

Analysis of Cost and Quality Comparison of Recycling Project Fence (RFP) with Zincalume Project Fence (Case Study Project X in Jakarta)

Egar Albert, Sugianto, Yopi, Lutfiansyah

Faculty of Civil Engineering, University Mercu Buana Jakarta, Indonesia
41116310054@mercubuana.ac.id, yopi.lutfiansyah@mercubuana.ac.id

Abstract

The fence of the project is a fence established on the project land for the safety boundary of the project during the period of implementation of the project, according to The Perda Dki No.7 Year 1991 the fence of the project should pay attention to the safety and harmony of the surroundings and have a height of at least 2.5 meters. The cost of installing a project fence requires a relatively high cost on a project that has a long perimeter area. Project Fence usually uses zincalume material and is often a problem of construction waste because the material is not durable, this led to the innovation of Recycling Project Fence (RFP). In this study, the authors conducted a cost and quality comparison between the two materials by conducting cost analysis in accordance with the contractor's cost analysis and disseminating 2 stages of questionnaires on quality comparison to experts and respondents who are contractor employees who are accustomed to using RFP. The results of the questionnaire will be conducted to test validity and reliability using statistical software and analysis of relative importance index (RII). The result of this study is the total cost required for PPDU Rp.1,097,864,515 and the total cost required for fencing the zincalume project Rp. 980,546,545 where PPDU is more expensive Rp. 117,317,979 or 10.69%. with the most influential variables on the comparison of RFP quality with Zincalume are Features (0.860), Durability (0.851), Aesthetics (0.850), Performance (0.823), Reliability (0.693). So that the cost of fencing zincalume project is more effective while ppdu quality is more effective to use.

Keyword :

Comparison, Cost, Quality, Recycling Fence Project (RFP), Zincalume.

1. Introduction

The fence of the project is a fence established on the project land for the safety boundary of the project during the period of implementation of the project. In general, the fence of the project uses zincalume material but as infrastructure development in Indonesia increases zincalume project fence becomes a new problem because the material is not durable, so it can no longer be used in the next project and become construction waste at the end of the project construction period. construction waste can have a negative effect on the environment around the project construction site. Along with the problem of construction waste, causing the emergence of new innovations such as materials and supporting equipment that can be used more than once and can be recycled, for example such as the use of Recycling Project Fences (RFP).

According to DKI Regulation No.7 year 1991 article 233 the project fence should pay attention to the safety and harmony of the surrounding area and have a height of at least 2.5 meters, under certain conditions the cost of installing the project fence requires a fairly high cost especially on projects with a long perimeter area.

The purpose of this research is to find out how cost and quality compare between recycling project fences and find out if RFP is efficient enough to replace zincalume project fences.

2. Reference

Cost and Quality are important enough in a construction project, so good management needs to be done so that the objectives of the project implementation can be met

2.1. Project Cost budget Plant

The Project Cost Budget Plan is an estimate of the cost required for each work in a construction project so that the total cost will be obtained to complete a project. In the calculation of project cost estimation there are two types of cost grouping, namely direct cost and indirect cost.

2.2. product Quality

The quality of the product is the factors contained in an item or result that cause the goods or results to be in accordance with the purpose for which the goods or results are intended.

The product quality indicators according to (Tjiptono, 2001) are:

1. Performance is the main operating characteristic of this purchased product. E.g. speed, ease and convenience in use
2. Aesthetics that is the attractiveness of products to the five senses, e.g. physical shape, artistic model or design, color and so on
3. Realibility is less likely to be damaged or failed to use. E.g. quality and design oversight, operational characteristic standards of conformity to specifications
4. Durability which means durability shows the age of the product, i.e. the durability of the product can be used, the longer the durability the more durable, durable products will be perceived to be more quality than products that are quickly depleted or quickly replaced
5. Features that are additional characteristics or features that complement the basic benefits of a product. Features can improve product quality if competitors don't have them.

2.3. Zincalume Project Fence

The project fence is made of zincalume material with hollow frame. In general this material is used as a roof cover but this material is used as a project fence because the material is easy to obtain and light.



Figure 1. Zincalume Project Fence

Source: google image, 2020

2.4. Recycling Project Fence (RFP)

This project fence is made of poly vinyl clorida main material with calcium carbonate mixture as material for strength and reinforcing agent and stabilizer to make RFP not easily broken and fire retardant.



Figure 2. Recycling Project Fence (RFP)

Source: erom abadi, 2020

3. Methodology

Cost analysis is done by looking for the price per square meter by previously determining the coefficient, material unit price, and wage. Further multiplication is done between the volume of work and the unit price.

$$\text{Cost Budget Plan} = \sum [(\text{volume}) \times \text{Unit Price}]$$

To determine the number of respondents using the slovin formula:

$$n = \left(\frac{N}{1 + N(e)^2} \right)$$

Figure 3. the slovin formula

Where :

n = sample

N = Population

e = percentage of tolerated errors, e = 10%

The results of the questionnaire data obtained are done validity and reality test with the next test of Relative Importance Index (RII) with the following formula:

$$\text{Relative Imporatanace Index} = \frac{5.n5 + 4.n4 + 3.n3 + 2.n2 + 1.n1}{5.N}$$

Description :

n5 = Number of Respondents who responded with 5 points

n4 = Number of Respondents who responded with 4 points

n3 = Number of Respondents who responded with 3 points

n2 = Number of Respondents who responded with 2 points

n1 = Number of Respondents who responded with 1 points

N = Number of respondents

4. Analysis and discussion

4.1. cost analysis

In the unit price analysis there are several parts that need to be considered including, the coefficient of material needs, the price of materials, the coefficient of wages and the cost of wages in the areas reviewed.

4.1.1 Direct Cost Analysis

Table 1. Direct Cost Analysis RFP per m2

No.	Description	unit	Coeff.	Unit Price (Rp.)	Total (Rp.)
1	Panel RFP	m2	1.00	120,000.00	120,000.00
2	Frame	m'	2.11	17,500.00	36,944.44
3	Joiner (clamp)	unit	2.00	10,000.00	20,000.00
TOTAL MATERIAL					176,944.44
No.	Description	unit	Coeff.	Unit Price (Rp.)	Total (Rp.)
1	workers	OH	0.40	138,077.00	55,230.80
2	Builders	OH	0.20	158,789.00	31,757.80
3	Head of builders	OH	0.02	173,978.00	3,479.56
4	Foreman	OH	0.02	185,023.00	3,700.46
TOTAL WAGE					94,168.62
TOTAL DIRECT COST					271,113.06

Source: Processed author, 2020

Table 2. Direct Cost Analysis Zincalume Project Fence per m2

No.	Description	unit	Coeff.	Unit Price (Rp.)	Total (Rp.)
1	Zincalume	m2	1.00	106,000.00	120,000.00
2	frame	m'	2.11	17,500.00	36,944.44
3	Joiner (screw)	unit	5.00	644.00	3,220.00
TOTAL MATERIAL					146,164.44
No.	Description	unit	Coeff.	Unit Price (Rp.)	Total (Rp.)
1	Pekerja	OH	0.40	138,077.00	55,230.80
2	Tukang	OH	0.20	158,789.00	31,757.80
3	Kepala Tukang	OH	0.02	173,978.00	3,479.56
4	Mandor	OH	0.02	185,023.00	3,700.46
TOTAL WAGE					94,168.62
TOTAL DIRECT COST					240,333.06

Source: Processed Author, 2020

4.1.2 Indirect Cost Analysis

Table 3. Indirect Cost Anallysis

No	Description	Vol.	unit	Unit Price (Rp.)	Total (Rp.)
1	Mobilization Materials & Tools	1	ls	11,100,000	11,100,000
2	Material impairment charges	1	ls	7,643,382	7,643,382
3	Supervisor and field accommodation (electricity)	1	ls	16,000,000	16,000,000
4	Risk cost reserves	1	ls	23,908,500	23,908,500
Total Indirect Cost					58,651,882
Volume					3465 m2
Indirect Cost per m2					16,926

Source: Processed Author, 2020

4.1.3 Total Cost Analysis

Table 4. Total Cost Analysis RFP

NO	Description	VOL	unit	TOTAL (Rp.)
1	Direct Cost	1	m2	271,113
2	Indirect Cost	1	m2	16,926
Total				288,040
Profit 10%				28,804
Grand Total				Rp. 316,844

Source: Processed Author, 2020

Table 5. Total Cost Analysis Zincalume Project Fence

NO	DESCRIPTION	VOL	UNIT	TOTAL (Rp.)
1	Biaya Langsung	1	m2	240,333
2	Biaya Tak Langsung	1	m2	16,926
Total				257,260
Profit 10%				25,726
Grand Total				Rp. 282,986

Source: Processed Author, 2020

Table 6. Total Cost RFP

RFP			
Volume	unit	Unit Price	Total
3465	m2	Rp. 316,844	Rp. 1,097,864,515

Source: Processed Author, 2020

Table 7. Total Cost Zincalume Project Fence

Zincalume			
Volume	unit	Unit Price	Total
3465	m2	Rp. 282,986	Rp. 980,546,545

Source: Processed Author, 2020

Based on a table of 7 costs required for the installation of recycling project fences amounting to Rp. 1,097,864,515,- and for zincalume project fencing of Rp. 980,546,545,- where RFP is more expensive Rp. 117,317,970,- compared to zincalume project fence.

4.2. Quality Comparison Analysis

4.2.1 Distribution of respondents

Table 8. Distribution of respondents' education levels

No.	Education Level	Amount	Percentage
1	S1	26	87 %
2	SMA	4	13 %
Total		30	100%

Source: Processed Author, 2020

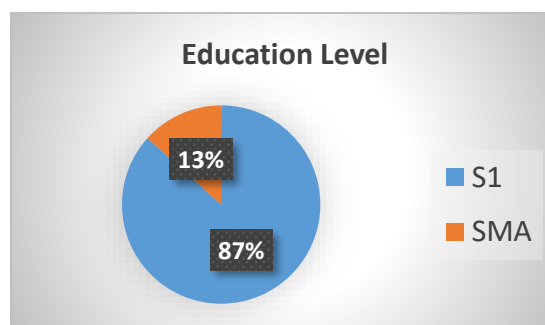


Figure 4. Distribution of respondents

Source: Processed Author, 2020

Table 9. Distribution of respondents' work experience

No.	Work Experience	Amount	Percentage
1	<5 years	5	17 %
2	5-10 years	21	70 %
2	>10 years	4	13 %
Total		30	100%

Source: Processed Author, 2020

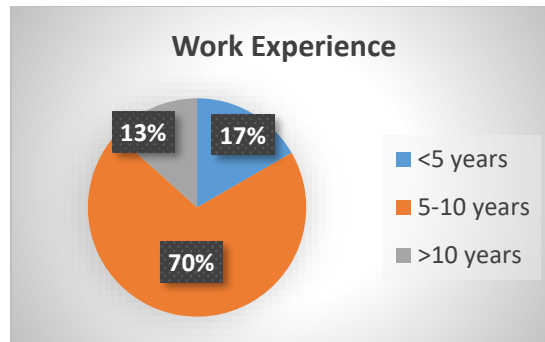


Figure 5. Distribution of respondents
Source: Processed Author, 2020

4.2.2 Validity test

Table 10. Validity Test Recapitulation

No. Item	VALIDITY		Description
	rhitung	rtabel 5% (30)	
X1.1	0.927	0.361	Valid
X1.2	0.822	0.361	Valid
X2.1	0.915	0.361	Valid
X2.2	0.919	0.361	Valid
X3.1	0.604	0.361	Valid
X3.2	0.635	0.361	Valid
X3.3	0.784	0.361	Valid
X3.4	0.809	0.361	Valid
X4.1	0.804	0.361	Valid
X4.2	0.885	0.361	Valid
X4.3	0.678	0.361	Valid
X5.1	0.742	0.361	Valid
X5.2	0.696	0.361	Valid
X5.3	0.732	0.361	Valid
X5.4	0.791	0.361	Valid

Source: Processed Author, 2020

Based on table 10 indicators X.1.1 to X.5.4 are declared valid because the rhitung value is greater than rtabel. With the following interpretation :

1. Compare the value of rhitung with rtabel
 - a. If the value of $\text{rhitung} > \text{rtabel}$ = Valid
 - b. If the value of $\text{rhitung} < \text{rtabel}$ = Invalid
2. See the value of signification (Sig.)
 - a. If the value of Significance $< 0,05$ = Valid
 - b. If the value of Significance $> 0,05$ = Invalid.

4.2.3 Reliability test

Table 11. Reliability test recapitulation

RELIABILITAS					
No. Item	Indicators	Alpha Cronbach	rtabel Item 5% (30)	Value Alpha Cronbach	Description
X.1	PERFORMANCE	0.820	0.361	0.60	REALIBEL
X.2	AESTHETIC	0.850	0.361	0.60	REALIBEL
X.3	REALIBILITY	0.693	0.361	0.60	REALIBEL
X.4	DURABILITY	0.851	0.361	0.60	REALIBEL
X.5	FEATURES	0.860	0.361	0.60	REALIBEL

Source: Processed Author, 2020

Based on table 11 all variables are declared ralibels because according to the interpretations i.e :

1. If the *Cronbach Alpha* > 0,60 the questionnaire is declared reliabel or consistent.
2. If the *Cronbach Alpha* < 0,60 then the questionnaire is declared un reliabel or inconsistent.

4.2.4 Relative Importance Index (RII)

Table 12. Indicators Ranking

Ranking	Indicators	
1	X.5.3	RFP can be recycled so as to reduce construction waste problems
2	X.4.3	RFP has a longer service life than zinalume
3	X.5.4	RFP can be made soundproof by adding special materials
4	X.2.1	RFP has a more attractive look compared to zinalume
5	X.5.1	RFP does not require painting costs to beautify the display
6	X.3.2	RFP is neater in terms of appearance compared to zinalume
7	X.2.2	RFP is easier to install compared to zinalume
8	X.1.2	RFP is more resistant to weather such as rain/heat compared to zinalume
9	X.4.2	RFP is more impact resistant than zinalume
10	X.4.1	RFP has more module size than zinalume
11	X.1.1	RFP is faster installation than zinalume
12	X.5.2	RFP is safer and does not harm workers such as scratching parts of the fence that can cause injuries
13	X.3.1	RFP requires a lower maintenance fee compared to zinalume
14	X.1.3	RFP needs more manpower compared to zinalume
15	X.3.3	RFP material is lighter than zinalume

Source: Processed Author, 2020

Table 13. Variabels Ranking

Ranking	Variabel	RII
1	Features (X5)	0.860
2	Durability (X4)	0.851
3	Aesthetic (X2)	0.850
4	Performance (X1)	0.820
5	Realibility (X3)	0.693

Source: Processed Author, 2020

Conclusion

From this study obtained the following conclusions:

1. The cost required for the work of installing recycling project fences is Rp. 316.844,- per m2 and the cost required for one area with a volume of 3465 m2 is Rp. 1,097,864,515, while the cost required for the construction of zinalume project fence is Rp. 282,986,- per m2 and the cost for one area with a volume of 3465 m2 is Rp. 980,546,545.
2. The price of recycling project fence compared to zinalume project fence is more expensive Rp. 33,858 per m2 or Rp. 117,317,970 for the volume of one area (3465 m2) or by percentage fencing recycling project is more expensive 10.69% compared to zinalume project fence
3. Based on the results of the recycling project fence questionnaire has better quality compared to zinalume project fence, with 5 most beaked variables with the following RII values: Features (0.860), Durability (0.851), Aesthetics (0.850), Performance (0.820), Reliability (0.693),
4. In this study can be summed up costly zinalume project fence is more effective to use, because the cost required is cheaper, while in terms of quality fence recycling project is more effective to use compared to zinalume project fence. This can be adjusted to the existing project conditions.

References

Tjiptono. (2001). *Manajemen Pemasaran dan Analisa Perilaku Konsumen*. BPFE.