

The Benefits of Infrastructure Availability on the Slums Area to the Development of Medan Belawan Sub Districts

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Abstract — Medan Belawan sub-district is one of the districts in Medan City, with an area of 2,820 Ha with total population in 2012 is 95,709 people (BPS Medan, 2013). Based on the Slum Area Survey conducted by the Medan City Government in 2012, it is known that in 5 of 6 urban villages in Medan Belawan sub-district, there are slum areas, Belawan Island Sicanang Island, Belawan Bahagia, Deli Chart, Belawan Bahari and Belawan I. Slums in the Medan Belawan sub-district faced with the problem of infrastructure. This research is about how the benefit of infrastructure availability in slum area to the development of area with benefit indicator that accepted by society in Medan Belawan Subdistrict. The realization of the availability of good infrastructure can be seen from the changing condition of the better and healthier environment in Medan Belawan Subdistrict, which in turn will affect the development of the region seen from the economic aspect (poverty). The results of the research include changes in the quality of the physical environment can be seen from the availability of infrastructure in the Sub-district of Medan Belawan. Government investments aim to provide the greatest benefit of public services, which means that the direct benefits received by the government are low. Likewise, in terms of infrastructure development in slum areas in the District of Medan Belawan, the benefits received by the government are relatively non-existent, but the benefits received by the community quite a lot. B/C is the value of the comparison between benefit and cost over the life of the project. The calculation of B/C is 1.256, it can be concluded that the development of slums in the sub-district of Medan Belawan feasible economically.

Keywords — Slums area; Infrastructure; Belawan district; Development.

I. INTRODUCTION

The rapid pace of urbanization that is not accompanied by the availability of space, infrastructure and facilities and utilities are enough to cause an area of settlement over capacity and become slum. In general, slum conditions face problems such as: (1) very narrow building area with conditions that do not meet the health and social life standards, (2) the condition of the interconnected house

building so that it is vulnerable to fire hazard, (3) lack of clean water, (4) the electrical network is complicated and not sufficient, (5) very bad drainage, (6) poor neighborhood roads, (7) very limited availability of MCK facilities. These conditions and problems have resulted in the emergence of various types of diseases, decreased productivity of residents, the emergence of vulnerability and social diseases [1].

Slums are areas where homes and conditions of community living in the area are very bad. The house and facilities and infrastructure are not in accordance with the applicable standards, both the standard requirement, the density of the building, the requirements of a healthy house, the need for clean water, sanitation and completeness requirements of road infrastructure, open space, and completeness of other social facilities [2].

The characteristics of the slums, as Suparlan explains [3] are:

1. Public facilities are inadequate.
2. Housing and settlement conditions and the use of spaces reflect the poor or inadequate inhabitants.
3. The presence of high frequency and volume density in the use of spaces in the slums to reflect the chaos of spatial layout and powerlessness of the inhabitant economy.
4. Slums are community units that live in isolation with clear cultural and social boundaries that are manifested as:
 - a. A single community, located on state property, and therefore can be classified as squatters.
 - b. A single unit of community that is part of a household or a house of citizens.
 - c. A single unit of community that manifests as a household or a resident's home or even manifests itself in a village, and not a squatter.
5. Slum residents are socially and economically unsound; their citizens have different livelihoods and densities, as well as their origin. In slum communities are also known for social coatings based on their different economic capabilities.

6. Most of the slum dwellers are those who work in the informal sector or have additional livelihoods in the informal sector.

According to Sinulingga [4] slum characteristics consist of:

- a. The population is very crowded between 250-400 people/ha. If the density of an area has reached 80 people /ha then the problem arises due to this density, between the built housing is no longer possible to have physiological, psychological and disease protection requirements.
- b. Narrow streets are not passable by four-wheeled vehicles, because of their narrowness, sometimes this path is hidden behind the roofs of houses intersecting with each other.
- c. The drainage facilities are very inadequate, and there are roads without drainage, so that if the rain falls on this area will be flooded by water easily.
- d. Sewage facilities/stools are very minimal. Some of them throw their stools into a water channel near the house, or some throw them into the nearest river.
- e. Water supply facilities are minimal, utilizing shallow well water, rainwater or purchasing it in a can.
- f. The building structure is much disorganized and the buildings are generally not permanent
- g. Conditions a through f makes this area very vulnerable to disease transmission.
- h. Ownership of land rights is often illegal, meaning that the status of the land is still state land and the owners have no status whatsoever.

TABLE 1. SUMMARY OF INFRASTRUCTURE CLASSIFICATION

P3KT (2005)	Hudson (1997)	Grigg & Fontane (1988)	Kodoatie (2003)	Suripin (2003)	Chaplin (1995)	Dinas PU (2006)
Clean water	Transportation & Service	Transportation	Road & Transport Service	Water		Clean water
Wastewater	Clean Water & Wastewater	Transport Service	Water Infrastructure	Highway, City Road & Bridge		Wastewater
Drainage	Waste management Energy	Communication	Waste	Transportation Facilities		Drainage
Trash	Production & Distribution	Inundated	Communication	Waste management	Infrastructure	Trash
Road Network		Waste management Energy		Energy		Road Network
Electric network		Production & Distribution	Energy	Telecommunication		Electric network
Phone						Phone

network						network
Public facilities	Building	Building	Building Environment Building	& Building Town	Public facilities	Public facilities

Source: Nalarsih [5]

Therefore, in this study discussed is the economic infrastructure of roads, electricity, gas, banks, markets, post offices, and telecommunications. While social infrastructure is a public facility especially education and health facilities. According to Robinson [6], one of the important tasks of a regional planner is to evaluate projects proposed by various parties including projects to be built by the government. According to Rustiadi, et al [7], the BC ratio exclusively used to measure social benefits in economic analysis is also used for private investment analysis.

II. MATERIALS AND METHODS

This study is a quantitative descriptive that aims to describe, explain, or summarize the various conditions, situations, phenomena according to events as they are [8]. This research was conducted by using survey approach. Umar [9] states that the survey is a study conducted to obtain facts and symptoms that exist and seek factual information about the social, economic, or political institutions of a group or region.

Hypothesis

The hypothesis in this research is as follows: "Development of infrastructure in the development of Medan Belawan Sub-district is economically feasible".

The population in this study is the number of residents in the five villages located in the slum area of Medan Belawan subdistrict as many as 15,556 heads of families. Samples were determined using Slovin formula [9], as many as 100

people representing from one family member. The sample selection was done by random sampling method.

The data used in this research are:

1. Typology of slum level in slum of Belawan sub-districts.
2. Availability of infrastructure in Belawan sub-districts in 2012 - 2015.

The selection of analysis in 2012 - 2015 is done by reason of availability of supporting data.

Descriptive analysis in this study is used to provide an explanation of the condition of infrastructure in the Medan Belawan sub-district. The analysis model used to answer the problems and hypothesis proposed in this research is Benefit Cost Ratio, which is the ratio between economic values of infrastructure benefits with the cash value of infrastructure development cost. Benefit Cost Ratio can be calculated by the following formula:

$$B/C = \frac{\sum_{t=1}^{t=n} \left[\frac{B_t}{(1+i)^t} \right]}{\sum_{t=1}^{t=n} \left[\frac{C_t}{(1+i)^t} \right]}$$

B/C : Benefit cost ratio
 B_t : Benefit year- i
 C_t : The cost of the i year
 i : Interest rate
 t : Age of the project in year of t

TABLE 2

Variable	Operational Definition
Infrastructure	Building or basic facilities, equipment, installations built and needed to support the functioning of a socio-economic life system of the community
Slum areas	The area where the house and the condition of community housing in the area is very bad.
Community income	Income of community members from various economic activities undertaken...
Development	An act of developing a region in order to improve people's lives.

III. RESULT

TABLE 3 NUMBER AND POPULATION DENSITY IN MEDAN BELAWAN SUB-DISTRICT YEAR 2014

No.	Villages	Broad (km ²)	Population			Density (people/km ²)
			Male	Female	Amount	
1	Belawan Pulau Sicanang	15,10	7.475	7.606	15.081	999
2	Belawan Bahagia	0,54	5.985	6.221	12.206	22.604
3	Belawan Bahari	1,03	6.044	6.268	12.312	11.953
4	Belawan II	1,75	10.419	11.046	21.465	12.266
5	Bagan Deli	2,30	8.190	8.075	16.265	7.072
6	Belawan I	1,10	10.281	10.410	20.691	18.810
Total		21,82	48.394	49.626	98.020	4.492

Source: Medan Belawan Sub-district in numbers, 2015

Table 3 shows that the population distribution is uneven in every sub-district.

TABLE 4 CHARACTERISTIC OF RESPONDENT

Age	Slums Area	
	Amount (people)	(%)
≤30	4	4
31 – 40	21	21
41 – 50	43	43
51 – 60	20	20
>60	12	12
Total	100	100

Source: Research Results 2016 (Data Processed)

Table 4 shows the age of the respondents more in the range of ages 31-40 years and 41-50 years. This shows that respondents are still in productive age.

TABLE 5 IDENTITY OF RESPONDENTS BASED ON LATEST EDUCATION

Level of education	Slums Area	
	Amount (people)	(%)
Primary school	20	20
Junior high school	23	23
High School	43	43
Higher Education	14	14
Total	100	100

Source: Research Result 2013 (Data Processed).

Table 5 shows that respondents are dominated by senior secondary education or high school (43%) in slum areas. Education of most community members causes them to work more in the informal sector.

TABLE 6 SLUMS AREA IN MEDAN BELAWAN SUB-DISTRICT

No.	Description/Village	Data		Slums
1	Belawan Pulau Sicanang			
	Broad (Ha)	1.510	21,43	
	Population	15.081	2.721	(678 KK)
	Neighborhood	20	3	V, IX, X
2	Bahagia			
	Broad (Ha)	54	8,32	
	Population	12.206	2.440	(610 KK)
	Neighborhood	20	5	VIII, IX, XII, XIV, XIX
3	Bahari			
	Broad (Ha)	103	6,17	
	Population	12.312	1.188	(297 KK)
	Neighborhood	13	4	III, VIII, IX, XIII
4	Bagan Deli			
	Broad (Ha)	230	7,43	
	Population	16.265	1.516	(379 KK)
	Neighborhood	15	4	IV, VIII, X, XIV

Source: Medan Belawan Sub-district Office, 2015

From the administrative status of the four urban villages in the suburbs of Medan City. Slum neighborhood conditions are divided into very bad, bad and moderate categories. Conformity with the spatial layout is not suitable for Belawan Village Sicanang Island (neighborhood X, V

and IX are located in the river border), Belawan Bahagia village is located in the coastal border, Belawan Bahari village is in the railway line border and Extra High Voltage Air Channel (SUTTET) border, and Bangan Deli Village located in the coastal border.

TABLE 7. COMPATIBILITY WITH SPATIAL PLANNING

No.	Village	Neighborhood	Suitable	Unsuitable*)				
				1	2	3	4	5
1	Belawan Pulau Sicanang	V				√		
		IX			√			
		X			√			
2	Bahagia	VIII				√		
		IX				√		
		XII				√		
		XIV						
		XIX						
3	Bagan Deli	IV				√		
		VIII				√		
		X			√			
		XIV				√		
4	Bahari	III					√	
		VIII					√	
		IX						√
		XIII					√	

Source: Medan City Municipal Office, 2015, Survey Results and Sub-district Office, 2015.

Non compatibility with the spatial layout causes obstacles for Government in undertaking the development

of the slum area, as it will be contrary to the spatial plan of the approved territory.

TABLE 8 ESTIMATED LOSSES DUE TO FLOODS PER YEAR

No.	Estimated Losses (Rp)	Middle Class (xi)	Number of Respondents (fi)	Amount (xi.fi)
1.	500.000 – 1.000.000	750.000	56	42.000.000
2.	1.000.001 – 1.500.000	1.250.000	33	41.250.000
3.	1.500.001 – 2.000.000	1.750.000	3	5.250.000
4.	2.000.001 – 2.500.000	2.250.000	8	18.000.000
Total			100	106.500.000
			Average	1.065.000

Source: Primary Data, Processed, 2016

Based on the calculation of the respondents, the loss of each flood occurs between 0.5 to 2.5 million rupiahs (average 1.065 million rupiahs). That is, if their house is not

flooded, they will be able to store material for the estimated loss, so it is calculated to be a benefit.

TABLE 9 FUEL COST DIFFERENCES PER MONTH

No.	Fuel Cost (Rp)	Middle Class (xi)	Number of Respondents		Amount	
			Before (fi)	After (fi)	Before (xi.fi)	After (xi.fi)
1.	≤ 100.000	100.000	46	75	4.600.000	7.500.000
2.	100.001 – 200.000	150.000	46	21	6.900.000	3.150.000
3.	200.001 – 300.000	250.000	5	2	1.250.000	500.000
4.	>300.000	300.000	3	2	900.000	600.000
Total			100	100	13.650.000	11.750.000
Average					136.500	117.500

Source: Primary Data, Processed, 2016

According to the respondents, before the infrastructure development, the average fuel cost was 136,500.00 rupiah per month, while after infrastructure development there was

a reduction of fuel cost, to an average of 117,500 rupiah per month.

TABLE 10 DIFFERENCES IN THE COST OF WATER PAYMENT PER MONTH

No.	Cost of Water Payment (Rp)	Middle Class (xi)	Number of Respondents		Amount	
			Tap Water (fi)	Non Tap Water (fi)	Tap Water (xi.fi)	Non Tap Water (xi.fi)
1.	≤ 10.000	10.000	28	0	280.000	0
2.	10.001 – 20.000	15.000	20	42	300.000	630.000
3.	20.001 – 30.000	25.000	2	0	50.000	0
4.	30.001 – 40.000	35.000	0	2	0	70.000
5.	> 40.000	40.000	0	6	0	240.000
Total			50	50	630.000	940.000
Average					12.600	18.800

Source: Primary Data, Processed, 2016

The cost of purchasing clean water is reduced. Some people have obtained water service from tap water, with an average cost of 12,600 rupiah per month. Some people who have not received tap water services receive clean water by purchasing, at an average cost of 18,000 rupiah per month. With the construction and repair of public drilling wells, the purchase of clean water is reduced by an average of 6,200 rupiahs / head of household / month.

IV. DISCUSSION

Government investments aim to provide the greatest benefit of public services, which means that the direct benefits received by the government are low. Similarly, in the case of infrastructure development in slum areas in Medan Belawan sub-district, the benefits received by the government are relatively non-existent, but the benefits received by the public can be calculated as described previously.

Efforts for the handling of slum areas are done in various ways according to the problem. In general, however, these

slum settlement efforts involve integrating slum areas into urban spatial structures so that they can be part of a full city in enjoying urban services and facilities, ensuring that improvements in public infrastructure are consistent with the improvement of housing and private / individual facilities.

Slum area rejuvenation is part of the city's rejuvenation program. Rejuvenation of slum settlements is the dismantling of some or all of the slums that are largely entirely within the State and subsequently in the same place built environmental infrastructure and facilities, such as flats and other buildings in accordance with the city spatial plan.

Rejuvenation of slum settlements aims to improve the quality of life and dignity of slum-dwelling people, especially the low-income groups, by obtaining adequate housing in healthy and orderly neighborhoods, forming urban areas arranged in accordance with their functions, encouraging land use more efficient and improving orderly building so as to facilitate the provision of facilities and infrastructure of the necessary settlement environment and

reduce the welfare gap of residents from various urban areas.

cost of 29,919,651,500 rupiahs with the following details:

Infrastructure development in slum areas in Medan Belawan Sub-district conducted during 2012 - 2015 at a

TABLE 11 THE COST OF INFRASTRUCTURE DEVELOPMENT IN THE SUBDISTRICT OF MEDAN BELAWAN 2012 - 2015

Year	Total Project	Budget Development Costs (Rp)
2012	3	1.605.400.000
2013	5	2.718.658.000
2014	76	12.546.889.500
2015	34	13.048.704.000
Total		29.919.651.500

Source: Medan City Municipal Office, 2015

In addition to the investment cost, the Municipal office should also perform maintenance annually. Maintenance begins in the 2nd year at a cost of 15% of development costs, up to the 5th year. After that in the 6th year until the 10th year the maintenance cost is estimated at 25% of the development cost.

The benefits received by the community with infrastructure development in slum areas in Medan Belawan

sub-district is quite a lot as has been calculated before, amounting to 12,763,311,600 rupiahs per year. However, the benefits are not directly accepted by the whole community every year, because the implementation of development is also not at once. It is therefore assumed that in the second year, the benefits received by society are estimated to be 15%; 3rd year to 25%; 4th year of 50%; 5th year of 70%; year 6 by 85%; and the 7th year is 100%.

As presented in the following table.

TABLE 12 COSTS AND BENEFIT OF INFRASTRUCTURE DEVELOPMENT IN THE SUBDISTRICT OF MEDAN BELAWAN, 2012 - 2015

Year	Investment Cost (Rp)	Maintenance cost (Rp)	Benefit (Rp)
1	1.605.400.000	-	-
2	2.718.658.000	240.810.000	1.914.496.740
3	12.546.889.500	648.608.700	3.190.827.900
4	13.048.704.000	2.530.642.125	6.381.655.800
5		4.487.947.725	8.934.318.120
6		4.487.947.725	10.848.814.860
7		4.648.487.725	12.763.311.600
8		4.920.353.525	12.763.311.600
9		6.175.042.475	12.763.311.600
10		7.479.912.875	12.763.311.600
Total	29.919.651.500	75.655.320.100	146.139.917.820
Total Investment and Maintenance		105.574.971.600	
		B/C	1.256

Source: Medan City Municipal Office and Primary Data, Processed

B/C is the value of the comparison between benefit and cost over the life of the project. The calculation of B / C is 1.256. Based on the calculation of the value of B / C above, it can be concluded that the development of slum area Medan Belawan sub-district is feasible economically.

V. CONCLUSIONS AND SUGGESTIONS

A. CONCLUSION

Infrastructure development in the slum area of Medan Belawan Sub-district can provide benefits to the community. The estimated total benefit that is acceptable to the community is 12,763,311,600 rupiahs per year. The greatest benefit is the avoidance of houses from floods, which

amounted to 9,940,710,000 rupiahs (77.88%) per year. Thus, infrastructure development in the slum area of Medan Belawan has a positive impact on the development of the area in Medan City, especially Medan Belawan sub-district.

The calculation of B/C is 1.256. Based on the calculation of the value of B/C above, it can be concluded that the development of slum area feasible economically. Thus Medan Belawan Sub-district will develop.

B. SUGGESTION

In connection with the results of this study, the following suggestions are given:

Medan City Government should strive to continue to carry out infrastructure development in the slum area of Medan Belawan Sub-district to increase the benefits for the community. For infrastructure development investment in slum area, the Medan City Government should also cooperate with all the people who live in slums in the maintenance of the infrastructure.

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