COMPARISON OF SYSTEM METHODS (TABLE FORM) WITH SEMI SYSTEMS FROM COST ASPECTS IN THE APARTMENT MEIKARTA PROJECT

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ABSTRACT

Meikarta Apartment Project at the beginning of the implementation of the method that is used is a formwork system so that the spring mounting groove formwork and casting becomes inhibited. With some consideration, the formwork method was changed from the Semi system method to the System (Table Form). Therefore an analysis of costs and time in formwork planning is carried out in order to obtain effective and efficient planning results. At this stage begins with field observations, literature studies include information gathering, problem formulation activities, primary and secondary data and data analysis processing with the Analysis of SNI Work Unit Price (AHS-SNI) 2018 To produce the price of formwork work which includes wages, materials and tool. Based on the results of the analysis carried out on each formwork method, it was concluded that the Cost of Formwork System Work (Table Form) is cheaper compared to Semi system. The total cost of work using the Semi system as much as Rp. 4,837,286,252.27 While using formwork System (Table Form) as much as Rp. 3,724,594,795.77. This shows that work using the System (Table Form) is cheaper by Rp. 1,112,691,456.50 or around 23%.

keywords: Semi Formwork System ; Formwork System (Table Form); Tool; Cost; Time

INTRODUCTION

The development of technology in the world of construction in Indonesia was marked by the growing number of innovations that are used in the process of construction . The role of technology grows even greater, especially to simplify the process that occurs in a construction project . One of the examples of the application of technology in the process of construction is the technology of mold concrete or formwork.

Formwork is a temporary structure because up to a certain time limit will be demolished , while the concrete structure is a permanent structure . M de- scribes that the structures while is a means of liaison between the design and execution of construction . The structure of the structure permanently not be built without the structures while the .

A formwork construction must meet the requirements of strength , rigidity , and stability . This requirement must be met considering that formwork is a work that is done repeatedly in high rise buildings and requires a large cost to make it (American Concrete Institute). The cost for formwork ranges from 40% - 60% of the cost of concrete works or about 10% of the total building construction cost.

When this in Indonesia there are 3 types of formwork are formwork conventional , semi- systems and systems . Selection of the type of formwork is a decision that is important to the project of building multi-storey as affect the cost , time of work and the quality of construction.

METHODOLOGY

The analysis is done based on the data of secondary that was taken from the location of the research is the Project Apartment Meikarta , with drip emphasis on the problems of the methods , the cost for the work formwork . The results of the analysis can later be used as a reference to evaluate where the system will be used for further projects . In making the analysis of the price of the unit , we must make an analysis coefficient of materials and wages , terms this is done to seek the capacity of materials and wages for 1 m2 her . For wages the coefficient is 1 but the price of wages is made into 1 m2 unit price as well . Specify material and wages are also divided into two kinds , namely materials and wages unloading / tide formwork as well as the materials and wages fabrication formwork . After we calculate the need Cost tool , Cost of materials , and the Cost of wages then the next we sum . The results are already summed multiplied by the volume of work , then we could see the price of a unit of work in total in the rupiah. Both of the tools of conventional and tool systems how is equal.

Table 1. The cost of wages and materials Install and Uninstall Formwork Plate Project Apartment Meikarta

Description		Coefficient	Unit Price (Rp)	Total (Rp)
Wage	Formwork Settings	1	Rp.42,960	Rp.42,960
	Dismantling Formwork	1	Rp10,688	Rp10,688
	Unloading Install Terminal	0.00195	Rp.192,900	Rp. 376
Total (A)			Rp. 54,023	
material	7cm nails	0.089	IDR 16,000	Rp1,424
	Mold Oil	0.05	Rp.17,500	Rp.875
	Playwood / Phenolic 12mm	0.3359	Rp.295,000	Rp99,091
	Torx Screw	8	Rp.340	Rp2,720
	Torx Bird	0.0175	Rp10,000	Rp175
Total (B)			Rp 104,110	
Total (A + B)			Rp 158,133	

(Source : AHS: SNI 2017-2018, 2019) [7] □.

Table 2. Additional costs Wages and Materials Install and Uninstall Formwork Plate Project Apartment Meikarta

Description		Coefficient	Unit Price (Rp)	Total (Rp)
Wage	Formwork Settings	1	Rp.42,960	Rp.42,960
	Dismantling Formwork	1	Rp10,688	Rp10,688
	Unloading Install Terminal	0.00195	Rp.192,900	Rp. 376
Total			Rp. 54,023	

(Source : AHS: SNI 2017-2018, 2019) [7] □.

Table 3. Costs for Wages and Fabrication Materials for the Meikarta Apartment Plate Formwork Project

Description		Coefficient	Unit Price (Rp)	Total (Rp)
Wage	Formwork Fabrication	1	10,740	10,740
Total (A)			IDR 10,740	
material	7cm nails	0.089	16,000	1,424
	Mold Oil	0.05	17,500	875
	Playwood / Phenolic 12mm	0.3359	295,000	99,091

	Torx Screw	8	340	2,720
	Torx Bird	0.0175	10,000	175
Total (B)			Rp 104,110	
Total (A + B)			Rp 114,850	

(Source : AHS: SNI 2017-2018, 2019) [7] □.

RESULTS AND ANALYSIS

After the unit price has been obtained , then multiplied by the volume of work . For the second floor of the first price of a unit of work post formwork can be added to the price of a unit of work fabrication but after the price which used only the price setting of the formwork . It is happening because of the use of materials formwork can be used up to four times the life .

Table 4. Price of Wage Units and Formwork Materials for Meikarta Apartments Project Plate System

NO	FLOOR	VOLUME (M ²)	PRICE UNIT (Rp)	AMOUNT (Rp)
1	4th floor	1,027.18	Rp.272,983	Rp.280,402,678
2	5th floor	1,027.18	Rp.272,983	Rp.280,402,678
3	6th floor	1,027.18	Rp.158,133	Rp.162,431,055
4	7th floor	1,027.18	Rp.158,133	Rp.162,431,055
5	8th floor	1,027.18	Rp.158,133	Rp.162,431,055
6	9th floor	1,027.18	Rp.158,133	Rp.162,431,055
7	10th floor	1,027.18	Rp.158,133	Rp.162,431,055
8	11th floor	1,027.18	Rp.158,133	Rp.162,431,055
9	12th floor	1,027.18	Rp.158,133	Rp.162,431,055
10	13th floor	1,027.18	Rp.158,133	Rp.162,431,055
11	14th floor	1,027.18	Rp.272,983	Rp.280,402,678
12	15th floor	1,027.18	Rp.272,983	Rp.280,402,678
13	16th floor	1,027.18	Rp.158,133	Rp.162,431,055
14	17th floor	1,027.18	Rp.158,133	Rp.162,431,055
15	18th floor	1,027.18	Rp.158,133	Rp.162,431,055
16	19th floor	1,027.18	Rp.158,133	Rp.162,431,055
17	20th floor	1,027.18	Rp.158,133	Rp.162,431,055
Total Volume (M ²)		(A)	17,461.99	
Total Price (Rp)		(B)	3,233,214,426	
Average Unit Price / M ²		(B / a)	IDR 185,157.27	

(Source : Author's Processed Data , 2019)

Table 5. Unit Price for Wages and Formwork Material for Semi- Meikarta Apartment System Project Formation

NO	FLOOR	VOLUME (M ²)	PRICE UNIT (Rp)	AMOUNT (Rp)
1	4th floor	1,027.18	327,006	335,894,023
2	5th floor	1,027.18	327,006	335,894,023
3	6th floor	1,027.18	212.156	217,922,400
4	7th floor	1,027.18	212.156	217,922,400
5	8th floor	1,027.18	212.156	217,922,400
6	9th floor	1,027.18	212.156	217,922,400
7	10th floor	1,027.18	212.156	217,922,400
8	11th floor	1,027.18	212.156	217,922,400
9	12th floor	1,027.18	212.156	217,922,400
10	13th floor	1,027.18	212.156	217,922,400
11	14th floor	1,027.18	327,006	335,894,023
12	15th floor	1,027.18	327,006	335,894,023
13	16th floor	1,027.18	212.156	217,922,400
14	17th floor	1,027.18	212.156	217,922,400
15	18th floor	1,027.18	212.156	217,922,400
16	19th floor	1,027.18	212.156	217,922,400
17	20th floor	1,027.18	212.156	217,922,400
Total Volume (M ²)		(A)	17,461.99	
Total Price (Rp)		(B)	4,176,567,293	
Average Unit Price / M ²		(B / a)	Rp 239,180.49	

(Source : Author's Processed Data , 2019)

Job Unit Price Analysis

After we calculate the need for tools , materials , and wages , we add them up . Then we can see the price of the work unit per m2. Both of the tools of conventional and tool system . Here is a recap of the price of Rap tools , materials , and wages on the job beam and plate. Here we can see the price comparison between formwork systems and conventional formwork .

Semi Formwork System

Table 6. Price Works Formwork Plate Semi System Project Apartments Meikarta

Description	Volume (M ²)	Unit Price (Rp)	Total (Rp)
Formwork Equipment Rental Costs	17461.99	32432,19	660,718,959.27
Wage and Material Costs	17461.99	239,180.49	4,176,567,293
Total Cost		IDR 4,837,286,252.27	

(Source : Author's Processed Data , 2019)

So , the Total Cost of Work if by using Semi System formwork is = **Rp . 4,837,286,252 , 27**

Formwork System (Table Form)

Table 7. Price Works Formwork Plate system (Table Form) for Meikarta Apartments Project

Description	Volume (M ²)	Unit Price (Rp)	Total (Rp)
Formwork Equipment Rental Costs	17461.99	28,140.00	491,380,399
Wage and Material Costs	17461.99	185,157.27	3,233,214,397
Total Cost		Rp 3,724,594,795.77	

(Source : Author's Processed Data , 2019)

So , the Total Cost of Work if by using Semi System formwork is = **Rp 3,724,594,795 , 77**

Conclusion , the Total Cost of Work using the Formwork System (Table Form) is cheaper than using the Semi System formwork worth = **Rp 1,112,691,456 , 50**

CONCLUSIONS

From the results of the analysis and discussion about the need for tools , materials , and wages and we add up , can we see the total costs are required . Both of the tools formwork Semi systems and tools formwork system (Table Form), then it can be drawn conclusions as follows :

- 1) After doing the calculations in Chapter IV obtained that the amount of the provision of material formwork (formwork), which takes on the system (Table Form) and Semi System as follows :

Table 8. Total supply of materials formwork Semi System and System (Table Form) Project Apartments Meikarta

Comparison of Formwork Material Supply			
No	Description	Spring System (Pcs)	System (Table Form) (Pcs)
1	Hollow 40/60	2268	2268
2	Hollow Double 50/100	332	332
3	Plat Head	-	2408
4	U Head	2408	-
5	Angkur U	-	2408

6	Angkur L and Plat strip	-	2408
7	Vertical Support	-	1204
8	Frame Leader	1204	-
9	Main Frame	1204	-
10	Horizontal Support	-	3612
11	Cross Brace	2364	-
12	Inner	-	1204
13	Jack Base	2408	1204
14	Caster Wheel	-	1204
Total		12188	18252

(Source : Author's Processed Data , 2019)

2) After doing the calculations in Chapter IV obtained that job by using the formwork system (Table Form) is saving around 20% - 25% of bekisting Semi System at work formwork plate floor .

Table 9. Comparison of Cost Works Formwork Plate Semi System and System (*Table Form*) Project Apartments Meikarta

Description	Comparison of the cost of Formwork Work	
	Semi System (Rp)	System (<i>Table Form</i>) (Rp)
Formwork Equipment Rental Costs	660,718,959.27	491,380,399
Wage and Material Costs	4,176,567,293	3,233,214,397
Total	IDR 4,837,286,252.27	Rp 3,724,594,795.77

(Source : Author's Processed Data , 2019)

Conclusion , the Total Cost of Work using the Formwork System (*Table Form*) is cheaper than using the Semi System formwork worth = **Rp. 1,112,691,456 , 50**

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