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The Value Engineering Analisys Of Drainage Job (Study Case at Cluster Naraya Project of Bukit Semarang Baru)

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Abstrack - Value engineering is a decision-making process based systematic and structured multi disclipinary. Drainage is a disposal water mass media in natural or artificial from the surface or subsurface of a place. In the housing scope, drainage is enabled to accomodate the flow of used water and rain water from the house which then flowed into the downstream or river as the final disposal place. The purpose of this study is to assess the initial design of the stream viewed from the cost budget plan. Find out whether the alternative design are required, find out the ideal alternative design, and get a comparison between the initial design and the alternative design. The result of this research is the analysis of budget plan, the production cost of initial design with u-ditch and buis concrete material is inefficient with budget of cost Rp. 1.781.350.200,- and then made alternative design buis concrete precast with budget of cost Rp. 1.104.667.700,- . After comparison between initial design and some alternative design, it is known that alternative design that can be recomended to be done is the alternative design with buis concrete precast material because it has lower price, by the difference of profit Rp. 676.672.500,-.

Keywords : *Value Engineering, Drainage*

1. Introduction

Construction projects are developing in line with the development of human life and technological progress. At this time the development of construction projects in Indonesia is currently very rapidly both in the sector of buildings, roads, bridges, infrastructure, and housing (Dimyati, 2014). Without realizing there are more important activities to make the planning more effective by doing value engineering or value engineering (Dimyati, 2014). Value engineering is a systematic, structured, multidisciplinary decision-making process. Perform a function analysis to achieve the best value of a project by defining the functions required to achieve the desired value targets and providing them with an optimum cost, consistent with the quality and performance required (Berawi, 2013).

Drainage or sewer is a natural or artificial mass drainage media from the surface or subsurface of a place. This disposal can be done by draining, draining, discharging, or diverting dirty water from upstream to downstream (Suripin, 2004).

Through its commitment to build a new urban area in Mijen, Semarang City, PT. Karyadeka Alam Lestari for 17 years has developed land ± 500 Ha. Up to 2017, in the residential sector there are four clusters that have been developed, namely Puri Arga Golf Cluster, Cluster Graha Taman Bunga, Cluster Graha Taman Pelangi, and Clara Naraya are now being developed.

To build a housing cluster, of course, the initial construction is to build good infrastructure of sewerage, clean water, electrical installation (mechanical electrical),

retaining wall, fence area, to pavement. From several items of infrastructure work, to work in Cluster Naraya, PT. Karyadeka Alam Lestari will conduct value engineering on sewage works after reviewing Cluster sewer work previously. This work is enough to provide a large production value on the infrastructure work of a cluster so it needs to be done value engineering by making some alternative designs for the value and benefits can be optimal (Rio, 2016)

Value Engineering will certainly add to the company's benefits of making production cost more efficient and better quality by making some alternative designs, versus and choosing which alternative designs are more useful (Rio, 2016).

Based on the above background, it can be proposed research question formulation as follows:

1) How is the initial design study of sewage work reviewed from the Budget Plan?
2) Is there an alternative design required in this sewer work?
3) How can alternative designs be applied based on Value Engineering?
4) How is the comparison between initial design and alternative design viewed from the aspect of the Budget Plan and the disposal capacity?

2. Literature Review

The project is a composite of various resources, which are collected in a temporary organizational container to achieve a specific goal. The definition of the project in this discussion is bidatasi in the sense of a construction project, which is a project related to the field of construction (development). From the above definition and limitations, it can be described some of the characteristics of the project as follows (Dimyati, 2014):

1) Project time is limited;
2) The results are not repeated;
3) Having different stages of activities;
4) Intensity of activities;
5) A wide range of activities and requires a diverse energy classification as well;
6) Specific project land / location;
7) Specific project specifications.

Type of Construction Project

1. Building construction project
2. Residential Contruction / Real Estate Projects
3. Civil / project engineering construction projects
4. Industrial construction project

Stages of Construction Project

Broadly speaking the stages of construction projects can be divided into (Dimyati, 2014):

1. Planning phase (planning)
2. Design stage (design)
3. Procurement / auction stage
4. Implementation stage (construction)

Each stage of the above project is subdivided into several more detailed activities.

Dirty Water Channel (Drainage)

Drainage is a curve or drainage on the surface or underground, both naturally occurring and man-made. In general, drainage is defined as a series of water structures that function to reduce and / or remove excess water from a region or land, so that the land can be

functioned optimally. Drainage is also defined as an effort to control groundwater quality in relation to sanitation.

Network Drainage System

The drainage network system is divided into 2 parts, namely (Suripin, 2004):

a) Major Drainage System, the system of water channels / bodies that accommodate and drain water from a catchment area (Catchment Area).

b) Micro Drainage System, ie drainage and drainage complementary drainage systems that collect and drain water from rain catchment areas.

Value Engineering

Value engineering is a systematic, structured, multidisciplinary decision-making process. Perform a function analysis to achieve the best value of a project by defining the functions required to achieve the desired value targets and providing them with an optimum cost, consistent with the quality and performance required (Berawi, 2013).

As the identification of function, pendektan made Value Engineering is to distinguish between the value (worth) and cost (cost) because:

1. The size of the price or cost is determined by the substance of the goods is the price of the components that make up the goods, while the value is determined by the function or usefulness of the goods.
2. Cost is how much material expenditure has been made to obtain the item, while the value of the measure tends toward subjective and largely depends on how far the owner can use it.

Value Engineering Concept

Value Engineering Concept Value Engineering Concepts is the emphasis on the cost of products or services by involving the principles of Engineering. This technique seeks to achieve the same minimal quality as planned with minimal cost. The planning process undertaken in the implementation of Value Engineering is always based on the required functions and the value obtained.

Benefits of Value Engineering Implementation

The VE application in a construction project convinces the parties in the project that investment in construction produces valuable assets where the value is effective for building, using, and maintaining. Certainty produces more valuable products or achieves value for money from those products, based on Connaughton and Green (1996) in Berawi (2013) because essentially the application of Value Engineering will ensure the need for projects that will always be verified and supported by data, objectives of the project discussed openly and clearly, important decisions in rational, decisive, and reliable value engineering processes, designs developed within the framework of agreed project objectives, alternative options are always taken into account, design submissions are evaluated and carefully selected based on predetermined performance criteria.

Value Engineering application in Dirty Water channel building

The implementation of Values engineering studies can be undertaken at each stage of project development in accordance with the expected outcomes and benefits of the Values Engineering study. Of course, if carried out at the beginning of the project will get greater benefits in terms of cost and time.

Data Analysis with Value Engineering

1. Information Stage, gather as much information as possible about the design of the project planning from general data to the desired design constraints in the project.
2. Phase Analysis Function, differentiates Value Engineering with other cost saving techniques.
3. Creative phase, develop ideas to bring up alternatives of elements that still fulfill the same function, then organized systematically.
4. Evaluation phase, reducing the number of ideas generated during the creativity phase into one of the most potential ideas to increase the value of the project.

3. Research Methods

This research is a case study of Dirty Water Design on Cluster Naraya Bukit Semarang Baru project, Mijen, Semarang City. The data in this study can be classified into primary data obtained from interviews and direct observation or field and secondary surveys obtained from various archives, documents and literature studies related to the feasibility of building sewerage. The research instruments used in this research are:

1) The hardware is a computer with enough specifications to run the software.
2) Software: Microsoft Office 2013, especially Microsoft word and excel 2013; AutoCad 2016.
3) Voice recorder used for interview

Methods of data analysis in this study are:

a. Reviewing the original Budget Plan (Secondary Data)
b. Reviewing the results of the Budget Plan analysis
c. Make an alternative Desail
d. Perform Value Engineering analysis

Tabel 1 Research Schedule

NO	KEGIATAN	TIME															
		JUNE				JULY				AUGUST				SEPTEMBER			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Preparation and proposal test																
2	Analysis and system create																
3	Data collection																
4	Analysis and interpretation of data																
5	Final report																
6	Final exam of thesis																
7	Revision																
8	Publish																

Source : Analysis results

4. Analysis

After doing the initial design analysis and making the alternative design, the next step is to compare the analysis with the following results:

Tabel 2 Comparison of analysis results

NO	PLAN	BUDGET PLAN	DURABILITY AND PRODUCTION TIME	CAPACITY (m3/det)
1	First plan (U-Ditch & Buis)	1.781.350.200	Enough and long	0,13 & 0,28

NO	PLAN	BUDGET PLAN	DURABILITY AND PRODUCTION TIME	CAPACITY (m3/det)
2	U-Ditch Precast	1.604.402.700	Good and fast	0,24 & 0,48
3	Buis Concrete Precast	1.104.677.700	Good and fast	0,13 & 0,28
4	River Stone	1.437.127.950	Enough and long	0,4 & 0,6

Source : Analysis results

After comparing the results of the initial design analysis with some alternative design plans, alternative designs that can be recommended for work on the Naraya Cluster Project are the second alternative with the design of the precast buis channel of precast because the price is lower at Rp. 1,104,677,700, - compared to the original plan of Rp. 1.781.350.200, - benefited Rp. 676.672.500, -. Besides durability or durability is also good, work time is also fast. For disposal capacity is the same as the original plan, although smaller than other alternative plans but because the surface of the channel without side then the speed can be fulfilled.

5. Conclusions and Recommendations

Based on the results of calculations and analysis of this Thesis can be concluded as follows:

1) After the initial design review of the channel based on the Budget Plan, the plan is calculated wasteful (over) because there are two channel construction work items that is u-ditch and buis concrete with a budget value of Rp. 1.781.350.200, -. With the value of unit price is also quite high while the construction is done in local materials and site mix it is this consideration that led to this construction design needs to be done value engineering by providing several alternative design other construction.
2) Alternate channel design offered is U-Ditch Precast with budget plan value Rp. 1.604.402.700, - as first alternative, Buis Concrete Precast with budget plan value Rp. 1.104.677.700, - as second alternative, and river stone with budget plan value Rp. 1.437.127.950, - as third alternative.

From the above conclusions the author gives suggestions as follows:

1. In conducting analysis or review of a project should be done on projects that have not been done or still in the planning stage so that the analysis can be used as reference or recommendation to change the design.
2. Alternative design analysis should be done by providing more alternatives such as local or manual u-ditch precast, local concrete buis, and some other designs thereby providing the best alternative design based on the existing construction in the field. The author gives more recent references from books, materials, national and international journals that can provide more insight into this research.

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