4.23	0.027	3.83	0.103
31	4.30	0.027	3.77	0.103
32	4.27	0.027	3.87	0.104
33	4.27	0.027	3.87	0.104
34	4.17	0.026	3.77	0.099
35	3.33	0.021	3.83	0.081
36	4.33	0.027	3.83	0.105
37	3.57	0.023	3.77	0.085
Σ	157.9			366.98

Source: Results of Primary Data Processing, 2018

Variable support to contractor with RRI equal to 84,7%, variable decision making with RRI value equal to 82,5%, and attitude variable with RRI value equal to 81,4% and for variable of satisfaction level perceived by contractor to service user got support variable to contractor with RRI value equal to 76,3%, attitude variable with RRI value of 76.1%, decision-making variable with RRI value of 75,8%, the variable understands project requirement with RRI value equal to 71,3%, management ability variable with RRI value equal to 70,4%, and financial variable with RRI value equal to 67,9%.

From the results of data processing by *customer satisfaction index (CSI)*

Obtain the level of contractor satisfaction to service users of 73.40% which can be categorized contractors feel satisfied with the performance of service users in the multi-story building project in the city of Palu.

$$CSI = 366.98 / 5 = 73.40\% \text{ (Satisfied)}$$

Based on the results of data processing using *Customer Satisfaction Index (CSI)* obtained contractor satisfaction level of 73.40%, it is categorized the contractor was satisfied with the service user performance in the multi-storey building project in Palu City. In this case for satisfied category included in the value of satisfaction index in table 3.4.

The value of Contractor Satisfaction Index which ranges between 66% - 80.90%. Thus, CSI is used to calculate the overall satisfaction of contractor to service users in general by looking at two sides: the level of importance and the level of satisfaction

5. Conclusion

Based on the results of research that the authors obtain about the satisfaction of contractors to service users in the building project in the city of Palu, it can be concluded as follows:

Based on research results found that the variables that affect the level of interest contractor to service users that is obtained financial variable with RRI value equal to 94,3%, management ability variable with RRI value equal to 86,9%, variable understand project requirement with RRI value equal to 86,1%,

6. Suggestions

To improve the contractor's performance in carrying out a construction project requires a good relationship between the project owner and the contractor as well as the performance standards for the project owner as a service user, both in terms of project needs, finance, decision making, management capabilities, contractor support, attitudes because these things can affect the performance of contractors.

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