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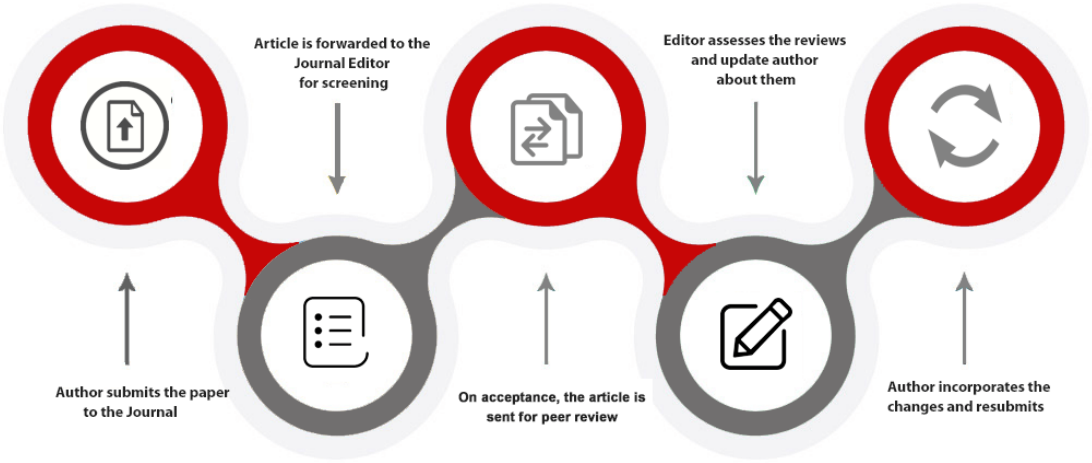

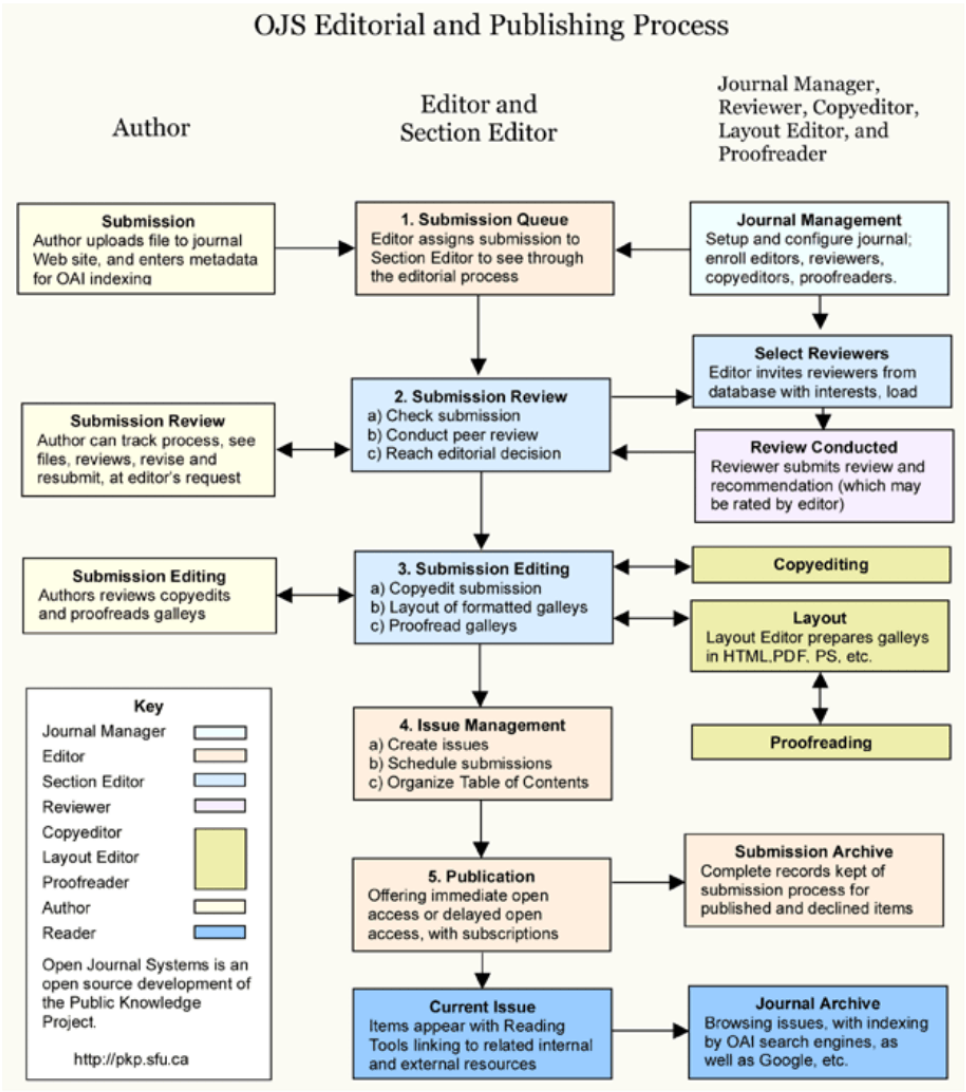

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Relationship Levels of Osh Knowledge Towards Discipline of Workers in The Time of The Covid-19 Pandemic Dolly Bird Market Project Surabaya

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Abstract

The COVID-19 pandemic has weakened various sectors in Indonesia, including the construction sector. This fast-transmitting virus raises the potential for contracting workers in the field, which is defined as an occupational disease. One of the protective behaviors for contracting the virus is the discipline of workers in obeying health protocols, especially the discipline of wearing masks as one of the work safety PPE. This study aims to determine the relationship between the level of knowledge of occupational safety and health (K3) on worker discipline in wearing masks at the Dolly Bird Market Surabaya development project. This research is a descriptive analytic study with a cross sectional approach. The sample in this study was 33 workers and research subjects were selected using random sampling technique. The statistical test used to analyze the research data is a simple linear regression coefficient with the SPSS 26 program. The results of the analysis of the relationship between the level of knowledge of occupational safety and health (K3) on worker discipline in wearing masks using the regression coefficient test obtained a value of 0.028 which states that the effect variable X to Y is positive. From the results of the T test, it is found that Tcount > Ttable, thus Ho is rejected and Ha is accepted, so there is a relationship between the level of K3 knowledge and the discipline of wearing masks on the construction project workers of the Surabaya Dolly Bird Market.

Keywords
Discipline, Knowledge of K3, Pandemic

1. Introduction

The Covid-19 pandemic has weakened various sectors in Indonesia, including the construction sector. Restrictions on social interaction and gatherings of people in public places make various jobs including construction work stop and temporarily delayed. Various policies and changes must be made to keep the construction sector running, given its important role in driving the country's economy (Brawijaya 2018).

In addition to the limitations in the new normal, new challenges arise with the Covid-19 pandemic or often referred to as the corona virus. The condition of the spread of the virus will certainly have an impact on operations and labor productivity in the construction sector. (Heriawansyah 2021). According to Luthfi Parinduri and Taufik Parinduri (2020) in their research Implementation of Construction Safety Management in the Covid-19 pandemic must be carried out to avoid and prevent construction workers from the impacts that may arise from the Corona Virus, both health impacts and adverse economic impacts. Taking into account that the impact given is very detrimental, it is very necessary to have a level of knowledge of Occupational Safety and Health for service users during the Covid-19 pandemic. The achievement of this goal will be successful by studying the discipline of workers in implementing the Corona Virus Prevention Protocol in Construction Service Providers, so this research is entitled Relationship of Knowledge Level of Occupational Safety and Health (K3) to Worker Discipline in the Covid-19 Pandemic Period, Surabaya Dolly Bird Market Project.

2. Methodology

The method used in this research is Analytical Observation with the aim of finding the relationship between OHS knowledge variables and worker discipline in wearing masks by calculating simple linear regression coefficients. The location of this research is the development project of the Dolly Bird and Agate Market, Surabaya, which is located on Jl. Kupang Gunung Timur I No. 14, Putat Jaya, Sawahan District, Surabaya City, East Java, with the research period from 20 December 2021 to 10 January 2022.

3. Result and Discussion

This study used a sample of 33 respondents with random sampling technique. The independent variable in this research is knowledge of K3 and the dependent variable is the discipline of workers in wearing masks as an effort to prevent the transmission of the covid-19 virus. Calculation of workers' knowledge of K3 is done by distributing questionnaires with a Likert calculation scale in order to get the level of knowledge of workers in knowing and understanding K3.

Table 1. Calculation of workers' knowledge of K3

Knowledge Level	Total	Presentase
Very High	18	54,54 %
High	9	27,27 %
Currently	6	18,18 %
Low	0	0 %
Very Low	0	0 %
Total	33	100 %

Based on the table above, the level of knowledge of workers in the construction project of the Surabaya Dolly Bird Market is very high.

In observing the discipline of using workers' masks, it is carried out with an observation checklist for 1 week to determine the level of worker discipline. The results of this observation showed that the average disciplined worker wore a mask. The following is the distribution of the frequency of worker discipline:

Table 2. The distribution of the frequency of worker discipline

Discipline of the Use of Masks	Total	Presentase
Very Disciplined	8	24,24 %
Discipline	12	36,36 %
Lack of Discipline	10	30,30 %
Undisciplined	3	9,09 %
Very Undisciplined	0	0 %
Total	33	100 %

From the results of the variable data obtained, testing and processing of this variable data is carried out with a simple linear regression coefficient test which aims to explore whether there is a relationship between the independent variable (X) and the dependent variable (Y) using the SPSS 26 program. The following are the results of the regression coefficient test. simple linear :

Table 3. Coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	7.875	1.679		4.690	.000		
X	.028	.019	.260	1.497	.000	1.000	1.000

a. Dependent Variable: Y

Based on the results of SPSS 26 output in this calculation, it is known that the constant value is 7875, while the regression coefficient x is 0.028 so that the regression equation is as follows:

$$Y = a + bX$$
$$Y = 7{,}875 + 0{,}028\ X$$

The equation can be translated that:

a. The constant of 7.875 means that the value of the coefficient of the variable x is 7.875
b. The regression coefficient X of 0.028 states that for every 1% addition of knowledge value, the value of discipline level increases by 0.028. The regression coefficient is positive, so it can be said that the direction of the influence of the variable X on Y is positive.

4. Conclussion and Suggestion

4.1. Conslussion

Based on the results of a simple linear regression test managed in SPSS 26, the level of K3 knowledge shows that the significance value is 0.00, thus linear regression testing can be accepted because the significance value is smaller than the probability value (0.00 <0.05). Then there is a relationship between the level of K3

knowledge on the discipline of the Surabaya Dolly Bird Market development project with a regression coefficient of X of 0.028 and for each addition of 1% knowledge value, the value of the level of discipline will increase, it can be concluded that the regression coefficient is positive because of the understanding of knowledge using masks as an effort to prevent the spread of the covid-19 virus as well as strict supervision from managers due to strict rules from the government. This is in accordance with the opinion (Soekidjo Notoatmodjo 2007), knowledge is a very important domain for the formation of a person's action because behavior based on knowledge will be more lasting than behavior that is not based on knowledge.

Factors that influence knowledge are individual experiences of an object and information received by individuals (Suma'mur 2009). Based on the results of previous research, knowledge is an important factor in the attitude to be applied. Of course, this plays an important role in reducing the level of health problems during the COVID-19 pandemic. So that a program is needed that can prevent the transmission and spread of the Covid-19 virus or reduce the possibility of an occupational disease that occurs in workers (Azis et al. 2014). The K3 program during this pandemic aims to protect workers' rights to safety and health in doing work for the welfare of life and to carry out government regulations in a virus pandemic situation for mutual safety.

4.2. Suggestion

The company always provides education to workers about occupational safety and health during the COVID-19 pandemic in accordance with government regulations in order to increase awareness and knowledge of the workforce in order to create a culture of discipline in the workplace, especially the discipline of wearing masks while working, conducting routine supervision in terms of wearing PPE masks. In an effort to protect workers from exposure to the Covid-19 virus, sanction workers if they do not wear masks.

For workers to be more aware of how important work safety is to occupational health for themselves, especially in the covid-19 virus pandemic with very fast transmission and a very high risk of death. This they can do by complying with government regulations and the contractors who provide the work for them. In addition, increasing their knowledge about the risk factors in their work and their welfare, so that workers can reduce their chances of having work accidents and health problems due to contracting the covid-19 virus.

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Biography

Achmad Marzuki Ferdianto is a 9th Semester Undergraduate Student at Narotama University Surabaya with a Civil Engineering Study Program, entered 2017 and is currently conducting Final Project Research

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Analysis of Urban Drainage System (Darmo Satellite Channel Case Study) Surabaya City

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Abstract

Rainage channel designed to accommodate plans with precipitation data, safe based on the use of, land and the dimensions. channelDrainage channel in water catchment areas along a channel darmo satellite is one of infrastructures supporting functioning of an urban system in the city surabaya.Changes in land over the function of the green space into land settlement and trade services responsible for the runoff of the surface in several locations in the city of surabaya.

The problem a runoff a surface that often happens when the rainy season resulting from increased discharge of water drainage channel water catchment areas in the rain along a channel darmo, satellite causing the need for a study to analyze the performance of drainage channel.

The data used in this study is secondary data, namely: the last 10 years of rainfall data obtained from rain stations (gunungsari rain stations, simo, and cages) and drainage channel data. While the methods used are hydrological analysis, arithmetic methods, and gumble methods. The data obtained is then analyzed to find out the plan discharge and drainage channel capacity. The analysis conducted in this study includes hydrological and hydraulic analysis. Hydrological analysis includes: 1) calculation of planned rainfall with Gumbel distribution with a re-period of two and five years, and 2) calculation of plan discharge using HSS Nakayasu.

Keywords
Aritmatik Method, Drainage Channel Capacity, Gumbel Method, HSS Nakayasu, Rainfall, The Dimensions, The Discharge.

1. Introduction

The growth and development of industry in urban areas has a considerable impact on the hydrological cycle and has a major effect on urban drainage systems. The development of dense residential areas is suspected as the cause of flooding and inundation in the surrounding environment. This is due to the development of urbanization that causes changes in land use. Therefore the development of the city must be followed by the improvement and improvement of the drainage system.

Darmo Satellite secondary channel is a channel that passes from upstream on the southern satellite highway to downstream at the Gunung Sari Diversi Primary Channel precisely on the tandes lor highway. This channel has a length of approximately 1.14 km and a catchmen area of approximately 58.31 hectares which is the rayon tandes area and is located in sukomanunggal subdistrict.

Existing conditions in the research area are residential, trade and service areas. Drainage channels that have been used have been reduced due to the presence of part of damaged channel walls and sediment so that there is a rainy season when the rainfall is high on southern satellite highways there are often puddles. The arrangement and improvement of the function of the city's drainage network, especially in the Darmo Satelit area, Sukomanunggal Subdistrict, Surabaya City needs to be done immediately so that the problem of flooding and inundation and all consequences arising from it can be immediately reduced or may be eliminated.

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2. Methodology

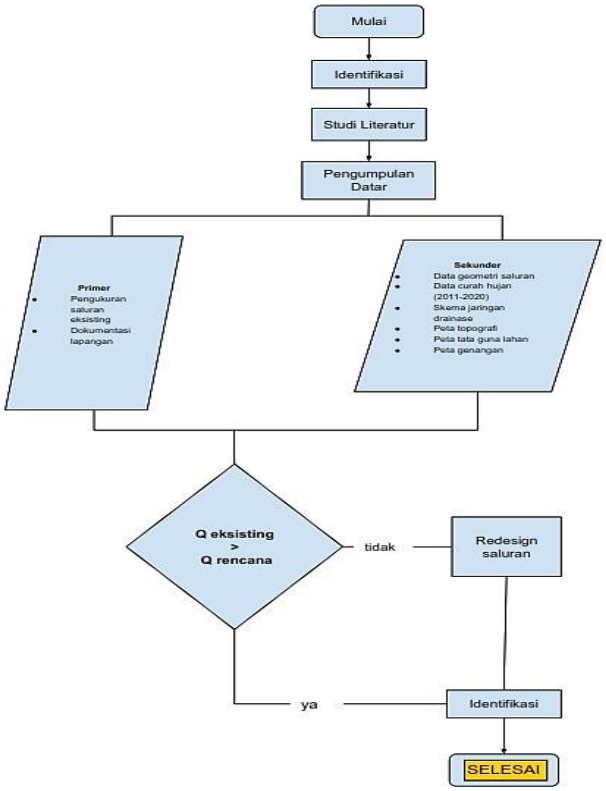

Figure 1. Diagram Alir Penelitian

2.1 Data Analysis and Processing

Data analysis is needed to find out the problem on the drainage system and is used for planning to overcome the problem. The data analysis used is:

a. The calculation of rain in the research area is determined by an algebraic flat method due to the uneven location of the rain-holding station and limited, flat topographical conditions.)

$\bar{P}$ = 1/n(P_1+P_2+P_3+⋯+P_n)……...……1

Information:

$\bar{P}$ = Average rain height
P1, P2, P3, ... Pn = High rain at the station 1,2,3,...n
N = number of stations
(Bambang Triatmodjo. 2010)

b. Calculates planned rainfall by Frequency Analysis of average annual maximum daily rainfall data with 10-year observation length (2011-2020) from one Simo rain observation station and calculates probability distribution using gumbel method, normal log, or type III person log with various birthdays (2 and 5 years).

Table 1 Frequency Distribution

Frequency Distribution	Statistical Data Parameters Skewness coefficient (Cs)	Kurtosis coefficient (Ck)
Normal	≈ 0	≈ 3
Gumbel	1,14	5,4
Log person Tipe III	Free	Free

Calculation/Dispersion Testing
Standard Deviation (s)

$$s = \sqrt{\frac{\sum_{i=1}^{n}(xi-x)^2}{n-1}} \quad \text{……2}$$

Kemencengan (skewness)

$$\alpha = \frac{n}{(n-1)(n-2)}\sum_{i=1}^{n}(xi-x)^3 \quad \text{……..3}$$

Calculates asymmetry coefficients with formulas:

$$\boldsymbol{Cs} = \frac{\alpha}{s^3} \quad \text{.....4}$$

Calculates kurtosis coefficient with formula:

$$\boldsymbol{Ck} = \frac{n^2}{(n-1)(n-2)(n-3)s^4} \sum_{i=1}^{n} (x1 - x)^4 \qquad 5$$

Calculates debit logarithms with reverse time with formula:

$$Log\ X_t = \overline{Log\ X} + K.S_d\ Log\ X \quad \text{.....6}$$

Chi Kudrat

$$x^2h = \sum \frac{(O_i - E_i)^2}{E_1}$$

.....7

Smirnov Kolmogorov

$$X = \bar{X} + k \times S_d 8$$

c. Calculate plan debits

Analyze existing cross-sectional channels to find out the ability to receive water discharge (fulbank capacity) repeat period of 2 and 5 years.

Rational Methods

$$Q = \frac{1}{3.6} .\beta.C.It.A$$

.....9

Table 2. Coefficient of Rain Spread (β)

Catchment Area (km²)	Coefficient (β)
0-4	1
5	0,995
10	0,98
15	0,995
20	0,92
25	0,875
30	0,82
50	0,5

(Soewarno 1995)

Flow coefficient

$$C_{gabungan} = \frac{C_1A_1 + C_2A_2 + \cdots + C_nA_n}{A_1 + A_2 + \cdots + A_n}$$

.....10

Nakayasu Methods

For the calculation of discharge using the hydrograph formula of the synthesis unit, rain data is required every hour. To calculate the average rain every hour is calculated by the formula:

Calculation of The Distribution of Rain Every Hour

Rt = $\frac{R24}{5}\left(\frac{5}{t}\right)^{2/3}$ 11

To calculate the height of rain at the t- hour used the formula:

Rt' = t . Rt – (t-1) . R(t-1).....12

In the calculation of the effective distribution of rain every hour, the formula used is:

Re = C . Rt'.....13

Bentuk persamaan HSS Nakayasu adalah

Qp = $\frac{1}{3,6}\left(\frac{A*Re}{0,3Tp+T0,30}\right)$.....14

To determine Tp and T0.3, the formula approach is used as follows: :

Tp = tg + 0,8 tr 15

T0,3 = α tg.....16

Tr = 0,5 tg sampai tg.....17

The value of tg is time lag which is the time between rain to the peak discharge of the flood (hour). tg calculated with the following conditions :

River with long grooves L > 15 km : tg = 0,4 + 0,058 L.....18

River with long grooves L < 15 km : tg = 0,21 L0,7.....19

Calculation T0.3 using the provisions:

a. α = 2 in the usual drainage area
b. α = 1, on the part of the slow hydrograph ride, and down fast
c. α = 3 on the up part of the fast hydrograph, and down slowly

1. On the rise: 0 < t < Tp
   Qa = (t/Tp)2,4……20
2. On a down curve
   a. Difference in value: Tp ≤ t ≤ (Tp + T0,3)
      Qd1= Qp x $\mathbf{0,3}^{(t-Tp)/T0,3}$……...21
   b. Difference in value : (Tp + T0,3) ≤ t ≤ (Tp + T0,3 + 1,5 T0,3)
      Qd2 = Qp x $\mathbf{0,3}^{[(t-Tp)+(0,5T0,3)]/(1,5T0,3)}$……...22
   c. Difference in value: t > (Tp + T0,3 + 1,5 T0,3)
      Qd3 = Qp x $\mathbf{0,3}^{[(t-Tp)+(1,5T0,3)]/(2T0,3)}$……..23

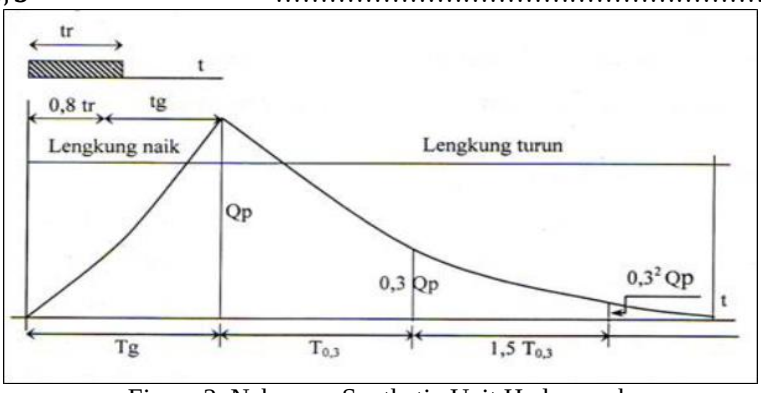

Figure 2. Nakayasu Synthetic Unit Hydrograph

3. Result and Discussion

3.1 Recapitulation of Maximum Rainfall

Table 3 Maximum Rainfall

No	Years Observations	R24 SIMO
1	2011	84
2	2012	67
3	2013	93
4	2014	109
5	2015	88
6	2016	86
7	2017	102
8	2018	49
9	2019	67
10	2020	98

3.2 Frequency Analysis

Table 4 Calculation of Distribution Statistical Parameters

No	Years	X (mm)	Order X (mm)	Average X (mm)	(Xi-X̄)2	(Xi-X̄)3	(Xi-X̄)4
1	2011	84	109	84,3	610,09	15069,22	372209,81
2	2012	67	102		313,29	5545,23	98150,62
3	2013	93	98		187,69	2571,35	35227,54
4	2014	109	93		75,69	658,50	5728,98
5	2015	88	88		13,69	50,65	187,42
6	2016	86	86		2,89	4,91	8,35
7	2017	102	84		0,09	-0,03	0,01
8	2018	49	67		299,29	-5177,72	89574,50
9	2019	67	67		299,29	-5177,72	89574,50
10	2020	98	49		1246,09	-43986,98	1552740,29
Sum					3048,1	-30442,6	2243402,02

Calculation/Dispersion Testing

Calculate Standard Deviation(s) with the formula:

$$s = \sqrt{\frac{\sum_{i=1}^{n}(xi-x)^2}{n-1}} \quad \text{.....24}$$

Calculate skewness with the formula:

$$\alpha = \frac{n}{(n-1)(n-2)}\sum_{i=1}^{n}(xi-x)^3 \quad \text{.....25}$$

The asymmetry coefficient is given by the following form:

$$Cs = \frac{\alpha}{s^3} \quad \text{.....26}$$

The kurtosis coefficient is given by the following equation :

$$Ck = \frac{n^2}{(n-1)(n-2)(n-3)s^4}\sum_{i=1}^{n}(x1-x)^4 \quad \text{.....27}$$

Table 5 Recapitulation of Cs and Ck Value

Frequency Distribution	Statistical Data Parameters		Calculation Results		
	Skewness Coefficient (Cs)	Kurtosis Coefficient (Ck)	(Cs)	(Ck)	Hasil
Normal	≈ 0	≈ 3	0,000034	3,88	Tidak Memenuhi
Gumbel	1,14	5,4			Tidak Memenuhi
Log person Tipe III	Bebas	Bebas			Memenuhi

3.3 Probability Distribution

Table 6. Probability Distribution Calculation Log Pearson Type III

No	Tahun Pengamatan	X (mm)	Urutan X (mm)	Xrata-rata (mm)	Log X	Log$\bar{X}$	LogX-Log$\bar{X}$	(LogX-Log$\bar{X}$)²	(LogX-Log$\bar{X}$)³
1	2011	84	109	84,3	2,04	1,92	0,12	0,0150	0,0018
2	2012	67	102		2,01		0,09	0,0087	0,0008
3	2013	93	98		1,99		0,08	0,0058	0,0004
4	2014	109	93		1,97		0,05	0,0028	0,0002
5	2015	88	88		1,94		0,03	0,0009	0,0000
6	2016	86	86		1,93		0,02	0,0004	0,0000
7	2017	102	84		1,92		0,01	0,0001	0,0000
8	2018	49	67		1,83		-0,09	0,0079	-0,0007
9	2019	67	67		1,83		-0,09	0,0079	-0,0007
10	2020	98	49		1,69		-0,22	0,0506	-0,0114
		Jumlah			19,15		0,000	0,1001	-0,0095

$$\log \bar{X} = \frac{\sum \log X}{n} \quad \text{.....28}$$

$$S \log \bar{X} = \sqrt{\frac{\sum(LogX - \log \bar{X})^2}{(n-1)}} \quad \text{.....29}$$

$$Cs = \frac{n.\sum(LogX - \log \bar{X})^3}{(n-1)(n-2)(S\log \bar{X})^3} \quad \text{.....30}$$

Tabel 7. K Value Distribution Log Pearson Type III

Cs	Tahun (Periode Ulang)							
	2	5	10	25	50	100	200	1000
-1,0	0,164	0,852	1,128	1,366	1,492	1,588	1,664	1,800
-1,2	0,195	0,844	1,086	1,282	1,379	1,449	1,501	1,625

To get a K value interpolated based on the value of Cs.

Calculation of rainfall plan R24 for the following 5-year re-period:

$$Log\ X = \overline{LogX} + K.S\overline{LogX} \quad \text{.....31}$$

Table 8 Rainfall Recapitulation Plan for Period (T) Year

T	K	log X	Xt
2	0,175	1,934	85,83
5	0,849	2,005	101,08
10	1,113	2,032	107,77
25	1,409	2,064	115,82
50	1,451	2,068	116,99
100	1,538	2,077	119,48
200	1,628	2,087	122,15
1000	1,752	2,100	125,88

3.4 Data Match Test

a. Chi quadratic test

- Sorting rainfall from largest to smallest then ranking.
- Calculate the value of odds with the following formula :

$$\boldsymbol{P = \frac{m}{n-1}} \quad \text{.....32}$$

- Specify the number of groups with a formula

$$G = 1 + 3{,}322 \log n \quad \text{.....33}$$

Tabel 9 Calculation of chi square odds

No.	Order X (mm)	$\bar{X}$	S	Rank	P	G
1	109	84,3	18,40	1	0,09	5
2	102			2	0,18	
3	98			3	0,27	
4	93			4	0,36	
5	88			5	0,45	
6	86			6	0,55	
7	84			7	0,64	
8	67			8	0,73	
9	67			9	0,82	
10	49			10	0,91	

- Determines The Value K obtained from gauss table based on group opportunity limits so interpolation is done

P = x

$$y = y_o + \frac{(y_1 - y_o)}{(x_1 - x_o)}(x - x_o) \quad \text{.....34}$$

Calculate Rainfall Limits with formula

$$\boldsymbol{X = \bar{X} + K.S} \quad \text{.....35}$$

Table 10 Recapitulation of Rainfall Limits

Peluang	k	x
0,182	0,920	101,23
0,364	0,348	90,71
0,545	-0,114	82,21
0,727	-0,602	73,22
0,909	-1,345	59,54

- Calculates Xh2 (calculated squared chi value) with formula

$$Xh^2 = \frac{\sum(Oi - Ei)^2}{Ei} \quad \text{.....36}$$

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Table 11 Calculation of Xh ²

No.	Batasan			Oi	Ei	(Oi-Ei)²	x²
1	73,22	≥	x	3		1,00	0,5
2	73,22	< x ≤	82,21	0		4,00	2
3	82,21	< x ≤	90,71	3	2	1,00	0,5
4	90,71	< x ≤	101,23	2		0,00	0
5	101,23	<	x	2		0,00	0
Jumlah =				10	2,00	6,00	3,00

Calculate the degree of freedom with the formula:

$$\boldsymbol{dk = G - (R + 1)} \quad \text{.....37}$$

R = 2 for normal and binomial distributions
R = 1 for Poisson

Table 12 Theoretical X value of Chi-Quadratic Test

dk	α degree of freedom							
	100%	90%	50%	30%	20%	10%	5%	1%
1	0	0.016	0.445	1.074	1.642	2.706	3.841	6.635
2	0.01	0.211	1.366	2.408	3.219	4.605	5.991	9.21
3	0.072	0.584	2.366	3.665	4.642	6.251	7.815	11.345
4	0.207	1.064	3.357	4.878	5.989	7.779	9.488	13.277
5	0.412	1.61	4.351	6.056	7.289	0.236	11.07	15.086
6	0.676	2.402	5.348	7.231	8.558	10.645	12.592	16.812
7	0.989	2.833	6.346	8.383	9.803	12.017	14.067	18.475
8	1.344	3.49	7.344	9.524	11.030	13.362	15.507	20.09
9	1.735	4.168	8.343	10.656	12.242	14.684	16.919	21.666
10	2.156	4.865	9.342	11.781	13.442	15.987	18.307	23.209

Conclusion based on the table above, for dk = 2 with a degree of confidence of 5% obtained theoretical X value = 5,991. Based on the calculation obtained Xh^2= 3.00. Because $Xh^2 < X_{teoritis}$,, then the distribution is acceptable.

b. Smirnov-Kolmogorov Test

Smirnov Kolmogorov's data match test calculation can be seen in the following table

Table 13 Calculation of Dmax

No	X	m	P(X)=m/(n+1)	P(x<)	f(t)=(X-X̄)/s	P'(X)	P'(X<)	D
	1	2	3	4 (value 1 - kol3)	5	6 (value 1- table value)	7 (value 1 - kol6)	8 = 7 - 4
1	109	1	0,09	0,91	1,34	0,0901	0,9099	0,0008
2	102	2	0,18	0,82	0,96	0,1685	0,8315	0,0133
3	98	3	0,27	0,73	0,74	0,2296	0,7704	0,0431
4	93	4	0,36	0,64	0,47	0,3192	0,6808	0,0444
5	88	5	0,45	0,55	0,20	0,4204	0,5796	0,0341
6	86	6	0,55	0,45	0,09	0,4641	0,5359	0,0814
7	84	7	0,64	0,36	-0,02	0,5080	0,4920	0,1284
8	67	8	0,73	0,27	-0,94	0,8264	0,1736	-0,0991
9	67	9	0,82	0,18	-0,94	0,8264	0,1736	-0,0082
10	49	10	0,91	0,09	-1,92	0,9726	0,0274	-0,0635
D max								0,1284

Table 14 Value Do Theoretical Test Smirnov Kolmogorov

N	α derajat kepercayaan			
	0.2	0.1	0.05	0.01
5	0.45	0.51	0.56	0.67
10	0.32	0.37	0.41	0.49
15	0.27	0.30	0.34	0.4
20	0.23	0.26	0.29	0.36
25	0.21	0.24	0.27	0.32
30	0.19	0.22	0.24	0.29
35	0.18	0.2	0.23	0.27
40	0.17	0.19	0.21	0.25
45	0.18	0.18	0.2	0.24
50	0.15	0.17	0.19	0.23
n > 50	$\frac{1,07}{\sqrt{n}}$	$\frac{1,07}{\sqrt{n}}$	$\frac{1,07}{\sqrt{n}}$	$\frac{1,07}{\sqrt{n}}$

From the table above for degrees of trust 5% obtained value $Do_{teoritis}$ be 0,41. Based on the calculation table obtained Dmax =0,1284. Because Dmax $< Do_{teoritis}$, Then the distribution can be accepted.

3.5 Concentration Time Analysis

Watershed concentration time is the time it takes for a stream of water to move from a distant point along the draining area to the survey point. Concentration time can be calculated by:

$$T_C = T_0 + T_1 \quad \text{.....38}$$

Calculation of Tf with formula

$$T_f = \frac{L}{V} \quad \text{.....39}$$

$$V = \frac{1}{n} R^{2/3} I^{1/2} \quad \text{.....40}$$

Tabel 15 Calculation of Tf

No	Channel Segment	L (M)	V (m/det)	Tf (det)	Tf (menit)	Tf (hour)
1	S. T Darmo Puncak Permai	870	0,11	7948,68	132,48	2,21
2	S.T Jl. Bima Sakti	550	0,39	1412,56	23,54	0,39
3	S.T Jl. Raya Satelit Utara 1	230	0,43	534,32	8,91	0,15
4	S.T Jl. Raya Satelit Utara	210	0,49	424,91	7,08	0,12
5	S.T Jl. Satelit Utara 6	190	0,37	517,58	8,63	0,14
6	Saluran Sekunder	1140	0,41	2784,49	46,41	0,77

Calculation To with formula:

$$T_o = \frac{2}{3} \; x \; 3,28 \; x \; Lo \; x \; \frac{nd}{\sqrt{s0}} \quad \text{.....41}$$

Calculation Tc with formula:

Tc = To + Tf..... 42

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Tabel 16 Calculation of Tc

No	Channel Segment	To (minutes)	To (hour)	Tf (minutes)	Tf (hour)	Tc (minutes	Tc (hour)
1	S. T Darmo Puncak Permai	1203,18	20,05	132,48	2,21	1335,66	22,26
2	S.T Jl. Bima Sakti	760,63	12,68	23,54	0,39	784,18	13,07
3	S.T Jl. Raya Satelit Utara 1	318,08	5,30	8,91	0,15	326,99	5,45
4	S.T Jl. Raya Satelit Utara	290,42	4,84	7,08	0,12	297,51	4,96
5	S.T Jl. Satelit Utara 6	262,76	4,38	8,63	0,14	271,39	4,52
6	Saluran Sekunder	1576,59	26,28	46,41	0,77	1622,99	27,05

3.6 Rain Intensity Calculation

The intensity of the rain varies. The time of rainfall greatly affects the magnitude of the intensity of rain To calculate the intensity of rain can use the formula Dr. Monoboe, which is as follows :

$$I = \frac{R_{24}}{24}\ x\ \left(\frac{24}{t}\right)^{2/3} \quad \text{.....43}$$

Tabel 17 Calculation of rain intensity

No	Channel Segment	Tc (hour)	R2 (mm)	R5 (mm)	R10 (mm)	I (mm/hour) 2 Tahun	5 Tahun	10 Tahun
1	S. T Darmo Puncak Permai	22,26	85,83	101,08	107,77	3,76	4,43	4,72
2	S.T Jl. Bima Sakti	13,07	85,83	101,08	107,77	5,36	6,32	6,73
3	S.T Jl. Raya Satelit Utara 1	5,45	85,83	101,08	107,77	9,61	11,32	12,06
4	S.T Jl. Raya Satelit Utara	4,96	85,83	101,08	107,77	10,23	12,05	12,85
5	S.T Jl. Satelit Utara 6	4,52	85,83	101,08	107,77	10,88	12,81	13,66
6	Saluran Sekunder	27,05	85,83	101,08	107,77	3,30	3,89	4,15

3.7 Calculation of The Flow Coefficient (C)

Tabel 18 Calculation of The Flow Coefficient (C)

No.	Jenis Guna Lahan	Luas Area (Ha)	Koefisien Pengaliran (C)	AC	C gabungan
1	Jalan Aspal	5,31	0,85	4,51	
2	RTH	4,78	0,1	0,48	
3	Settlements	20,39	0,75	15,30	0,70
4	Public Facilities	1,78	0,6	1,07	
5	Trade and Services	26,05	0,75	19,53	

3.8 Flood Discharge Analysis Plan

By using the rational method of calculating flood discharge plan, from the data that has been obtained above it can be calculated flood discharge plan with the formula

$$\boldsymbol{Q = \frac{1}{3{,}6}\ .\beta\ .C_{gab}.It.A} \quad \text{.....44}$$

β = 1 , based on the table of Rain Spreading Coefficient (β) with watershed area DAS 0,29 Km2

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Table 19 Calculation of Flood Discharge Plan

No	Channel Segment	C	β	I (mm)/hour			A (km²)	Q plan (m³/det)		
				2 Tahun	5 Tahun	10 Tahun		2 Tahun	5 Tahun	10 Tahun
1	S. T Darmo Puncak Permai	0,70	1	3,76	4,43	4,72	0,29	0,21	0,25	0,26
2	S.T Jl. Bima Sakti	0,69	1	5,36	6,32	6,73	0,08	0,08	0,10	0,11
3	S.T Jl. Raya Satelit Utara 1	0,74	1	9,61	11,32	12,06	0,08	0,15	0,18	0,19
4	S.T Jl. Raya Satelit Utara	0,72	1	10,23	12,05	12,85	0,08	0,16	0,19	0,20
5	S.T Jl. Satelit Utara 6	0,73	1	10,88	12,81	13,66	0,06	0,12	0,15	0,16
6	Saluran Sekunder	0,70	1	3,30	3,89	4,15	0,58	0,38	0,44	0,47

3.9 Channel Capacity Analysis (Full Bank Capacity)

Full Bank Capacity is the amount of discharge on the channel according to the conditions in the field. This calculation is needed to find out how much the cross-sectional ability of the channel to accommodate rainwater runoff

Table 20 Full Bank Capacity in Tertiary Channel

No	Channel Segment	Penampang Saluran	L (m)	I	n koef	b (m)	h (m)	A (m²)	P (m)	R (m)	V (m/dt)	Q eks (m³/dt)
1	S. T Darmo Puncak Permai	square	870	0,016	0,350	0,5	0,5	0,25	1,5	0,17	0,11	0,03
2	S.T Jl. Bima Sakti	square	550	0,002	0,033	0,5	0,5	0,25	1,5	0,17	0,39	0,10
3	S.T Jl. Raya Satelit Utara 1	square	230	0,002	0,033	0,5	0,5	0,25	1,5	0,17	0,43	0,11
4	S.T Jl. Raya Satelit Utara	square	210	0,003	0,033	0,5	0,5	0,25	1,5	0,17	0,49	0,12
5	S.T Jl. Satelit Utara 6	square	190	0,002	0,033	0,5	0,5	0,25	1,5	0,17	0,37	0,09
6	Saluran Sekunder	trapesium	1140	0,001	0,003	4,2	0,91	3,82	6,02	0,63	0,41	11,41

3.10 Comparison of Existing Channel Capacity with Plan Debit

For more detail in analyzing the comparison of existing channel capacity with the discharge plan on the Darmo satellite drainage channel, it can be seen in the table

Tabel 20 Perbandingan Obtained debit planPeriode Ulang 2 Tahunan Saluran tersier:

No	Channel Segment	Q plan (m³/det)	Q eksisting (m³/det)	difference	Information
1	S. T Darmo Puncak Permai	0,21	0,03	-0,18	SPILLING OUT
2	S.T Jl. Bima Sakti	0,08	0,10	0,01	SAFE
3	S.T Jl. Raya Satelit Utara 1	0,15	0,11	-0,04	SPILLING OUT
4	S.T Jl. Raya Satelit Utara	0,16	0,12	-0,04	SPILLING OUT
5	S.T Jl. Satelit Utara 6	0,12	0,09	-0,03	SPILLING OUT

Tabel 21 Perbandingan Obtained debit planPeriode Ulang 5 Tahunan Saluran tersier:

No	Channel Segment	Q plan (m^3/det)	Q eksisting (m^3/det)	difference	Information
1	S. T Darmo Puncak Permai	0,25	0,03	-0,22	SPILLING OUT
2	S.T Jl. Bima Sakti	0,10	0,10	0,00	SPILLING OUT
3	S.T Jl. Raya Satelit Utara 1	0,18	0,11	-0,07	SPILLING OUT
4	S.T Jl. Raya Satelit Utara	0,19	0,12	-0,07	SPILLING OUT
5	S.T Jl. Satelit Utara 6	0,15	0,09	-0,05	SPILLING OUT
6	saluran sekunder	0,44	11,41	10,97	SAFE

3.11 Nakayasu's Method of Calculation

The first step taken in calculating the plan's discharge with the Nakayasu HSS method is to calculate the average rain (Rt) from the 1st hour to the 5th hour according to the optimal duration of the rain plan which is 5 hours. After the average rain is known, then the next calculated high rain (Rt') from the 1st hour to the 5th hour. Here is a calculation of the average rain and high rain from the 1st hour to the 5th hour.

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Tabel 22 calculation of debit channel Secondary Darmo Satellite PUH 5 Years

T	U (t,l)	Due to rain					Q5
		R1(mm)	R2(mm)	R3(mm)	R4(mm)	R5(mm)	
(hour)	(m3/det)	60,71	15,67	11,10	8,82	7,47	(m3/det)
0,00	0,0000	0,0000					0,0000
0,10	0,0008	0,0474					0,0474
0,20	0,0041	0,2500					0,2500
0,30	0,0109	0,6617					0,6617
0,40	0,0217	1,3197					1,3197
0,50	0,0371	2,2546					2,2546
0,60	0,0575	3,4923					3,4923
0,70	0,0833	5,0557					5,0557
0,80	0,1147	6,9656					6,9656
0,90	0,1522	9,2411					9,2411
1,00	0,1960	11,8999	0,0000				11,8999
1,03	0,2105	12,7799	3,2987				16,0786
1,10	0,1754	10,6466	2,7481				13,3947
1,20	0,1350	8,1965	2,1157				10,3122
1,30	0,1039	6,3102	1,6288				7,9390
1,40	0,0800	4,8580	1,2540				6,1120
1,49	0,0632	3,8340	0,9896				4,8236
1,50	0,0621	3,7711	0,9734				4,7445
1,60	0,0522	3,1677	0,8176				3,9853
1,70	0,0438	2,6608	0,6868				3,3477
1,80	0,0368	2,2351	0,5769				2,8120
1,90	0,0309	1,8775	0,4846				2,3621
2,00	0,0260	1,5771	0,4071	0,0000			1,9841
2,10	0,0218	1,3247	0,3419	0,2423			1,9090
2,18	0,0189	1,1502	0,2969	0,2104			1,6574
2,20	0,0185	1,1220	0,2896	0,2052			1,6168
2,30	0,0162	0,9845	0,2541	0,1801			1,4187
2,40	0,0142	0,8638	0,2230	0,1580			1,2448
2,50	0,0125	0,7579	0,1956	0,1386			1,0922
2,60	0,0110	0,6650	0,1717	0,1216			0,9583
2,70	0,0096	0,5835	0,1506	0,1067			0,8408
2,80	0,0084	0,5120	0,1321	0,0936			0,7378
2,90	0,0074	0,4492	0,1160	0,0822			0,6473
3,00	0,0065	0,3941	0,1017	0,0721	0,0000		0,5680
3,10	0,0057	0,3458	0,0893	0,0633	0,0502		0,5486
3,20	0,0050	0,3034	0,0783	0,0555	0,0441		0,4814
3,30	0,0044	0,2662	0,0687	0,0487	0,0387		0,4224
3,40	0,0038	0,2336	0,0603	0,0427	0,0339		0,3706
3,50	0,0034	0,2050	0,0529	0,0375	0,0298		0,3252
3,60	0,0030	0,1798	0,0464	0,0329	0,0261		0,2853
3,70	0,0026	0,1578	0,0407	0,0289	0,0229		0,2503
3,80	0,0023	0,1385	0,0357	0,0253	0,0201		0,2196
3,90	0,0020	0,1215	0,0314	0,0222	0,0177		0,1927
4,00	0,0018	0,1066	0,0275	0,0195	0,0155		0,1691
4,10	0,0015	0,0935	0,0241	0,0171	0,0136		0,1484
4,20	0,0014	0,0821	0,0212	0,0150	0,0119		0,1302
4,30	0,0012	0,0720	0,0186	0,0132	0,0105		0,1142
4,40	0,0010	0,0632	0,0163	0,0116	0,0092		0,1002
4,50	0,0009	0,0554	0,0143	0,0101	0,0081		0,0879
4,60	0,0008	0,0486	0,0126	0,0089	0,0071		0,0772
4,70	0,0007	0,0427	0,0110	0,0078	0,0062		0,0677
4,80	0,0006	0,0374	0,0097	0,0068	0,0054		0,0594
4,90	0,0005	0,0329	0,0085	0,0060	0,0048		0,0521
5,00	0,0005	0,0288	0,0074	0,0053	0,0042	0,0000	0,0457
5,10	0,0004	0,0253	0,0065	0,0046	0,0037	0,0031	0,0432
5,20	0,0004	0,0222	0,0057	0,0041	0,0032	0,0027	0,0379

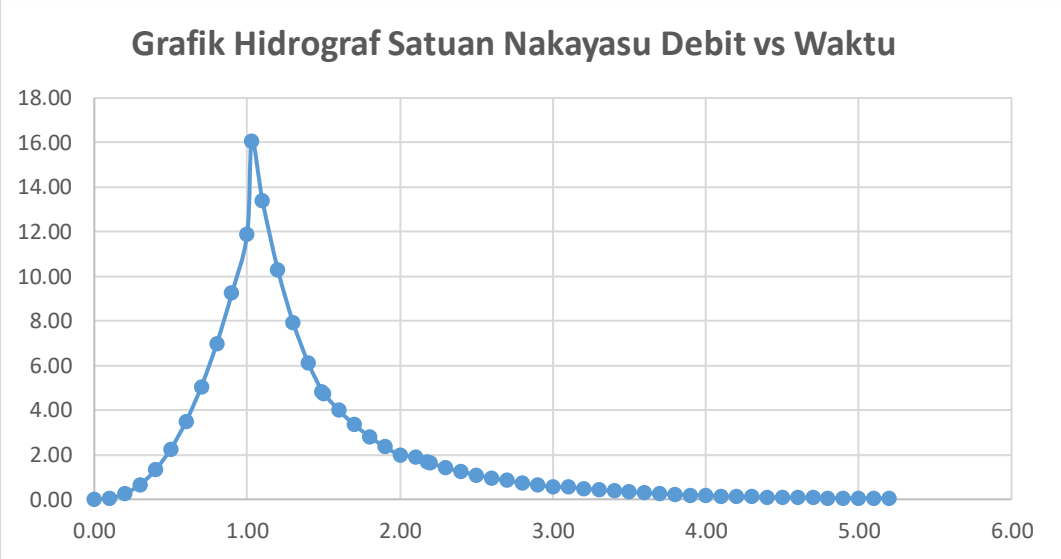

Figure 3 Flood Hydrograph on Secondary Channel (DAS) Darmo Satellite

In column 1 of table 4.31 entered the value t, which is the hydrograph period with an interval of 0.1 hours. Pool 2 is the unit discharge value based on the calculation of hydrograph units. Columns 3 to column 7 are the result of multiplication of unit discharge values with effective rain height that occurs. There are 5 pieces of effective rain in this calculation. 60,71; 15,67; 11,10; 8,82; dan 7,47 mm. so column 3 = 60,71 x column 2. column 4 = 15,67x column 2. And so on until column 7. Column 8 It is a total hydrograph due to the five rains above. Figure is a hydrograph resulting from table calculations.

3.12 Flood Management

Flood Management on the tertiary channel Darmo Puncak Permai, Milky Way, Northern Satellite Kingdom 1, Northern Satellite Kingdom and North Satellite 6 by planning the dimensions of the channel using a culvert box.

Table 23 Calculation of channel type changes

No	Channel Segment	p saluran	L (m)	I	n koef	b (m)	h (m)	A (m^2)	P (m)	R (m)	V (m/dt)	Q eks (m^3/dt)
1	S. T Darmo Puncak Permai	square	870	0,016	0,010	0,5	0,5	0,25	1,5	0,17	3,83	0,96
2	S.T Jl. Bima Sakti	square	550	0,002	0,010	0,5	0,5	0,25	1,5	0,17	1,28	0,32
3	S.T Jl. Raya Satelit Utara 1	square	230	0,002	0,010	0,5	0,5	0,25	1,5	0,17	1,42	0,36
4	S.T Jl. Raya Satelit Utara	square	210	0,003	0,010	0,5	0,5	0,25	1,5	0,17	1,63	0,41
5	S.T Jl. Satelit Utara 6	square	190	0,002	0,010	0,5	0,5	0,25	1,5	0,17	1,21	0,30

Tabel 24 Re-Design 2-Year Re-Period Tertiary Channels

No	Channel Segment	Q plan (m^3/det)	Q eksisting (m^3/det)	difference	Information
1	S. T Darmo Puncak Permai	0,21	0,96	0,75	SAFE
2	S.T Jl. Bima Sakti	0,08	0,32	0,24	SAFE
3	S.T Jl. Raya Satelit Utara 1	0,15	0,36	0,20	SAFE
4	S.T Jl. Raya Satelit Utara	0,16	0,41	0,25	SAFE
5	S.T Jl. Satelit Utara 6	0,12	0,30	0,18	SAFE

Tabel 25 Re-Design 5-Year Re-Period Tertiary Channels:

No	Channel Segment	Q plan (m^3/det)	Q eksisting (m^3/det)	difference	Information
1	S. T Darmo Puncak Permai	0,25	0,96	0,71	SAFE
2	S.T Jl. Bima Sakti	0,10	0,32	0,22	SAFE
3	S.T Jl. Raya Satelit Utara 1	0,18	0,36	0,18	SAFE
4	S.T Jl. Raya Satelit Utara	0,19	0,41	0,22	SAFE
5	S.T Jl. Satelit Utara 6	0,15	0,30	0,16	SAFE

4. Conclusion

Based on the analysis and calculations that have been done can be concluded as follows::

1. Based on the results of analysis and calculation of existing flood discharge hydrology:
   a. In the tertiary channel Darmo Puncak Permai on the birthday of 2 years with a rational method of 0,03 m3/det, Bima Sakti 0,1 m3/det, Raya Satelit Utara 1 as much as 0,11 m3/det , Raya Satelit Utara as much as 0,12 m3/det and Satelit Utara 6 as much as 0,09 m3/det
   b. Di saluran Sekunder Darmo Satelit pada kala ulang 5 tahun dengan metode rasional as much as 11,41 m3/det.
   c. Pada kala ulang 5 tahun dengan metode perhitungan nakayasu diperoleh debit puncak 16,0786 m3/det

2. Berdasarkan hasil analisis dan perhitungan perbandingan obtained debit plandengan dimensi saluran yang ada:
   a. Pada kala ulang 2 tahun di saluran tersier
      1) S. T Darmo Puncak Permai obtained debit plan0,21 m^3/det and existing debit 0,03 m^3/det.
      2) S.T Jl. Bima Sakti obtained debit plan 0,08 m^3/det and existing debit 0,10 m^3/det.
      3) S.T Raya Satelit Utara 1 obtained debit plan0,15 m^3/det and existing debit 0,11 m^3/det.
      4) S.T Raya Satelit Utara obtained debit plan0,16 m^3/det and existing debit 0,12 m^3/det.
      5) S.T Raya Satelit Utara 6 obtained debit plan0,12 m^3/det and existing debit 0,09 m^3/det.
   b. Pada kala ulang 5 tahun di saluran tersier dan sekunder
      1) S. T Darmo Puncak Permai obtained plan discharge of 0,25 m3/second and existing discharge of 0,03 m3/det.
      2) S.T Jl. Bima Sakti obtained plan discharge 0,10 m3/det and existing debit 0,10 m3/det.
      3) S.T Raya Satelit Utara 1 obtained plan discharge 0,18 m3/det and existing debit 0,11 m3/det.
      4) S.T Raya Satelit Utara obtained plan discharge 0,19 m3/det and existing debit 0,12 m3/det.
      5) S.T Raya Satelit Utara 6 obtained plan discharge 0,15 m3/det and existing debit 0,09 m3/det.
      6) S. S Darmo Satelit obtained plan discharge 0,44 m3/det and existing debit 11,41 m3/det.

3. Based on the results of analysis and calculation of channel dimensions that correspond to the debit plan:
   a. S. T Darmo Puncak Permai using the box culvert 0,5 x 0,5 m.
   b. S.T Jl. Bima Sakti using the box culvert 0,5 x 0,5 m.
   c. S.T Raya Satelit Utara 1 using the box culvert 0,5 x 0,5 m.
   d. S.T Raya Satelit Utara using the box culvert 0,5 x 0,5 m.
   e. S.T Raya Satelit Utara 6 using the box culvert 0,5 x 0,5 m.

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Analysis of Pedestrian During The COVID – 19 Period in The Dago – Bandung Area

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Abstract

The sidewalk in the Dago - Bandung area is one of the sidewalks that is widely used by pedestrians because there are schools, campuses, hospitals, clothing stores and restaurant. This study to determine the average daily use of sidewalks in the Dago - Bandung area, identify sidewalk facilities, determine level of services sidewalks, and obtain pedestrian perceptions of sidewalk facilities. This study used the field survey to primary data and quisioner from pedestrians for secondary data. Analysis of sidewalk facilities uses the Regulation of the Minister of Public Works Number 3 of 2014 while level of service uses High Capacity Manual method. Pedestrian perceptions use the Importance Performance Analysis method. The survey showed on the largest pedestrian volume occurred on Sunday at 2.49 people/minute and it was found that the sidewalks in the Dago - Bandung area had met standards. Based on the results the level of service on the sidewalk is Standard A with the average pedestrian flow of 1.64 ppl/m/mnt and the average space for pedestrians of 34.62 m2/ppl. The results of the Cartesian diagram obtained in quadrant I. The main priority is the condition of the signage, the location of the street furniture, and the cleanliness of the channel. Overall, a few items need improvement in order to create better comfort for pedestrians.

Keywords
Dago – Bandung Area, Level of Service, Pedestrians, Sidewalks

1. Introduction

Transportation facilities and infrastructure are mutually supportive factors, in the transportation system both are the main needs. Transportation facilities are made to support the movement of people from one place to another using the available public transportation modes, transportation facilities are also intended to serve the community in their activities to achieve the goals of the movement. Transportation facilities related to traffic are terminals, traffic signs and markings, pedestrian facilities, parking facilities, and stopping places.(Hasanah 2017)

Pedestrian is a term given in transportation to describe people who are walking on a pedestrian path either on the side of the road, sidewalk, special lane for pedestrians or road crossing (Dermawan et al. 2021).Walking as one of the common transportation systems in all communities around the world and has an important role in an urban space, especially as a liaison between regional functions with one another and a liaison between modes of transportation. With more people walking, it increases clean air and reduces congestion.(Lestari 2020)

Sidewalks are pedestrian paths that are parallel and adjacent to traffic lanes that are paved with pavement construction. (Kementerian Pekerjaan Umum dan Perumahan Rakyat 2017) Sidewalks make pedestrians comfortable on foot, because they are not integrated with other modes of transportation. Sidewalks that are well built and have complete facilities will cause many people to want to walk. In addition, sidewalks can also shape the character or image of the city because it is the most important element in the image of the city (Path or path). But in reality, the sidewalk is no longer functioning as it should. The sidewalks are full of small buildings that are permanent and non-permanent, and various other types of buildings. (Mulyanto and Aziz 2020)

Around the research location there are schools, campuses, hospitals, clothing shops, restaurants, and gift shops. Many pedestrians are jostling on the existing sidewalk so that the impression is that the sidewalk is narrow or not wide enough. In sidewalk design, the standard ideal width of the sidewalk is often ignored in

pedestrian planning, so that in reality, when the sidewalk is used, a sense of security and comfort in the use of pedestrian paths is not felt by pedestrians.(Waani 2016)

2. Literature View

2.1 Sidewalk

According (Direktur Jenderal Bina Marga 1999)to what is determined by grant is the part of the highway that is specifically provided for pedestrians located in the road benefit area, whose surface is higher than the road surface, and is generally parallel to the traffic lane. Sidewalks also function to facilitate road traffic because they are not disturbed or affected by pedestrian traffic. The space below can be used as a space to place utilities and other road accessories. In accordance with the specifications of the free space the sidewalk has a free height of not less than 2.5 m, will not exceed the limit of 2.5 m, will not be less than 0.3 meters from the surface and the width of the sidewalk will not be less than 0.3 meters (Kep. Bina Marga 1999). There are 2 sidewalk slopes, namely longitudinal and transverse slopes. Ideally, the longitudinal slope of the sidewalk is 8% and the cross-slope of the sidewalk is 2% to 4% for the purpose of channeling surface water (Kementrian PU No. 3 2014). Based on Technical Guidelines No. 2 of 1999 concerning Accessibility Requirements on Public Roads, the specifications for the height of the kereb vary according to the type, ranging from 5-30 centimeters in height.

2.2 Sidewalk Standar

The standard provisions for sidewalks are regulated in regulations such as dimensions of width, free space, slope, curb height and sidewalks for special needs. The effective width of the pedestrian lane based on the needs of one person is 60 cm with an additional width of 15 cm for moving without carrying goods, so that the total lane requirement for two pedestrian hand in hand or two pedestrians passing by without contact occurs is at least about 1.50 cm (Kementerian Pekerjaan Umum dan Perumahan Rakyat 2017). Based on Technical Guidelines No. 2 of 1999 concerning Accessibility Requirements on Public Roads, the specifications for the height of the kereb vary according to the type, ranging from 5-30 centimeters in height. Selection of surface material for pavement facilities with special needs, which is used must be stable, strong, smooth textured but not slippery, both in dry and wet conditions. To guide people with visual impairments on the pedestrian path, the selection of materials can use the texture of the guide tiles (striped tiles) and for situations around the path that can endanger the visually impaired can use the warning tile texture (dot/round tiles). Stagnant water at the pedestrian facilities is very uncomfortable, especially since this facility is specifically for blind people, this can cause the road surface to be slippery and can be easily slipping for the user. Not only selection of surface materials but also the use of porous concrete in the guiding paving block is one effort that will be done to avoid a puddle of water on the road surface due to rainfall, beside which the slightly rough surface will make the road surface is not slippery. (Isradi, Hidayat, and Prasetijo 2020)

2.3 Level of Service

In the implementation of service standards, of course, there are service level criteria that must be met. The criteria for the service level of sidewalk facilities are contained in the Regulation of the Minister of Public Works (Ministry of Public Works No. 3, 2014), as follows:

1. Standard A, pedestrians can walk freely, including being able to determine the direction of walking freely, at a relatively fast speed without causing interference between pedestrians. The area of the pedestrian path is 12 m2 /person with a pedestrian flow of <16 people/minute/meter.
2. Standard B, pedestrians can still walk comfortably and quickly without disturbing other pedestrians, but the presence of other pedestrians has begun to affect the pedestrian flow. The area of the pedestrian path is 3.6 m2 /person with a pedestrian flow of <16-23 people/minute/meter.
3. Standard C, pedestrians can move with the current in the same direction normally although in the opposite direction there will be little contact, and relatively slowly due to limited space between pedestrians. The area of the pedestrian path is 2.2-3.5 m2/person with a pedestrian flow of <23 people/minute/meter.
4. Standard D, pedestrians can walk with a normal flow, but must change positions frequently and change speed because the opposite flow of pedestrians has the potential to cause conflict. The area of the pedestrian path is 1.2-2.1 m2/person with a pedestrian flow of <33-49 people/minute/meter.
5. Standard E, pedestrians can walk at the same speed, but movement will be relatively slow and irregular when many pedestrians turn around or stop. The area of the pedestrian path is 0, 5–1.3 m2/person with a pedestrian flow of >49-75 people/minute/meter.
6. Standard F, pedestrians walk at a very slow and limited current speed because there are often conflicts with pedestrians in the same direction or opposite. Standard F is no longer comfortable and is no longer suitable for pedestrian space capacity. The area of the pedestrian path is <0.5 m2/person with various pedestrian flows.

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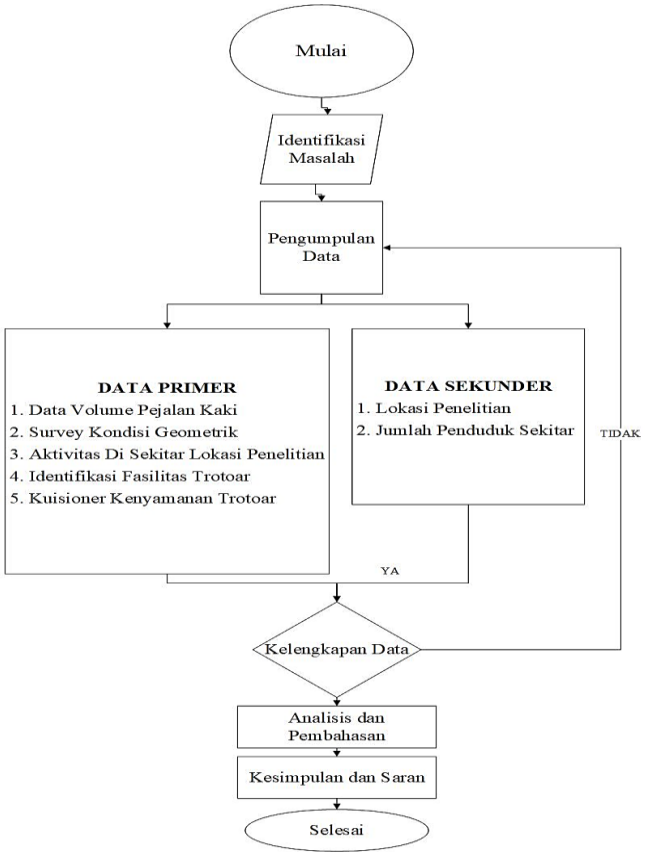
3. Methodology



Flowchart 1. Research

Based on the flowchart above this research using 2 types of data, are primary data and secondary data. Primary data were obtained by direct observation of pedestrian volume, pedestrian travel time, sidewalk conditions, activities around the sidewalk and filling out questionnaires. In this study, the sidewalks used are the right and left side of the road. The survey location is in the Dago Area - Bandung, on the right starting from the Police Post to SPBU and on the left starting from Bank BCA to Bank Mega. The length of the sidewalk in this study is ± 1 km.

The secondary data obtained a map of the research location and data on the population of the area, from these data will be processed to obtain the results of the level of use and service of the sidewalk facilities. Image 1 below shows the research location:

Figure1. Research Location Map

3.1 High Capacity Manual

The High Capacity Manual method is used to determine the pavement service level requirements. The requirements in determining the level of service in pedestrian spaces are used in several ways as follows:

1. Calculate the value of the pedestrian flow at the largest 15 minute interval from the value of the pedestrian flow at other 15 minute intervals.

$$Q_{15} = \frac{Nm}{15WE}$$

Q_{15} = Flow of pedestrians at 15 minutes interval (people/m/minute)
Nm = Total of pedestrians at 15 minuter interval
WE = Effective width of pedestrian space

2. To calculate the value of pedestrian space at the time of the largest 15-minute flow, the following formula is used:

$$S_{15} = \frac{1}{D_{15}}$$

S_{15} = Pedestrian space at the time of the largest 15 minute flow ($m^2/pedestrian$)
D_{15} = Density at the time of the largest 15 minute current ($pedestrian/m^2$)

3.2 Importance Performance Analysis

The use of the Importance-Performance Analysis method is to measure the level of service satisfaction that is included in the quadrants on the Importance-Performance Analysis map. The formula used is as follows:

$$Tki = \frac{X_i}{Y_i} x\ 100\%$$

Tki = Community satisfaction level
X_i = Government performance evaluation
Y_i = Community expectation evaluation

A Cartesian diagram is a shape that is divided into four parts bounded by two perpendicular intersecting lines at the points ($\bar{\bar{X}}_\iota$, $\bar{\bar{Y}}_\iota$) where $\bar{\bar{X}}_\iota$ is the average of the average implementation level scores. and (Y_i) is the average of the average importance scores of all factors that affect people's satisfaction (Purnomo 2015), the formula is as follow :

$$\bar{\bar{X}} = \frac{\sum_{i=1}^{N} \overline{X\iota}}{k} \quad \bar{\bar{Y}} = \frac{\sum_{i=1}^{N} \overline{Y\iota}}{k}$$

Furthermore, the level of these elements will be described and divided into four parts into a Cartesian diagram.

3.3 Data Analysis

3.3.1 Validity Test

Validity test is a test that serves to see whether a measuring instrument is valid or invalid. In this study, the validity test method used the pearson product moment method. The basis for taking the validity test of the pearson product moment method can be by comparing the value of rcount with rtable as follows:

1. If value of rcount > rtable = Valid
2. If value of rcount < rtable = Invalid

3.3.2 Reliability Test

Reliability is an index that shows the extent to which a measuring instrument can be trusted or relied on. The basis for making decisions in reliability testing is as follows:

1. If value of Cronbach's Alpha > 0.60 so, quisioner is reliabel or consistent
2. If value of Cronbach's Alpha < 0.60 so, quisioner is not reliabel or not consistent

3.3.3 Normality Test

The normality test aims to determine whether the residual value is normally distributed or not. The basis for decision making in this test is to use the following significance values:

1. If significance value > 0.05, so residual value is normal distribution
2. If significance value < 0.05, so residual value is not normal distribution

3.3.4 Regression Linear Test

Linear regression test is a statistical method used to form a model of the relationship between the dependent variable and one or more independent variables. The basis for decision making in a simple linear regression test can refer to two things, namely:

1. Comparing the significance value with a probability value of 0.05
   a. If significance value < 0.05, so variable X effect on variable Y
   b. If significance value < 0.05, so variable X has no effect on variable Y
2. Comparing t value of tcount with t table
   a. If value of tcount > t table, so variable X effect on variable Y

b. If value of tcount < t table, so variable X has no effect on variable Y

4. Result and Analysis

4.1 Sidewalk Density Analysis

The pavement density level is calculated for 3 days a week, namely 2 hours in the morning, 2 hours in the afternoon, and 2 hours in the afternoon. This survey was conducted by counting pedestrians on the sidewaks. Can be seen the volume of pedestrian by graph below:

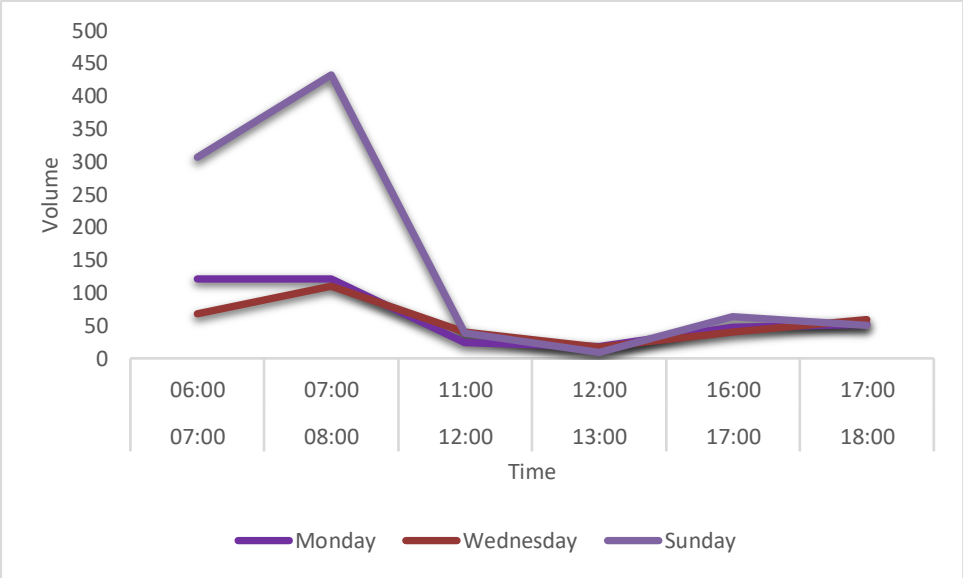


Figure 2. Pedestarians Volume on Monday, Wednesday, and Sunday

According to the results of a survey conducted on Monday, it was found that the number of people crossing the sidewalk in both directions was 419 people/6 hours or 1.16 people/minute, and on Wednesday 470 people/6 hours or 1.31 people/minute were found. Meanwhile, on Sundays the number of people crossing the sidewalk in both directions is 899/6 hours or 2.49 people/minute.

4.2 Sidewalk Condition Survey

Table 1. The Result of Survey

Indicator of Research	Survey Points				Average	Standart
	Police Post	Bank BCA	SPBU	Bank Mega		
Widtht of Sidewalks (m)	4	3.9	3.6	4	4 m	4 m
Free Space (m)	0.3	0.3	0.3	0.3	0.3 m	0.3 m
Height of Kerb (cm)	13.5	14	11.5	14	13.25 cm	5 cm – 30 cm
Facility Line (m)	2.6	2	2	1.9	2.1 m	1.2 m
Slope (%)	3.9	3.8	3.6	3.8	3.8 %	2% - 4%

Based on the survey, it is known that the facilities for disabled and non-disabled people are good. The size is large enough to be used for people with special needs with wheels, sticks or crutches. The survey showed, the sidewalk had the guiding paving block.

4.3 Analysis of LOS

The analysis of level of service, it can be seen from calculations using the Highway Capacity Manual with data from survey results that have been carried out both on weekdays and weekends.

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Table 2. Calculation of HCM

The Day of Research	Flow (ppl/m/mnt)	Speed (m/snd)	Density (ppl/m2)	S_{15} (m2/ppl)
Monday	1.19	0.83	0.024	41.67
Wednesday	0.82	0.70	0.020	50.00
Sunday	2.91	0.59	0.082	12.20
		Average		34.62 m^2/ppl

4.4 Respondent Characteristics

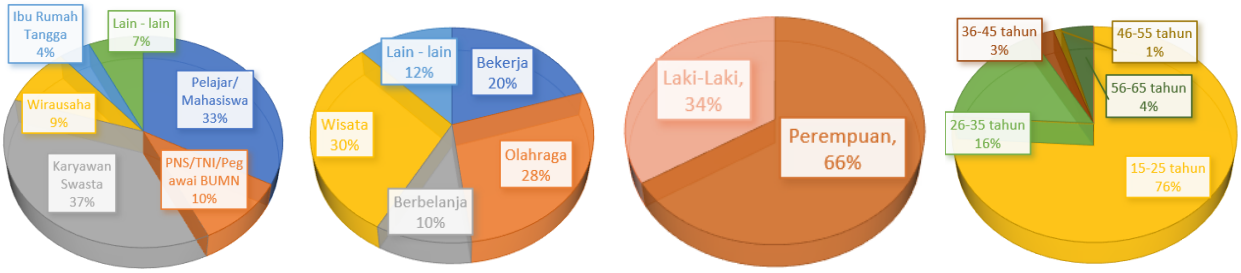

Figure 3. Characteristics of Respodent Based on Profession, Purpose, Gender, and Age

The picture above is obtained from 100 respondents with each criteria. The first picture shows the criteria based on work, the second picture shows the criteria based on the respondent's purpose of walking on the sidewalks in the Dago area of Bandung, the third picture shows the criteria based on gender, and the last picture is based on the age of the respondent.

4.5 Validity Test

Validity test function to determine the validity of the questionnaire that has been carried out. This test was carried out using SPSS software version 25. The output of SPSS obtained was Pearson Correlation or as rcount and significance value (Sig). In this study, a method that compares the value of r_count is used. If rcount > rtable, then the data from the questionnaire is declared valid or true. The value of rtable can be seen in table R where the value of N is the number of respondents, namely 100 people and a significance value of 5% is 0.195. The results of the Convenience Level validity test can be seen in the following table:

Table 3. Value of R Count for indicator of Convenience

Indikator	r_{hitung}	r_{tabel}	Keterangan
The hight of kerb between sidewalk and road (min : 5-30 cm)	0.566	0.195	Valid
Condition of Signage ex. Evacuation Road Board	0.690	0.195	Valid
Condition of sidewalk for disability ex.be found guilding block)	0.698	0.195	Valid
Guardrail on the side of sidewalk	0.676	0.195	Valid
Width of sidewalk (min : 4 m)	0.502	0.195	Valid
Sidewalk surface condition (standart : not slippery)	0.721	0.195	Valid
Location of Street furniture (ex. Street light and rubbish bin)	0.722	0.195	Valid
Condition of trees (to take shelter)	0.529	0.195	Valid
The slope of sidewalk (water doesn't stagnate)	0.615	0.195	Valid
The channel cleanliness around the sidewalk	0.707	0.195	Valid
Location of street lighting (min. each 10 m)	0.658	0.195	Valid
The sidewalk cleanliness	0.670	0.195	Valid
Condition of sidewalk location (reachable)	0.605	0.195	Valid

Table 4. Value of R Count for Indicator of Importance

Indikator	r_{hitung}	r_{tabel}	Keterangan
The hight of kerb between sidewalk and road (min : 5-30 cm)	0.537	0.195	Valid
Condition of Signage ex. Evacuation Road Board	0.728	0.195	Valid
Condition of sidewalk for disability ex.be found guilding block)	0.713	0.195	Valid
Guardrail on the side of sidewalk	0.565	0.195	Valid
Width of sidewalk (min : 4 m)	0.764	0.195	Valid
Sidewalk surface condition (standart : not slippery)	0.720	0.195	Valid
Location of Street furniture (ex. Street light and rubbish bin)	0.719	0.195	Valid
Condition of trees (to take shelter)	0.525	0.195	Valid
The slope of sidewalk (water doesn't stagnate)	0.608	0.195	Valid
The channel cleanliness around the sidewalk	0.712	0.195	Valid
Location of street lighting (min. each 10 m)	0.700	0.195	Valid
The sidewalk cleanliness	0.735	0.195	Valid
Condition of sidewalk location (reachable)	0.599	0.195	Valid

4.6 Reliability Test

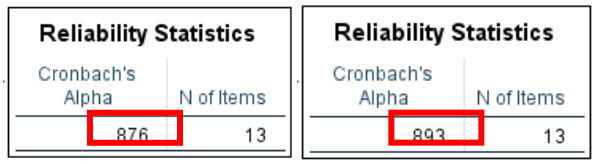

Figure 4. Value of Cronbach's Alpha for Convinience Indicator and Importance

Refer from the table above, the convinience indicator with Cronbach's Alpha value of 0.896 and importance with Cronbach's Alpha value of 0.89. From the 13 data, 13 have Cronbach's Alpha values > from 0.6, so it can be said that each of these variables is declared reliable / trustworthy.

4.7 Reliability Test

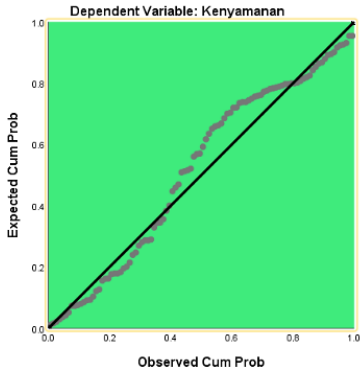

Figure 4. Graph of Normality

From the graph above, the points which are the result of the respondent's questionnaire data spread around the diagonal line and follow the direction of the diagonal line, so it can be said that the data is normally distributed.

4.8 Regression Linear Test

Table 1. Value of Significance and Value of t

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	18.194	5.471		3.326	.001
	KEPENTINGAN	.532	.099	.478	5.390	.000

a. Dependent Variable: KENYAMANAN

From the output of the coefficients table above, a decision can be made in a simple regression test as follows:

1. Based on the significance value
   From the coefficient table, obtained a significance value of 0.000 <0.05 so it can be concluded that the variable interest of sidewalk facilities (X) affects the pedestrian comfort variable (Y)
2. Based on the value of t:
   T table = (α/2 : n-k-1)
   = (0.05/2 : 100-1-1)
   =(0.025:98) [Viewed on the distribution of t-table values]
   =1,984

   It is known that the value of tcount is 5.390 > ttable of 1.984 so it can be concluded that the variable interest of sidewalk facilities (X) has an effect on the variable of pedestrian comfort (Y).

4.9 Importance Performance Analysis

In this study, it will be carried out to measure the level of satisfaction and the level of importance of the facility on the performance of the pedestrian path in the Dago - Bandung area which is felt by pedestrians. The level of importance and satisfaction will be described and plotted into four parts on the Cartesian diagram where the horizontal axis (X) is the level of satisfaction while the vertical axis (Y) is the level of importance.

4.10 Level of Compatibility

The level of compatibility analysis is the first stage in the analysis of the IPA method. The level of compatibility serves to determine the level of compatibility between the level of importance and the level of performance of the quality of the facility under study by comparing the performance score with the importance score.fttyio

Table 6. Level of Compatibility from Convenience dan Importance

No. Quisioner	Convenience	Importance	Compability	Explanation
1	388	428	90.65 %	Very Good
2	305	426	71.60 %	Good
3	367	441	83.22 %	Very Good
4	278	413	67.31 %	Good
5	376	392	95.92 %	Very Good
6	365	413	88.38 %	Very Good
7	361	430	83.95 %	Very Good
8	382	426	89.67 %	Very Good
9	363	420	86.43 %	Very Good
10	359	438	81.96 %	Very Good
11	377	422	89.34 %	Very Good
12	388	436	88.99 %	Very Good
13	394	412	95.63 %	Very Good

4.11 Priority Level Analysis

From the data, the results of a questionnaire about the perception of pedestrians walking analyzed using methods IPA seen that the graph IPA matrix as follows:

1. Quadrant I, which is the main priority, is the indicator condition of signage (2) location of the street furniture (7) and the channel cleanliness (10)
2. Quadran II achievement is maintained on indicators width of sidewalks, the height of kerb, condition sidewalk for disabilitas, condition of shelter, an the cleanliness of sidewals
3. Quadrant III, with low priority in handling, has an indicator guardrail on the side of sidewalk
4. Quadrant IV, which is categorized as excessive, width of sidewalk, sidewalk surface condition, the slope of sidewalk, the location of the street lighting, and the location of sidewalk.

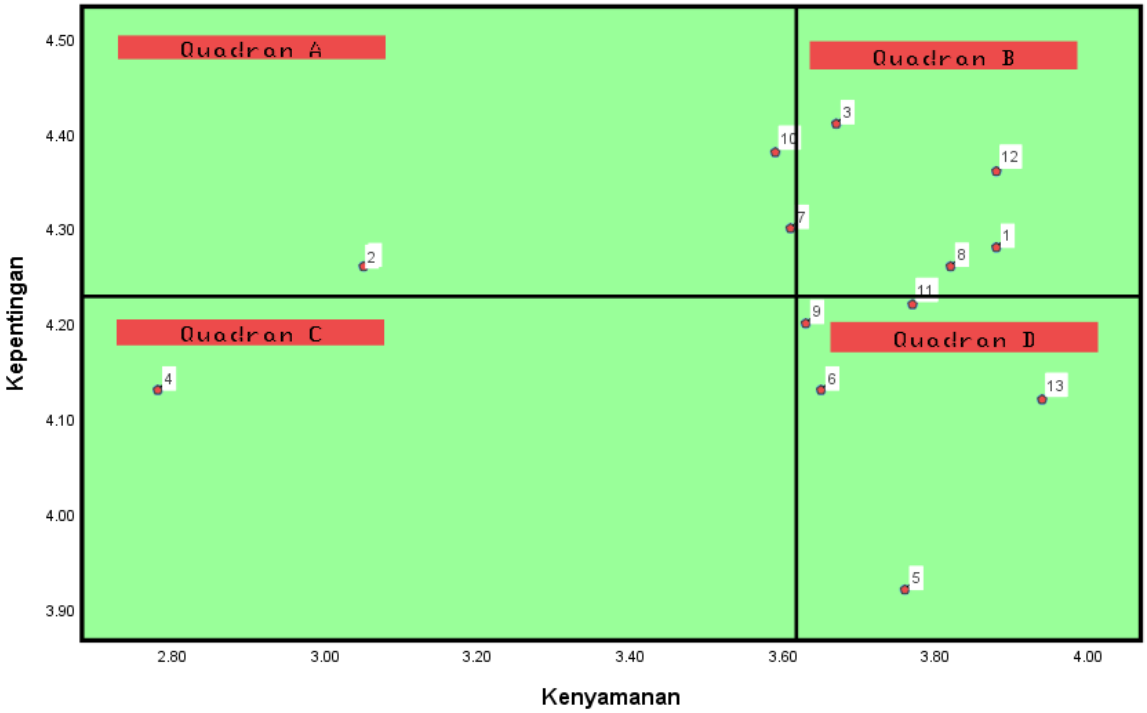

Figure 5. Cartesian Diagram of Importance and Comvenience

5. Conclussion

According to the survey results, on Monday it was found that the number of people crossing the sidewalk in both directions was 419 people/6 hours or 1.16 people/minute, and on Wednesday it was 470 people/6 hours or 1.31 people/minute. Meanwhile, on Sundays the number of people crossing the sidewalk in both directions is 899/6 hours or 2.49 people/minute. From the results of this survey, it can be seen that there is a high density of pedestrians on Sundays.

From the survey results, it can be seen that the sidewalks in the Dago - Bandung area have met the standards for pedestrians without special needs or with special needs.

According to the calculation of the Highway Capacity Manual, the average pedestrian flow at 15minute intervals is 1.64 people/m/minute and the average pedestrian area is 34.62 m^2/pedestrian. From this data, it can be seen that the criteria for the level of service for sidewalk facilities contained in the Regulation of the Minister of Public Works, sidewalks in the Dago - Bandung area are included in Standard A.

From the questionnaire data on pedestrian perceptions that have been analyzed using the Importance Performance Analysis (IPA) method, it shows that in Quadrant A the main priority is on indicators of information system conditions (signage), location of street furniture, and channel cleanliness. Quadrant B, which is a sidewalk facility whose performance must be maintained, is found in the indicators of the height of the ker between the sidewalk and the road, the condition of the sidewalk for people with disabilities, the condition of the trees as shade, and the cleanliness around the sidewalk. Quadrant C, which is a sidewalk facility with low priority in handling, is only found in 1 indicator, namely the guardrail on the side of the sidewalk. Finally, quadrant D, which is excessive sidewalk facilities, is found in indicators of the width of the sidewalk, the condition of the pavement surface, the slope and slope of the sidewalk, the location of the lighting and the condition of the sidewalk. From the quadrants of the IPA method, it can be seen that the condition of the information system, the location of the street furniture and the cleanliness of the channel need improvement in order to create better comfort for pedestrian users.

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Comparison Analysis of Plaster Aci Wall Finishing Method With Stick on Wall

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Abstract

With the development of technology in the world of building materials, it is demanded that related parties include stakeholders to be able to respond and think effectively and efficiently which of course can be harmonized with the motto of the construction world, namely BMW (cost, quality, time) as well as the demands for the speed of construction projects causing manufacturers to materials compete to create new materials that can speed up the building construction process. Today a lot of products are popping up as a result of innovative creative ideas in order to compete to be the best. For the current building material products that have been and or are on the rise, one of them is the development of technology regarding wall finishing work. The wall is one of the non-structural elements in buildings, both low-rise and high-rise buildings must use this material. Wall finishing work usually uses wall plaster. Wall plaster on lightweight bricks is generally a mortar that has been mixed during the manufacturing process with a formulation that has been tested so that it has better properties than sand cement mortar which is generally mixed in the field, easy to use just by adding enough water and stirring until evenly distributed manually or by machine. stirrer. (license brochure, plaster). However, in recent years there have been developments in wall plastering materials, the emergence of gypsum walls which is a new material as an alternative to lightweight brick plastering in wall construction. This gypsum wall innovation is known for being faster and cheaper but has shortcomings in terms of quality and durability when compared to plastering. In this study the authors review the wall finishing work on the Grand Sungkono Lagon Apartement project which is located on Jl. KH Abdul Wahab Siamin. Where in this project using wall finishing in the form of stucco and stick on wall (gypsum wall). This became the basis of the research, namely by comparing wall plastering using aci plaster with wall plastering replaced using gypsum (stick on wall). The goal to be achieved in writing this scientific paper is to find out which method of construction of wall work is more efficient between the two methods of wall plastering and replacement of wall plastering.

Keywords
Aci Plaster, PT.Atap Perkasa, Stick On Wall

1. Introduction

1.1 Background Behind

In this study the authors review the wall finishing work on the Grand Sungkono Lagon Apartement project which is located on Jl. KH Abdul Wahab Siamin, Surabaya. In this project using wall finishing in the form of stucco and Stick on Wall (gypsum wall). This is the basis of the research, namely by comparing wall plastering using aci plaster with wall plastering replaced using gypsum (Stick on Wall). So based on this description, this study analyzed the comparison of time efficiency of workmanship and ease of wall finishing work.

The research was conducted to compare the two finishing methods in terms of implementation time with the work study method . According to Andardi and Faris Rizal (2019) work study is a technique that includes analysis and working time in a job. Work studies can be used to (a) collect information which will support decision-making that is intended for systematic analysis to address existing problems, (b) determine the time required for qualified workers in a particular job and eliminate factors that make work ineffective. This research uses the work study method because from this method obtained direct observation data from the field so that the data obtained is more accurate . The goal to be achieved in writing this scientific paper is to find out which method of construction of wall work is more efficient between the two methods of wall plastering and replacement of wall plastering.

1.2 Overview References

According to Ismail Marzuki (2017) explains that the wall is a solid structure which limits and sometimes protects an area. Generally, walls limit a building and supports other structures, limiting the space in the building Becomes rooms, or protect and limit something room in nature open.

According to Taufik Dwi Laksono (2010), there are several kinds of plastering work, including vertical wall plastering, floor plastering and brick plastering work. From several kinds of plastering work above, it will have different productivity. This is because each job will have factors that affect its own work productivity. Vertical wall stucco work is the work of covering the masonry with mortar so that a flat and smooth wall face area and a straight and vertical or upright wall face area will be obtained.

According to Arifatul Husna (2016) explaining that gypsum is one example of a mineral with a dominant calcium content in the mineral. In a balanced state, gypsum which is above a temperature of 108°F or 42°C in pure water will turn into anhydrite. Currently, gypsum as a building material is used to make gypsum boards and propyl as a substitute for plywood.

Stick On Wall is a wall covering made of gypsum board covered with thick paper which must be strengthened by a collection of glue/bond components as an adhesive to a lightweight brick wall. Stick on wall is a product with the latest technology using quality materials and experienced experts. an innovative product assembled by a certain company using quality imported materials based on requirements.

2. Methodology

The work to be observed in the Grand Sungkono Lagon Apartement project. Field observations were carried out for approximately 1 month. The object being observed is a craftsman who works in groups. The builders are grouped according to several jobs, namely land preparation work, material preparation, installation of gypsum walls, plaster and wall plaster. Observers must first observe several work cycles to understand the work cycle to be studied and by obtaining explanations from supervisors or workers.

Work study involves 2 main stages, namely:

Planning

The thing that should not be missed is planning for field observations so that when in the field observations can be carried out correctly. The equipment that must be prepared to conduct observations and prepare work study forms are as follows:

a. O'clock
b. Stationary
c. Field data form
d. Shop Drawing
e. Data collection in the field

This section is a realization to do what was previously planned, namely to fill out a field data form that contains: time observation long job . Observed work _ that is profession marking , mixing matrial , land preparation , matrial material , and installation . These data were obtained during field observations. Calculation of time in the field begins at the beginning of the first activity and the clock is not stopped until all activities are completed. The ineffective time encountered during the observation, it is also calculated and recorded. This ineffective time includes rest and relaxation, correcting mistakes, waiting time due to distractions such as waiting for materials, waiting for other workers, and so on. so this time inefficient can be taken as a continuous calculation.

3. Result and Discussion

This study aims to analyze the productivity of workers on the job Plaster Aci and Stick On Wall at the Grand Sungkono Lagon Apartement project, which is located on Jl. KH Abdul Wahab Saiman. Method research used _ that is method work studies . Live data retrieval done field observations . _ The data is in the form of observe time which is then processed Becomes basic time and standard time .

Each work on aci plaster walls and stick on wall walls will be analyzed for worker productivity to compare the actualization in the field with what was planned. Observations to collect primary data were carried out in approximately 1 month during the research period. Observations are carried out on weekdays (Monday-Saturday) while the observation time starts at 08.00-17.00, with rest periods adjusting to field conditions. For more details can be seen in the flow chart image.

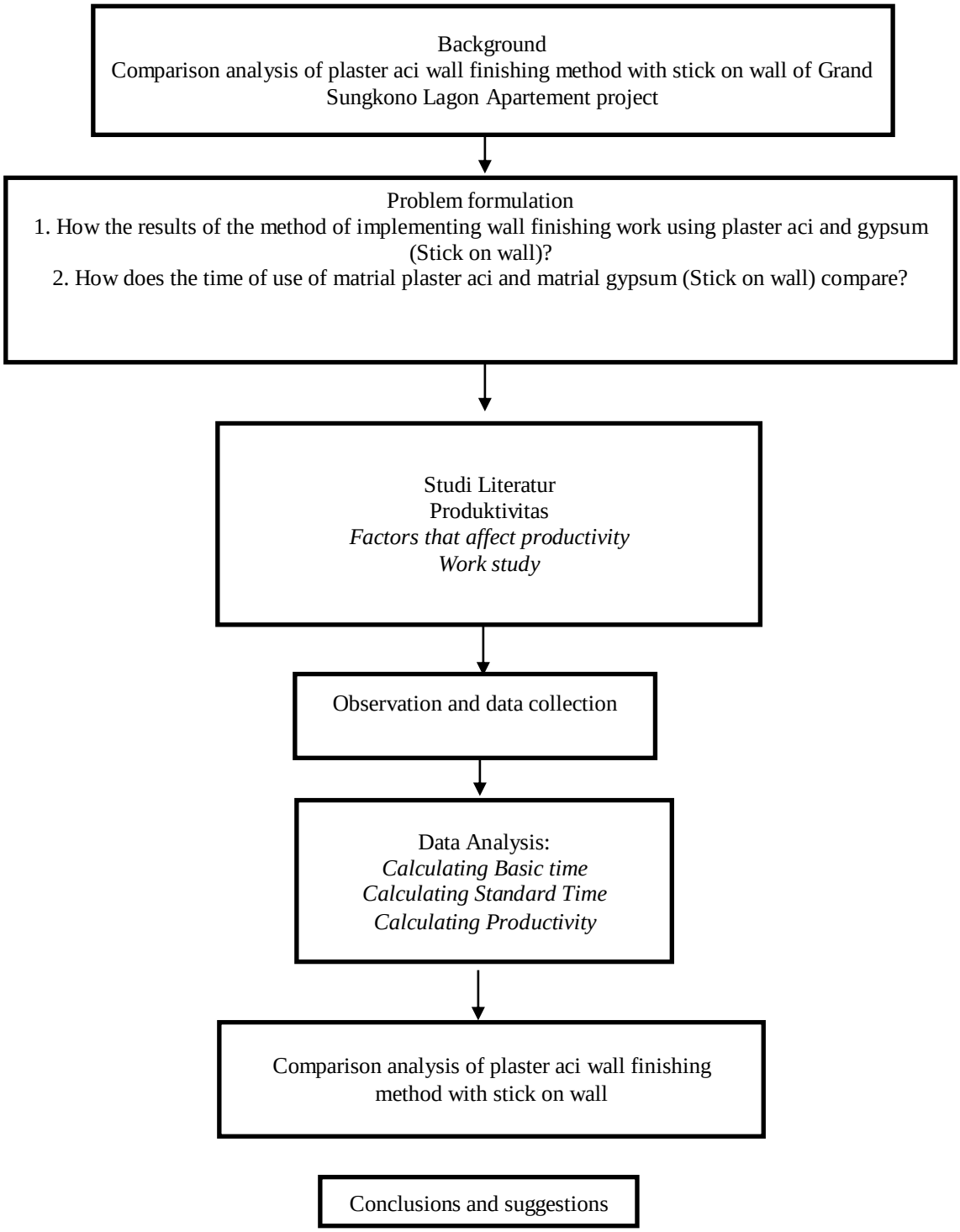

Figure : Research flow chart

The research steps are planned as follows:

1. Background : Describes the background of the research on labor productivity analysis.
2. Problem Formulation : Explaining the things that are the problem and the main discussion in writing this final project.
3. Literature study : Looking for existing theories to support the work of the final project.
4. Field Observation : Observing the work that will be calculated for the productivity of workers. In this case, it is plaster work and stick on wall.

5. Data Collection : Collecting data in the field through direct observation. This observation takes field workers as the object, namely the difference between plaster and stick on wall walls. Data collection is done by recording the duration of a job, the number of workers and the quantity of work.
6. Data Analysis : The data that has been collected will be analyzed using the time study method

The data that have been obtained from the field include:

Standard Time , is the sum of basic time , relaxation allowances and contingency allowances . The values of basic time and relaxation allowances were obtained from the field observation form. Then the total basic time is calculated on the summary form, and the total value of the basic time is added up with the value of relaxation allowances and contingency allowances on the conclusion form to get the standard time value .

Quantity of Work: is primary data that contains the volume of work and is obtained from shop drawings.

Number of Workers: is the primary data obtained when the observations were made.

Productivity

Factors affecting worker productivity, this data was obtained after calculating the value of worker productivity and adjusted for the number of workers and conditions in the field that occurred during observations.

7. Conclusions and Suggestions: From working on this final project, conclusions can be drawn regarding worker productivity in plastering aci and stick on wall work, and also knowing what factors hinder worker productivity on the project, as well as optimizing labor productivity.

4. Conclussion and Suggestion

4.1 Conlussion

1. The method of carrying out wall finishing work using aci plaster is slower than stick on wall because one installation gets 2.88 m2, and installation is easier because you only need to glue the stick on wall material to the plaster. The materials for gluing are also cheap and easy to obtain. in addition to having a high level of durability and stability. While plaster aci tends to be slow because it requires a longer step, and also requires more workers if you want to speed up the work, besides that the results of the work are not necessarily neat depending on the skills of the craftsman.
2. Productivity of correct plaster The comparison of the overall productivity of the craftsmen is greater than the productivity of the non-workmen and the productivity of SNI. The overall average productivity for builders is 9.14 m2/day while the overall average productivity for builders is not 6.35 m2/day, and. Comparison of the overall productivity value between workers who are not and builders is 1:1,44. If Stick on the wall Productivity whole = 1.9015 m2 / hour.

4.2 Suggestion

This study only examines the productivity comparison between Acid and Stick on Wall Plaster in 1 different project using the Work Study method. This study only counts on the variable ability of the workforce. Research with the Work Study method is very useful for every company that wants to evaluate the shortcomings of each workforce on construction projects so that they get a productivity archive of each workforce that is useful in determining construction project planning. This study has a drawback, namely that it does not calculate the motivation and competitiveness variables. Therefore, it is recommended for further researchers to continue this research in terms of evaluating the workforce with wider variables as well as other research studies with different work objects so that there are more benchmarks in construction education.

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Analysis of Road Damage Using the PCI Method (Case Study on Tambak Osowilangon Road)

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Abstract

Road is a land transportation infrastructure which includes all parts of the road, including complementary buildings and equipment intended for traffic that is at ground level, above ground or water level, above water level, except for trains, lorries and cable roads. The use of roads can help improve the economy, therefore periodic maintenance is needed. This research was conducted on the Tambak Osowilangon road using the location survey method and calculating the amount of damage and the PCI method. The results of this study are expected to be useful to determine the feasibility of the Tambak Osowilangon road as a benchmark for future improvements.

Keywords
Osowilangon, Pavement, PCI, Road Damage

1. Introduction

The highway is one of the important means of land transportation in daily life, in the Law of the Republic of Indonesia no. 38 of 2004 concerning road infrastructure, it is stated that roads as part of the national transportation system have an important role in realizing the development of the nation. In general, roads are built to facilitate community mobility in transportation and socio-economic activities in the community. The existence of roads is very necessary to support the pace of economic growth, trade, and other needs.

The sustainable use of roads will cause damage to roads that cause losses to road users so that they are not in accordance with the planned age of the road. Road damage requires research to determine the condition of the road surface by making visual observations. Road condition surveys need to be carried out periodically, both structural and non-structural, to determine the level of existing road services. Non-structural inspection aims to check the flatness (roughness), roughness (texture), and roughness (skid resistance).

Pavement Condition Index(PCI) is an estimate of road conditions with a rating system to state the actual pavement condition with reliable and objective data. This method is used to monitor damage on the highway because with this method accurate data is obtained according to the original conditions in the field. The PCI level is written as having a range of 0 to 100 with the criteria of perfect (excellent), very good (very good), good (good), moderate (fair), poor (poor), very poor (very poor), and failed (failed).

2. Methodology

2.1 Pavement Condition Index

Pavement Condition Index(PCI) is an estimate of road conditions with a rating system to state the actual pavement condition with reliable and objective data. The PCI method was developed in America by the US Army Corp of Engineers for airport pavements, highways and parking areas, because with this method accurate data and condition estimates are obtained according to conditions in the field. The PCI level is written as having a range of 0 to 100 with the criteria from Fail to Perfect According to Shahin and Ibrahim (2020) the condition of the pavement is divided into several levels as shown in the following table and diagram:

Table 1. PCI level

PCI value	Pavement Condition
0-10	Failed
10-25	Very Poor
25-40	Poor
40-55	Fair
55-70	Good
70-85	Very Good
85-100	Exellent

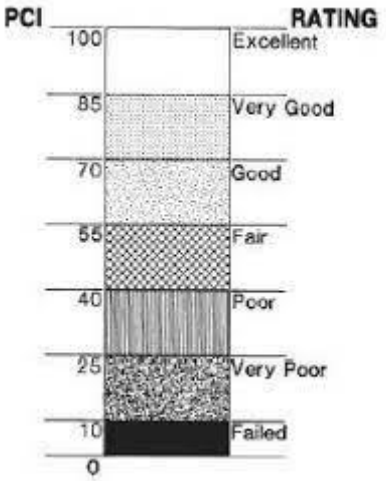

Figure 1. PCI Diagram

The PCI method provides information on pavement conditions only at the time of the survey, but cannot provide a predictive picture in the future. However, by conducting periodic condition surveys, information on pavement conditions can be useful for predicting future performance, as well as being used as input for more detailed measurements.

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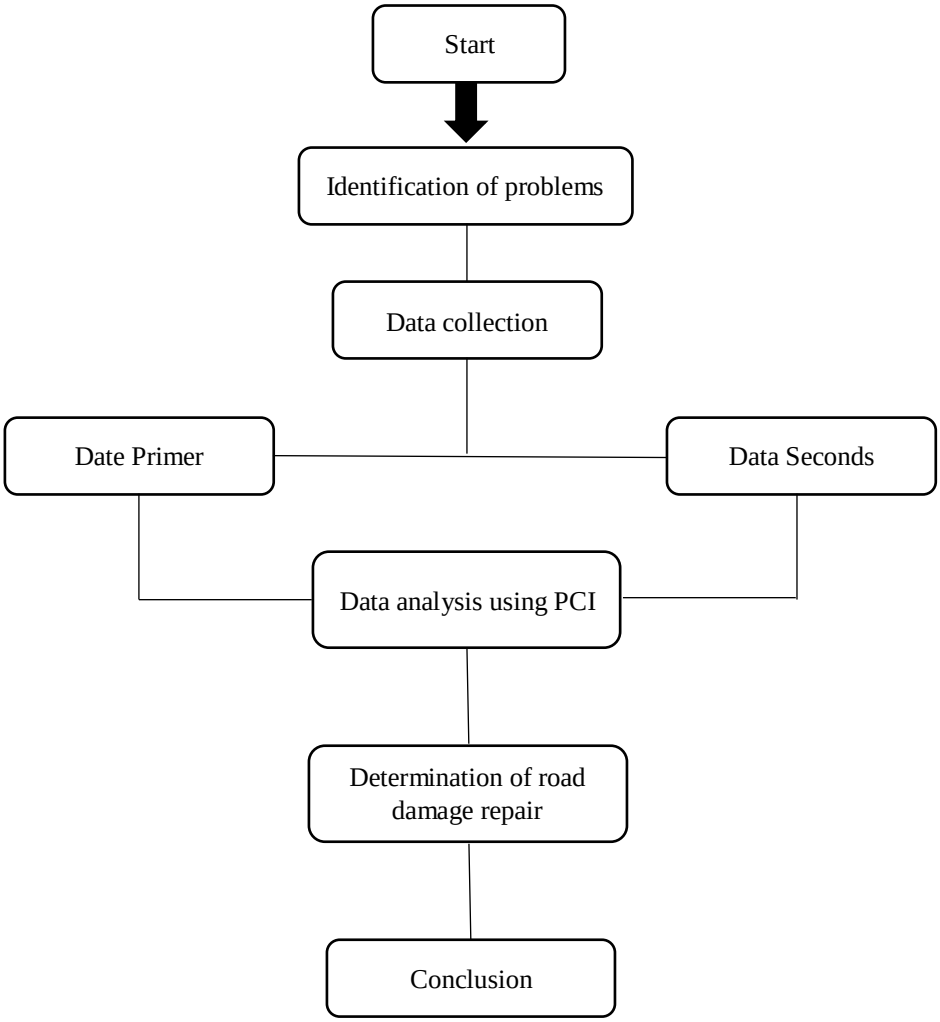
2.2 Research Chart



Flowchart 1. Research Chart

3. Result and Discussion

3.1 PCI Method

The following are the types of damage obtained after conducting a field survey on the Osowilangon road section STA 0+000 – 0+100:

Table 2. Density of Segment 1

Section	Code	Type of Road Damage	Size of each Damage			Damage Class
			P (m)	L (m)	A (m2)	
1+000 - 1+100	1	Alligator Cracking	4.3	0.8	3.44	L
	1	Alligator Cracking	23.6	3.1	73.16	M
	1	Alligator Cracking	19.8	2.4	47.52	M
	11	Patching & Util. Cut Patching	9.8	1.9	18.62	L
	1	Alligator Cracking	0.7	1	0.7	L
	1	Alligator Cracking	1.9	0.9	1.71	L
	1	Alligator Cracking	18.2	2.4	43.68	M
	13	Potholes	0.4	0.5	0.2	M
	6	Depression	2.8	1.4	3.92	L

3.2 Determining the Deduct Value (DV)

Deduct Value is the reduction value for each type of damage obtained from the curve of the relationship between density and severity of damage per type of damage in one segment. If the severity of the damage is different, then the highest level of damage is taken. Here is the DV for STA1+000 – 1+100

Table 3. Deduct Value of Segment 1

Type of Road Damage	Class	Deduct Value
Alligator Cracking	L	5.6
Alligator Cracking	M	50
Depression	L	4
Patching & Util. Cut Patching	L	3.6
Potholes	M	5
Total :		68.2

3.3 Determining the PCI Value

After getting the CDV value, the PCI value can be determined by: PCI = 100 – CDV = 100 – 42 = 58 So it can be concluded that STA 1+000 – 1+100 has a PCI value = 58 which means the pavement condition in that segment =Fair.

In this study, road damage was calculated on the Sijunjung road section starting from STA 0+000 – 1+900 (2 km) and the PCI calculation results obtained that the road section was in Fair condition. The calculation of the PCI value per km can be seen in the following table

Table 4. PCI Calculation

Segment	IS	CDV max	PCI	Condition Rating
1	0+000 - 0+100	42	58	Good
2	0+100 - 0+200	63	37	Poor
3	0+200 - 0+300	53	47	Fair
4	0+300 - 0+400	38	62	Good
5	0+400 - 0+500	44	56	Good
6	0+500 - 0+600	57	43	Fair
7	0+600 - 0+700	47	53	Fair
8	0+700 - 0+800	37	63	Good
9	0+800 - 0+900	40	60	Good
10	0+900 - 1+000	25	75	Very Good
11	1+000 - 1+100	24	76	Very Good
12	1+100 - 1+200	27	73	Very Good
13	1+200 - 1+300	85	15	Very Poor
14	1+300 - 1+400	77	23	Very Poor
15	1+400 - 1+500	55	45	Fair
16	1+500 - 1+600	34	66	Good
17	1+600 - 1+700	35	65	Good
18	1+700 - 1+800	53	47	Fair
19	1+800 - 1+900	33	67	Good
			54.2	Fair

3.4 Metode Asphalt Institute

From the results of the PCI calculation, a value of 54.2 is obtained which means it is sufficient, so for recommendations for improvement using the methodAsphalt Instituteis like the picture below

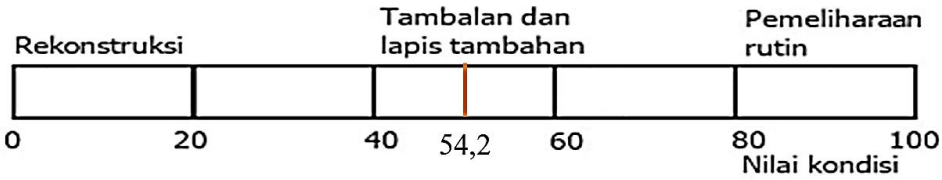


Figure 2. Asphalt Institute Method

Which shows the road is in sufficient condition, then the road which is damaged with potholes needs to be patched and overlaid so that the former patch and cracks and other damages that occur along the road are covered. by hotmix asphalt so that water does not quickly seep into the road layer which causes the damage to be getting worse.

3.5 Road Repair Value

By knowing the results of the recommendations from the calculation of the Asphalt Institute Method, it can be concluded that the repair only includes patching and re-coating, with a detailed price of around Rp. 75,000 for overlay or re-coating. Patching will be carried out on potentially dangerous roads such as damage to holes and cracks, then the value of repairing the Tambak Osowilangon road is as shown in the following table

Table 5. Road Repair Value

No	Damage type	Level	Damage Area (m2)	Repair Price (m2)
1	Alligator Cracking	L	505	Rp 37,875,000
2	Patching & Util. Cut Patching	H	70	IDR 5,250,000
3	Patching & Util. Cut Patching	L	305	Rp 22,875,000
4	Potholes	L	3.57	IDR 267,750
5	Long & Trans Cracking	L	14.6	Rp 1,095,000
6	Rutting	H	10.9	IDR 817,500
7	Rutting	L	153.2	IDR 11,490,000
				IDR 79,670,250

3.6 Road Damage Factor

After we know the PCI value & Damage Value, it is also necessary to know the factors that cause damage to Jalan Tambak Osowilangon. Interviews were conducted using a purposive technique with five key informants conducted around Jalan Tambak Osowilangon. The informants who were interviewed intensively used names using initials, namely RB, TN, SH, LQ and LR.

Data that were not collected through interviews were supplemented with data from direct participant observations conducted between December and January. All data in this survey is described as follows, based on the focus of the survey questions:

1. Type of motorized vehicle?

All interviewees answered that they passed Tambak Osowilangon road using 2-wheeled vehicles or motorbikes.

2. How often do you pass by Jalan Tambak Osowilangon?

Because there are 2 resource persons who work across the cities of Surabaya and Gresik, on average they pass through the Tambak Osowilangon road 3-4 days a week. And 3 resource persons are natives of the Tambak Langon road, so they pass that road every day.

3. Experience passing the Tambak Osowilangon road?

On average, the respondents answered poorly, the number of potholes and road damage made it uncomfortable for the interviewees to pass through the Tambak Osowilangon road, especially when the rainy season often floods.

4. The factors that made the Tambak Osowilangon road into what it is today?

All interviewees answered that the large volume of vehicles caused the road conditions to worsen. The addition of flooding and the lack of maintenance of the roads and drainage system there resulted in the

Tambak Osowilangon road becoming even worse. (Dinata, Rahmawati, and M 2017)

4. Conclussion and Suggestions

4.1 Conclusion

1. The damage that occurred on Jalan Tambak Osowilangon was dominated by crocodile skin damage (Alligator cracking) of 29.37%, Depression of 17.9%, Groove (Rutting) of 13.5% and patching of 17%. . In addition, the damage caused by not being carried out properly and appropriately in response to (Road Maintenance) (puncture damage due to minor damage of unknown cause, such as a gap becoming a hole).
2. After analyzing the calculation using the PCI method, the average PCI value is 54.2 which indicates the condition of the road pavement is in Fair condition.
3. After obtaining the results of field analysis and calculating values according to the PCI method, the condition of the road damage provides recommendations for road repairs using the Asphalt Institute MS-17 method, namely patching and overlaying with a total repair value of Rp.79,670,250
4. The factors that caused the Tambak Osowilangon road to be damaged according to the results of surveys and interviews were the large volume of large vehicles and the frequent rains, causing flooding every rainy season.

4.2 Suggestion

From the findings of the evaluation of the level of damage to the Jalan Tambak Osowilangon section, the researchers tried to provide limited suggestions for the damage that occurred on the road section. The suggestions that can be given are:

1. In order for this road to remain in good condition, it is necessary to review the existing maintenance system by creating a programmed maintenance system that is actually in accordance with the identification of the damage that occurred in order to save the existing road repair budget.
2. For further research, this method (PCI) can be compared with other methods such as Highways and Asphalt Institute to determine road surface conditions

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Analysis of Parking Capacity and Road Performance in Cileungsi-Bogor Market

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Abstract

Cileungsi Market which is located on Jln Raya Narogong, Cileungsi Kidul Village, Rt. 03/06 Kec. Cileungsi Kab. Bogor. As a trading center. Therefore, the Cileungsi Market area needs to optimize and improve the performance of the area itself. One of the facilities that need to be optimized for its performance is the parking lot. This study aims to analyze the volume of vehicles entering and leaving the Cileungsi market area, to analyze the characteristics and parking needs of the Cileungsi Market area, to provide parking management solutions to maximize the existing parking capacity in the Market area, to determine the performance of roads in the area. cileungsi market. The method used in this research is a field survey by recording the types of vehicles entering and leaving the parking area and taking data on the condition of the roads in the Cileungsi market area. The results of the analysis of the maximum parking volume of 384 cars and 2174 motorcycles Maximum accumulation of 92 cars and 293 motorcycles. The average parking duration for cars is 1.07 hours/vehicle and 1.45 hours/vehicle for motorbikes. The maximum parking turnover rate is 1 vehicle/SRP/time for cars and 1 vehicle/SRP/time for motorbikes. The maximum parking index is 81.42% for cars and 73.80% for motorbikes. The results of the analysis of the performance of the Jln. Raya Narogong traffic flow and average speed is quite stable. with an average level of service or Level of Service (LOS) which is C from the average value of the Degree of Saturation, which is 0.53.

Keywords
Cileungsi Market, Degree of Saturation, Parking characteristics, Parking Facilities, Road Performance.

1. Introduction

Parking is a problem that is often encountered in transportation systems that often occur in big cities, and parking problems can affect vehicle movement, where vehicles pass through places that have a high level of activity.(Rifai et al. 2020).

In general, the market is a place for transaction activities that bring together the flow of goods/services and their users. The market is a generator (stimulator) of the growth of a region or region. According to the study of economics, the market is a place or process of interaction between demand (buyers) and supply (sellers) of a particular good or service. This happens because of the dual function of the market as a collector of goods and services as well as a distribution center. These activities will cause a concentration of activity so as to cause attraction to travel to the market(Lestari, Mataram, and Purbanto 2016).

One of them is the Cileungsi Market which is located on Jln Raya Narogong, Cileungsi Kidul Village Rt.03/06 Kec.Cileungsi Kab. Bogor. The goods sold in the market are very diverse, ranging from daily necessities such as food, clothing, electronic goods.

As a trading center. Therefore, the Cileungsi Market area needs to optimize and improve the performance of the area itself. One of the facilities that need to be optimized for its performance is the parking lot.

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As a trading center. Therefore, the Cileungsi Market area needs to optimize and improve the performance of the area itself. One of the facilities that need to be optimized for its performance is the parking lot

2. Methodology

Data collection in this study used 2 data, namely primary and secondary data.

In this study, the data used to perform the analysis are primary data obtained from the results of field surveys and secondary data from related agencies.

2.1 Primary data

Primary data that can go directly to the field survey and some observations in the study include:

1. Street geometry
2. Traffic flow volume
3. Parking vehicle data

2.2 Primary data

Secondary data can be obtained from relevant agencies and personal data. Data to be collected in The research is as follows:

1. Location map
2. Number of parking space units (SRP)

3. Result and Discussion

3.1 Parking Characteristics

A reference in the measurements used in parking characteristics are:

3.1.1 Parking Volume

Parking volume is the number of vehicles included in the parking load (ie the number of vehicles per certain period of time, usually per day).

Table 1.Vehicle Volume Saturday, November 13, 2021

Time	Car			Time	Motorcycle		
	Enter	Go out	Volume		Enter	Go out	Volume
Abandoned Vehicles	6	0	0	Abandoned Vehicles	32	0	0
08.00 - 08.59	98	12	104	08.00 - 08.59	169	32	201
09.00 - 09.59	10	78	108	09.00 - 09.59	211	157	380
10.00 - 10.59	14	23	24	10.00 - 10.59	198	128	409
11.00 - 11.59	18	10	32	11.00 - 11.59	163	198	361
12.00 - 12.59	4	14	22	12.00 - 12.59	100	121	263
13.00 - 13.59	17	15	21	13.00 - 13.59	143	144	243
14.00 - 14.59	23	6	40	14.00 - 14.59	74	177	217
15.00 - 16.00	10	36	33	15.00 - 16.00	26	127	100
Total	200	194	384	Total	1116	1084	2174
Maximum Parking Volume			108	Maximum Parking Volume			409

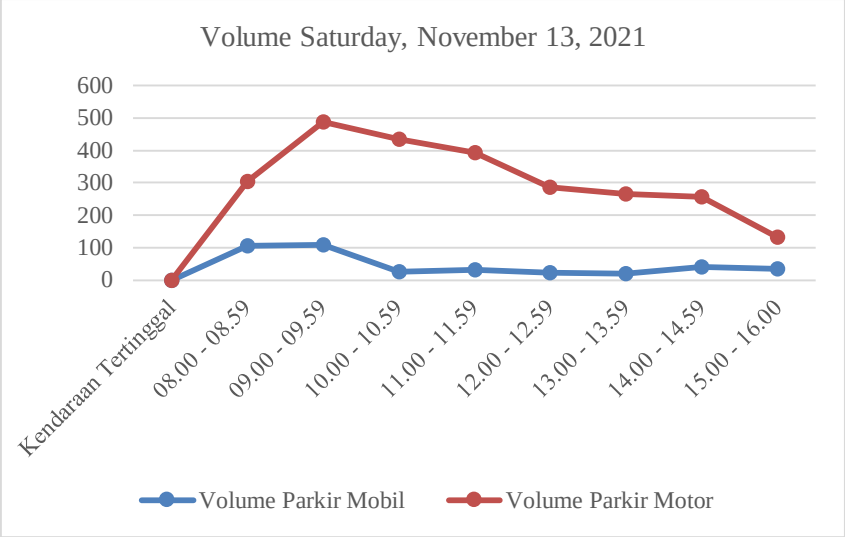

Figure 1. Parking Volume Graph Saturday, November 13, 2021

3.1.2 Parking Accumulation

Parking accumulation is needed to see how many vehicles are parked at specific time intervals.

Table 2.Parking Accumulation Saturday, November 13, 2021

Time	Car		Car Parking Accumulation	Time	Motorcycle		Motorcycle Parking Accumulation
	Enter	Go out			Enter	Go out	
Abandoned Vehicles	6	0	6	Abandoned Vehicles	32	0	32
08.00 - 08.59	98	12	92	08.00 - 08.59	169	32	169
09.00 - 09.59	10	78	24	09.00 - 09.59	211	157	223
10.00 - 10.59	14	23	15	10.00 - 10.59	198	128	293
11.00 - 11.59	18	10	23	11.00 - 11.59	163	198	258
12.00 - 12.59	4	14	13	12.00 - 12.59	100	121	237
13.00 - 13.59	17	15	15	13.00 - 13.59	143	144	236
14.00 - 14.59	23	6	32	14.00 - 14.59	74	177	133
15.00 - 16.00	10	36	6	15.00 - 16.00	26	127	32
Total	200	194	226	Total	1116	1084	1613
Maximum Accumulation			92	Maximum Accumulation			293
Average Accumulation			25.11	Average Accumulation			179.22

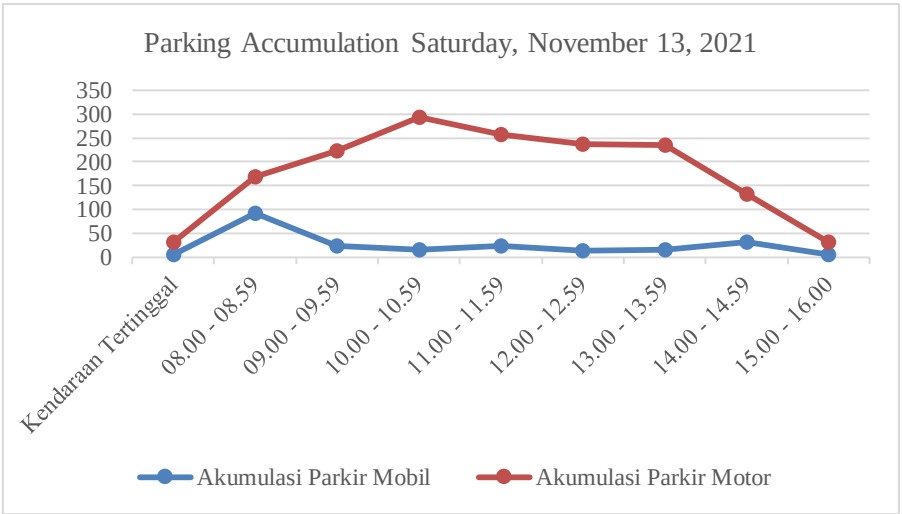

Figure 2. Graph of Parking Accumulation Saturday, November 13, 2021

3.1.3 Parking Duration

Parking accumulation is needed to see how many vehicles are parked at specific time intervals. The highest average duration on Monday, November 15, 2021 is:

Table 3.Parking Duration Saturday, November 13, 2021

Car			Motorcycle		
Parking Duration (Hours)	Number of vehicles	Number of Vehicles* Parking Duration	Parking Duration (Hours)	Number of vehicles	Number of Vehicles* Parking Duration
0-1	196	143	0-1	931	931
2	2	4	2	74	148
3	0	0	3	46	138
4	2	8	4	39	156
5	0	0	5	20	100
6	0	0	6	6	35
7	0	0	7	0	0
8	0	0	8	0	0
Total	200	155	Total	1116	1509
Average Parking (Hour/vehicle)		0.78	Average Parking (Hour/vehicle)		1.35

With this formula, the average duration of car parking on Saturday, November 13, 2021 is :155/200 = 0.78 hours

The average car park Saturday, November 13, 2021 is a short type of parking.

1. Short parking type approx. 196 + 2 = 198 Vehicles
2. Moderate parking type approximately = 2 Vehicles
3. Parking type length approx = 0 Vehicles

With this formula, the average duration of motorbike parking on Saturday, November 13, 2021 is: 1509/1116 = 1.35 hours

The average motorbike parking on Saturday, November 13, 2021 is a short type of parking.

1. Short parking type approx. 931 + 74 = 1005 Vehicles
2. Moderate parking type is around 46 + 39 = 85 Vehicles
3. Long parking type about 20 + 6 = 26 Vehicles

3.1.4 Parking Index

Index It is a percentage of the maximum parking accumulation which has been parked in one parking space then divided by the number of existing parking spaces. The maximum parking index is on Saturday, November 13, 2021, namely:

Table 4.Parking Index Saturday, November 13, 2021

Time	Car			Motorcycle		
	Parking Accumulation	Parking Space Available	Parking Index	Parking Accumulation	Parking Space Available	Parking Index
Vehicles left behind	6		5.31%	31		7.81%
08.00 - 08.59	92		81.42%	169		42.57%
09.00 - 09.59	24		21.24%	223		56.17%
10.00 - 10.59	15		13.27%	293		73.80%
11.00 - 11.59	23	113	20.35%	258	397	64.99%
12.00 - 12.59	13		11.50%	237		59.70%
13.00 - 13.59	15		13.27%	236		59.45%
14.00 - 14.59	32		28.32%	133		33.50%
15.00 - 16.00	6		5.31%	32		8.06%
Maximum Parking Index		81.42%			73.80%	
Average		22.22%			45.12%	

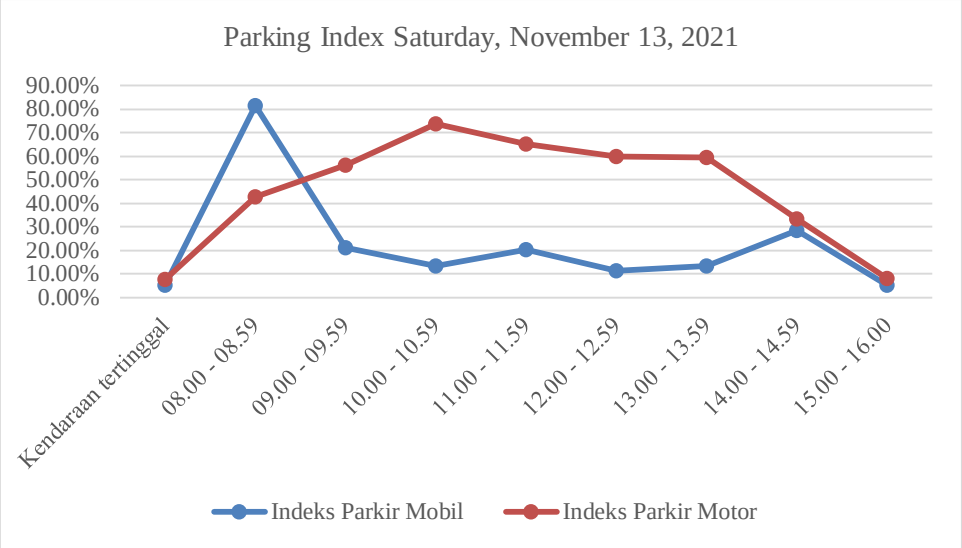

Figure 3. Graph of Parking Index Saturday, November 13, 2021

3.1.5 Parking Turnover Rate (PTO)

The parking turnover rate (Parking Turn Over) can show the level of use of parking spaces obtained from the division between the volume of vehicles and the number of parking spaces available during the observation time.

Table 5.Parking Turnover Rate (PTO)

Vehicle Type	Time	Parking Volume (Vehicle)	Number of Available Tiles (SRP)	Turnover (Vehicle)
Car	08.00-08.59	108	113	0.95
Motorcycle	10.00-10.59	409	397	1.03

3.1.6 Prediction of Parking Needs

The prediction calculation of parking demand used is using the increase in the number of residents per year in the Cileungsi sub-district because the authors did not get parking data for the previous year. The calculation results can be used as an estimate of how long the parking space available at Cileungsi Market can meet the parking demand each year. The results of the calculation are not a form of real need but only a formula used in determining parking spaces for the following year. Assuming an increase in population growth that occurred in 2018 to 2019 with an increase of 4.62%.

Table 6.Prediction of Parking Needs for the Next 5 Years

Year	Car Needs	Available Capacity (SRP)	Motorcycle Needs	Available Capacity (SRP)
2021	92	113	293	397
2022	96	113	306	397
2023	100	113	320	397
2024	105	113	335	397
2025	109	113	351	397
2026	115	113	367	397

The following is an example of calculating population growth expressed in percent:

Σ Mobil $\times (1+i)^n$

$92 \times (1+0{,}0462)^1 = 96$

From table IV-18 above are the results of calculating the need for car parking in 2026 as many as 115 vehicles, showing the available parking capacity is not sufficient for car parking in the next 5 years and the need for motorcycle parking in 2026 as many as 367 vehicles, showing the available parking capacity. still sufficient for motorcycle parking needs in the next 5 years.

3.2 Road Performance

3.2.1 Traffic Volume

Table 7.Traffic Volume During Peak Hours Monday, 22 November 2021

Time	Direction	Number of vehicles			Total vehicles/hour
		LV	HV	MC	
07.00-08.00	1	241	51	2136	2428
	2	322	68	1372	1762
	Total	563	119	3508	4190
07.15-08.15	1	238	50	2097	2385
	2	333	81	1385	1799
	Total	571	131	3482	4184
07.30-08.30	1	249	50	1981	2280
	2	330	74	1391	1795
	Total	579	124	3372	4075
07.45-08.45	1	258	54	1900	2212
	2	336	85	1451	1872
	Total	594	139	3351	4084
08.00-09.00	1	256	62	1764	2082
	2	322	82	1560	1964
	Total	578	144	3324	4046
11.00-12.00	1	142	108	1102	1352
	2	247	180	1037	1464
	Total	389	288	2139	2816
11.15-12.15	1	163	112	1114	1389
	2	292	199	995	1486
	Total	455	311	2109	2875
11.30-12.30	1	205	109	1124	1438
	2	317	222	961	1500
	Total	522	331	2085	2938
11.45-12.45	1	243	104	1123	1470
	2	335	243	928	1506
	Total	578	347	2051	2976
12.00-13.00	1	255	114	1082	1451
	2	343	243	866	1452
	Total	598	357	1948	2903
16.00-17.00	1	218	193	1114	1525
	2	309	143	1608	2060
	Total	527	336	2722	3585
16.15-17.15	1	204	197	1285	1686
	2	277	152	1498	1927
	Total	481	349	2783	3613
16.30-17.30	1	177	183	1376	1736
	2	235	155	1470	1860
	Total	412	338	2846	3596
16.45-17.45	1	168	188	1487	1843
	2	199	148	1563	1910
	Total	367	336	3050	3753
17.00-18.00	1	167	187	1594	1948
	2	177	135	1691	2003
	Total	344	322	3285	3951

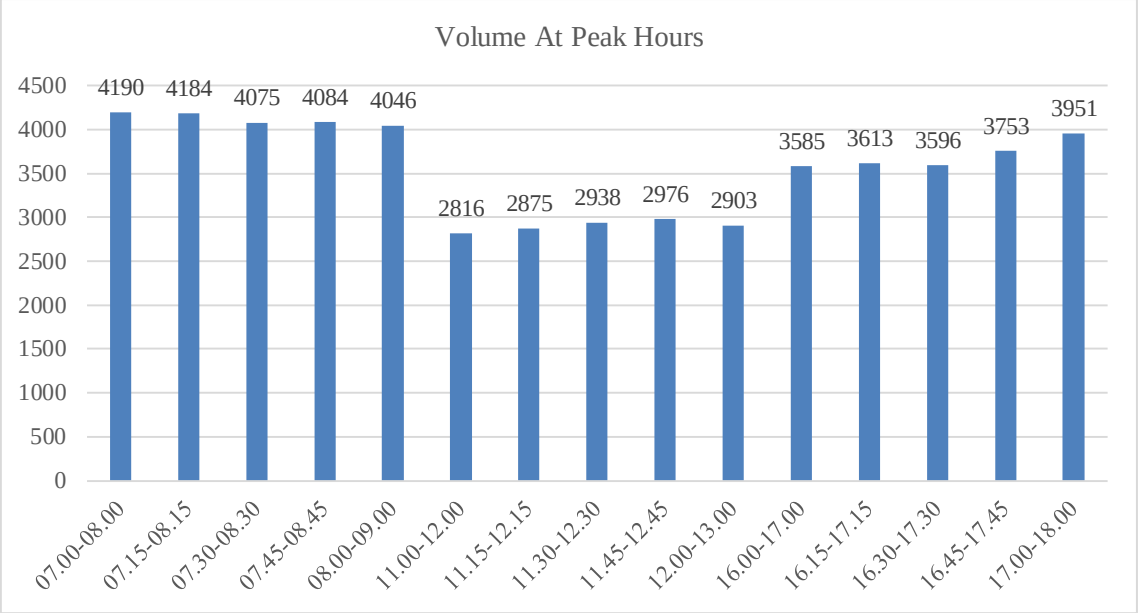

Figure 4. Graph of Traffic Volume at Peak Hours Monday, November 22, 2021

3.2.2 Side Barriers

Based on the results of the side obstacle survey data processing on the Narogong highway, it can be obtained the number of frequency events at peak hours, namely on Monday, November 22, 2021 at 07.00 - 08.00 with a total frequency of occurrence of 458.1/hour, 200m.

3.2.3 Road Segment Capacity

Determination of capacity (C) can be calculated using the following equation:

$C = C_O \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS}$
$C = 2900 \times 1{,}29 \times 1 \times 0{,}90 \times 1{,}04$
$C = 3501{,}5\ smp/jam$

3.2.4 Degree of Saturation

The value of the degree of saturation is used as the main factor that can determine the level of service of a company

roads, whether the roads under study have capacity problems or not. The degree of saturation is obtained from

ratio of traffic flow (Q) smp/hour to capacity (C) smp/hour. The degree of saturation can be calculated using

the formula:

$DS = Q/C$
$DS = 1974{,}25/3501{,}5$
$DS = 0{,}56$

Table 8.Degrees of Saturation Monday, November 22, 2021

Direction 1			
Time	Traffic Volume (Q)	Road Capacity (C)	Degree Of Saturation (Ds) (Q)/(C)
07.00-09.00	1997.6	3501.5	0.57
11.00-13.00	1427.8	3501.5	0.41
16.00-18.00	1788.8	3501.5	0.51
Average			0.50
Direction 2			
Time	Traffic Volume (Q)	Road Capacity (C)	Degree Of Saturation (Ds) (Q)/(C)
07.00-09.00	1850.2	3501.5	0.53
11.00-13.00	1763.65	3501.5	0.50
16.00-18.00	1974.25	3501.5	0.56
Average			0.53

3.2.5 Road Service Level (LOS)

Table 9.Road Service Level Monday, November 22, 2021

Direction 1				
Time	Traffic Volume (Q)	Road Capacity (C)	Degree Of Saturation (Ds) (Q)/(C)	Los
07.00-09.00	1997.6	3501.5	0.57	C
11.00-13.00	1427.8	3501.5	0.41	B
16.00-18.00	1788.8	3501.5	0.51	C
Average			0.50	
Direction 2				
Time	Traffic Volume (Q)	Road Capacity (C)	Degree Of Saturation (Ds) (Q)/(C)	Los
07.00-09.00	1850.2	3501.5	0.53	C
11.00-13.00	1763.65	3501.5	0.50	C
16.00-18.00	1974.25	3501.5	0.56	C
Average			0.53	

3.2.6 Free Flow Speed

Free flow speed using light vehicles as the main measure of performance(MKJI 1997).
The equation for determining the free current velocity has the following general form:

$FV = (FV_O + FV_W) \times FFV_{SF} \times FFV_{CS}$

Where :
FV = free flow speed of light vehicles (km/hour)
FVo = Basic free flow speed of light vehicles (km/hour)
FVW = Effective traffic lane width adjustment (km/h) (sum)
FFVSF = Side resistance adjustment factor (multiplication)
FFVCS = City size adjustment factor (multiply)

1. FVo = Basic free flow speed of light vehicles (km/hour)
   Two lane undivided road type (2/2 D)
   Basic free current speed = 42
2. FVW = Effective traffic lane width adjustment (km/h) (sum)
   Two lane undivided road type (2/2 D)
   Lane width 10.00 m/2 lane
   Free flow speed adjustment factor for traffic lane width = 6

3. FFVSF = Side resistance adjustment factor (multiplication)
   Side barrier condition = Medium M (Commercial area with high roadside activity)
   Side resistance adjustment factor = 0.90
4. FFVCS = City size adjustment factor (multiply)
   City Size > 3.0 (million inhabitants)
   City size adjustment factor = 1.03
   Then the value of the free current velocity FV can be calculated using the following equation:

$FV = (FV_O + FV_W) \times FFV_{SF} \times FFV_{CS}$
$FV = (42 + 6) \times 0{,}90 \times 1{,}03$
$FV = 44{,}5\ km/jam$

4. Conclussion

Based on the results of observations and calculations of the results of data analysis in chapter 4, the following conclusions are obtained:

1. Volume of Vehicles In and Out at Cileungsi Market
   Saturday, November 13, 2021
   Car : 384 vehicles
   Motorcycle : 2174 vehicles
   Sunday, November 14, 2021
   Car : 343 vehicles
   Motorcycle : 1906 vehicles
   Monday, November 15, 2021
   Car : 273 vehicles
   Motorcycle : 1166 vehicles
2. Parking Characteristics at Cileungsi Market
   a. Parking space capacity:
      Car : 113 SRP
      Motor : 397 SRP
   b. Parking accumulation, the peak period of hourly parking accumulation occurs on Saturday, November 13, 2021 with car and motorcycle parking vehicles, the highest number of accumulations from 08.00 – 16.00 occurred at 08.00 – 08.59 for car type vehicles as many as 92 vehicles, while parking vehicles for motorcycle types occurred at 10.00 – 10.59 as many as 293 vehicles.
   c. The longest average duration of vehicle parking is 1.07 hours/vehicle for cars and 1.45 hours/vehicle for motorbikes.
   d. The highest parking index is the parking index on Saturday, November 13, 2021, 81.42% for cars occurs at 08.00-08:59 WIB and 73.80% for motorbikes occurs at 10:00-10:59 WIB. From the results of the analysis of the Cileungsi Market parking area, it can meet the parking demand with a parking index value below 100%.
   e. The highest Parking Turn Over is 1 vehicle/SRP/observation time for cars and 1 vehicle/SRP/observation time for motorcycles, occurring on Saturday, November 13, 2021.
3. Based on the data that has been collected at the Cileungsi market parking lot, the parking capacity at the Cileungsi market can meet the needs of vehicles parked every day, to maximize the existing capacity, it is necessary to use grid lines and parking signs so that there is no congestion due to vehicles parked carelessly and vehicles that oppose current.
4. Based on a survey conducted for 3 days, the performance of the Jln. Raya Narogong Cileungsi Kidul Village Rt. 03/06 Kec. Cileungsi Kab. Bogor ± 500 meters at the entrance to the Cileungsi market, the flow of vehicles and the average speed is quite stable. with an average level of service or Level of Service (LOS) which is C from the average value of the Degree of Saturation, which is 0.53.

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The Effect of Occupational Safety and Health Application (Smk3) on Labor Productivity in Construction Projects in Surabaya (Case Study of Pt Tata Bumi Raya Apartment Development)

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Abstract

The Surabaya Apartment building construction project must be in accordance with its use, and meet the requirements of safety, health, comfort, convenience and efficient use of resources. Development projects will not run well if the position of activities as a source of energy for the community does not function actively and has great capabilities. One of the reasons for the success of the architectural development blueprint is the ability of its workforce. By implementing occupational safety and health programs on construction projects, workers will feel more secure in their safety and can improve their abilities. Trial of questions and answers, monitoring, and distributing questionnaires distributed to 52 workers assigned to the Surabaya Apartment building construction project to obtain test information. The elasticity measured in this study is the variable of work safety (X1), occupational health (X2), and work productivity (Y). In the analysis, several methods were used, namely Experimental Research Instruments (validity and reliability experiments), classical assumption experiments, multiple linear regression analysis, f and t experiments. The impact of the implementation of the occupational safety and health program on the work productivity of PT. Tata Bumi Raya in the Surabaya Apartment development project has reached 90%. From the results of the Square calculation processed with SPSS 22 which reports the Square number or the resultant number of the two elastics, it is 0.898. Therefore, can it is certain that the X1 variable of Health and Safety X2 greatly influences the Y variable of Work Productivity.

Keywords
Occupational Health, Work Productivity, Work Safety

1. Introduction

1.1 Background

The Ministry of Manpower (Kemennaker) claims that the problem of work accidents during 2017 faced a decline compared to 2016. In 2017, the number of work accidents was recorded as 80, 393 problems, down to close to 20, 975 problems. The Director General (Dirjen) of Manpower Supervision and Occupational Safety and Health (PPK and K3) Sugeng Priyanto said the understanding of the workers had begun to build. This understanding of work safety results in the least number of work accidents (Maudy et al. 2017).

The implementation of K3 programs in development projects also means that the effects of disasters are also large. Not only that, it must also be supported by the understanding of workers to protect their own safety while working. It can be seen from the number of disasters. As well as employment problems. Based on industry information that has successfully implemented the OHS Management program, it has grown to 1,221 industries. The number is up close to 69.1 percent from 2016 (Maudy et al. 2017).

1.2 Formulation Of The Problem

Based on the background of the problem above, the researchers identified several topics that became the formulation of the problem in this study, namely:

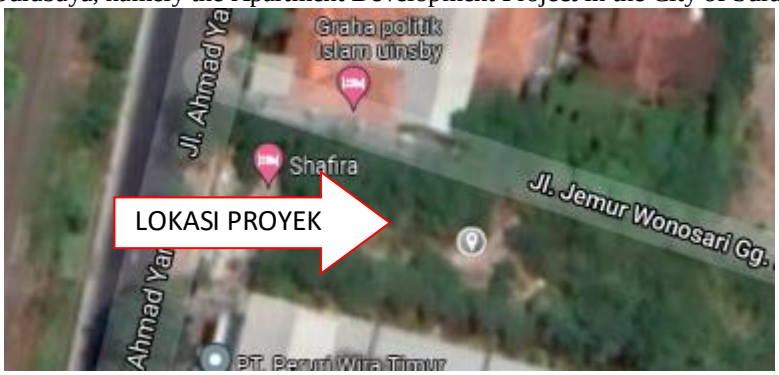
1. How much influence the implementation of the occupational health and safety management system has on the labor productivity of PT. Tata Bumi Raya in the Surabaya City Apartment building project?
2. What is the impact of the implementation of the occupational health and safety management system of PT. Tata Bumi Raya in the Surabaya City Apartment building project?
3. What is the significance level of implementing a safety and health management system PT. Tata Bumi Raya in the Surabaya City Apartment building project?

2. Methodology

The research concept used in this research is a survey type. For Nana Syaodih (Asep Saepul Hamdi and E. Bahruddin 2012) said that the survey was used to identify the usual reflection of the character of the population. In this research, the author conducts a survey using quantitative research as associative research type with the Proposiv Sampling sampling method. Multiple Linear Regression Analysis intends to examine the effect between variable X on variable Y. The variables for this analysis method were selected by researchers because to identify the effect of implementing the OHS System (X) on Labor Productivity (Y)

2.1 Research Location and Time

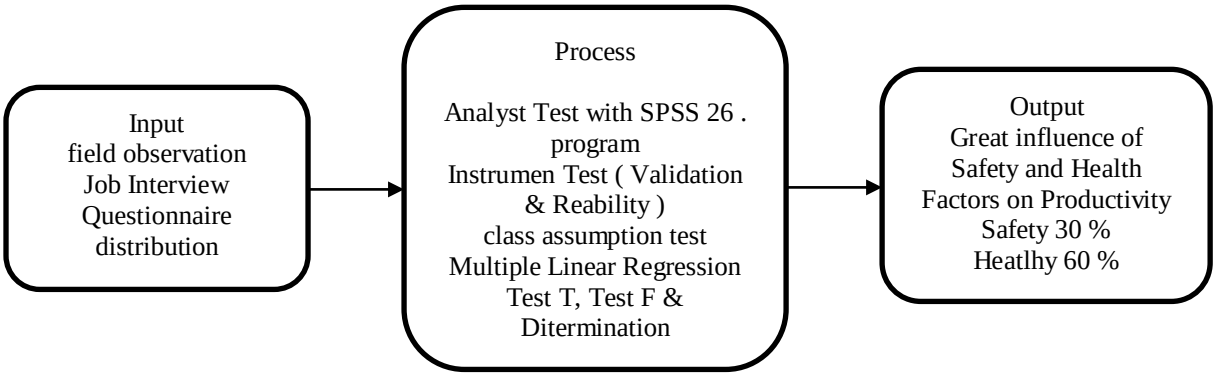
a. Research Location This research is located on an ongoing construction project on Jl Ahmad Yani Gayungan, Surabaya, namely the Apartment Development Project in the City of Surabaya.



Picture 1. Location Sites Jl. Ahmad Yani Gayungan

b. Research Time This research was carried out within 2 months from October 13 to December 13, 2021, starting from preparation, field surveys, data analysis to compiling research results.

2.2 Research Flow



Flowchart 1. Research Flow

3. Result and Discussion

3.1 Validity Test

Table 1. Validity Test

No	Indicator	r Count	r Table	Description
	Work Safety			
	X1.1	0,441	0,273	Valid
	X1.2	0,524	0,273	Valid
	X1.3	0,405	0,273	Valid
	X1.4	0,574	0,273	Valid
1	X1.5	0,353	0,273	Valid
	X1.6	0,674	0,273	Valid
	X1.7	0,442	0,273	Valid
	X1.8	0,708	0,273	Valid
	X1.9	0,515	0,273	Valid
	X1.10	0,527	0,273	Valid
	Occupational Health			
	X2.1	0,363	0,273	Valid
	X2.2	0,621	0,273	Valid
	X2.3	0,302	0,273	Valid
	X2.4	0,422	0,273	Valid
2	X2.5	0,359	0,273	Valid
	X2.6	0,651	0,273	Valid
	X2.7	0,498	0,273	Valid
	X2.8	0,575	0,273	Valid
	X2.9	0,395	0,273	Valid
	X2.10	0,673	0,273	Valid
	Work Productivity			
	Y1	0,276	0,273	Valid
	Y2	0,373	0,273	Valid
	Y3	0,345	0,273	Valid
	Y4	0,372	0,273	Valid
3	Y5	0,296	0,273	Valid
	Y6	0,682	0,273	Valid
	Y7	0,389	0,273	Valid
	Y8	0,598	0,273	Valid
	Y9	0,276	0,273	Valid
	Y10	0,384	0,273	Valid

Table 1. shows that all question items used to measure each bail variable, independent and dependent variables can be said to be valid. It can be seen from the comparison of r arithmetic greater than r table (0.273) which indicates that all question items are valid.

3.2 Reliability Test

Table 2. Reliability Test

Variabel	Koefisien conrobach alpha	Koefisien alpha	Keterangan
Work Safety	0,672	0,6	Reliabel
Occupational Health	0,642	0,6	Reliabel
Work Productivity	0,631	0,6	Reliabel

The reliability experiment proves that all variables have a Cronbach Alpha coefficient greater than 0.60 so it can be concluded that the question items from the questionnaire are reliable, which means that the questionnaire used in this research is a professional questionnaire.

3.3 Normality Test

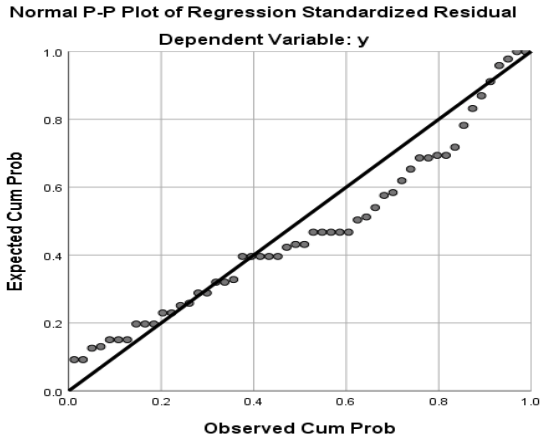


Figure 2. Normality Test

By looking at the normal plot diagram, we can see that the points are sown near the diagonal line and their distribution follows the diagonal line, so it can be said that the distribution pattern is normal.

3.4 Multikolinearity Test

Table 3. Multikolinearity Test

Coefficientsa

Model				Standardized Coefficients	t	Sig.	Collinearity Statistics	
				Beta			Tolerance	VIF
1	(Constant)	0,455	0,664		0,684	0,497		
	x1	0,017	0,019	0,016	0,906	0,369	0,597	1,676
	x2	0,972	0,018	0,985	54,692	0,000	0,597	1,676

The results of the multicollinearity test show that the tolerance value of each independent variable is above 0.1, which is 0.597 and the VIF value is below 10, which is 1.676, this indicates that there is no multicollinearity in the independent variables.

3.5 Hesteroskedasity Test

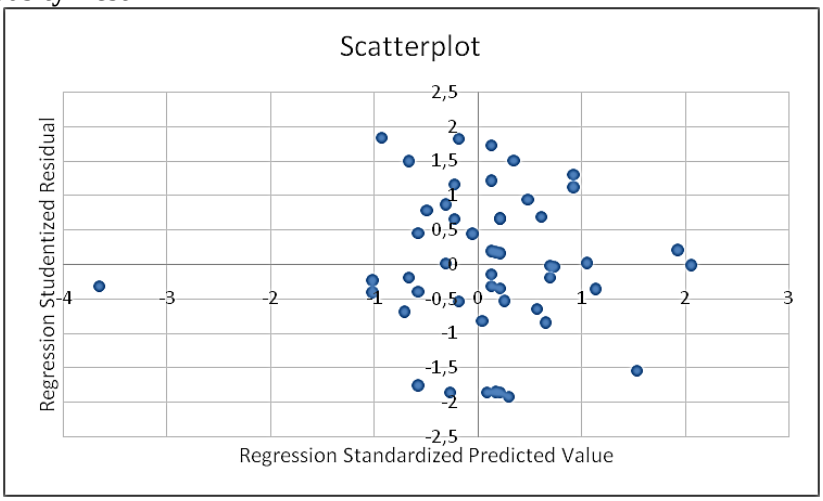


Figure 3. Hesteroskedasity Test

Based on the scatterplot diagram above, the data is randomly distributed without forming a particular pattern, and the points are spread above and below 0 on the Y axis, this proves that there is no heteroscedasticity. Thus it can be concluded that in this regression model there is a difference in the variance of the residuals from one observation to another.

3.6 Multiple Linear Regression Test

Table 4. Multiple Linear Regression Test

Coefficientsa

Model				Standardized Coefficients Beta	t	Sig.
1	(Constant)	14,108	1,869		7,548	0,000
	x1	0,261	0,052	0,294	4,987	0,000
	x2	0,938	0,050	1,107	18,771	0,000

The regression equation model that can be written from these results, namely Unstandardized Coefficients, is as follows: Y = 14108 + 0.261 X1 + 0.938 X2 + 1.868

The Unstandardized Coefficient form shows that the coefficient b is a number that indicates that Y (the dependent variable) will change if X (the dependent variable) is replaced by 1 unit. On the other hand, create a regression meeting for Standardized Coefficients where the coefficient numbers will not change again as follows: Y= 0, 294 X1+ 1, 107 X2

a. The regression coefficient (β) X1 of 0.294 shares the meaning that Work Safety (X1) has a positive influence on Activity Productivity (Y).
b. The regression coefficient (β) X2 of 1, 107 means that Occupational Health (X2) has a positive influence on Work Productivity (Y).

Based on the equation above, it can be seen that the independent variable (X) which greatly affects the dependent variable (Y) is the work safety variable (X2) with a coefficient of 1, 107

3.7 Hypothesis Testing

3.7.1 F Test

Table 5. F Test

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	198,233	2	99,116	216,429	.000b
	Residual	22,440	49	0,458		
	Total	220,673	51			

From the results of the regression analysis above, it can be seen that the totality of the independent variables has an important influence on the dependent variable. This can be proven from the number F, the number is 216, 429 with a significance number (sig) of 0.00. Because the significance number (sig) is much smaller than 0.05 and Fcount > Ftable is (216,429 > 3.18), the regression form can be used to calculate Occupational Safety and Health in a similar way to work productivity.

3.7.2 T Test

Table 6. T Test

Coefficientsa

Model				Standardized Coefficients Beta	t	Sig.
1	(Constant)	14,108	1,869		7,548	0,000
	x1	0,261	0,052	0,294	4,987	0,000
	x2	0,938	0,050	1,107	18,771	0,000

a. The effect of work safety variables on activity productivity. From the calculation results of chart 4. 11, the regression coefficient for activity safety is 0.294 with a significance number of 0.00 which is smaller than the probability number of 0.05. And for the calculation results Tcount = 4, 987 and Ttable = 2.001. The result can be concluded Tcount > Ttable. Until the activity safety variable (X1) has a positive and important influence on the production power of activities.
b. The effect of occupational health variables on work productivity. From the results of the calculation of chart 4. 11, the regression coefficient for occupational health is 1, 107 with a significance number of 0.00 which is smaller than the probability number of 0.05. And for the calculation results Tcount = 18, 771 and T table = 2, 001. The result can be concluded Tcount > Ttable. Until the occupational health variable (X2) has a positive and important influence on work productivity.

3.7.3 Termination Coefficient Test (R2)

Table 7. Termination Coefficient Test (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.948a	0,898	0,894	0,677

a. Predictors : (Constant). X2, X1
b. Dependent Variable : y

From the results of the calculations in table 4.12, it can be seen that the coefficient of determination (R Square) obtained is 0.898, this shows that the independent variables, namely occupational safety and health, affect work productivity by 90% while the rest is 0.10 or 10%. influenced by other variables that were not examined in this research

4. Conclussion and Suggestions

4.1 Conclusions

Based on the results of research that has been tried by distributing questionnaires to 52 respondents regarding the effect of implementing occupational safety and health programs on labor productivity in the Surabaya City Apartment construction project and from the conclusions of the research problems proposed, some conclusions are drawn as follows

a. The impact of the implementation of occupational safety and health programs on the work productivity of PT. Tata Bumi Raya in the Surabaya City Apartment building project is 90%. From the results of the Rsquare calculation processed with SPSS 26 which reports the Rsquare number or the resultant number of the two elastics, it is 0.898
b. Based on the magnitude of the influence of each variable, namely occupational safety (X1) and occupational health (X2) which proved positive results, until the result of the implementation of the Occupational Safety and Health program of PT. Tata Bumi Raya in the Surabaya City Apartment building project is positive
c. There is an important influence between occupational safety and health programs and work productivity in the Surabaya City Apartment building project. From the results of the experimental calculation F processed with SPSS 26 which reports the F number of 216, 492 with a significance number (sig) of 0.00. Because the significance number (sig) is much smaller than 0.05 and Fcount > Ftable is (216, 492 > 3, 18), so Ho is rejected which means that the occupational safety (X1) and occupational health (X2) program together have participation is important to labor productivity (Y).

4.2 Suggestions

a. For construction service companies or contractors, it is hoped that by continuing to share descriptions with all workers on the importance of occupational safety and health, as well as distributing sanctions to workers who do not comply with the rules regarding occupational safety and health that apply to the company.
b. It is hoped that the company's directives can take corrective steps to increase the productivity of labor activities. Where the quality of people's energy sources must be prioritized, starting from the procurement of quality workers (professional activities, having expertise in competition, prudence in duty, great discipline), to increasing human resources themselves.
c. For the next researcher, it is highly expected to study other variables that affect work productivity, in order to get more varied results

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Biography

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