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Developing a Framework for Assessing City Sustainability (Case Study: Bandar Lampung and Metro City, Lampung Province, Indonesia)

To cite this article: C Persada *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **556** 012005

Developing a Framework for Assessing City Sustainability (Case Study: Bandar Lampung and Metro City, Lampung Province, Indonesia)

C Persada[1], **S Tugiono**[2], **I Kustiani**[2]

[1] Department of Architecture, Faculty of Engineering, University of Lampung, Lampung-Indonesia
[2] Department of Civil Engineering, Faculty of Engineering, University of Lampung, Lampung-Indonesia

*Corresponding author: citra.persada@eng.unila.ac.id

Abstract. Sustainable city development is influenced by the availability of sustainable infrastructure. High population growth in urban areas requires improvements in many aspects, especially infrastructure. However, the need for improvements is often not fulfilled. As a result, various problems that would ultimately affect the city sustainability emerge. To overcome the problems, it is important to develop comprehensive and integrated policies and strategies framework that enables a city to meet the demand for improvement and sustainability. The very first stage of developing a city development framework is to understand the current condition of city performance and sustainability. The main objective of this paper is to develop an indicator framework of a sustainable city. The stages of developing the framework consist (1) defining the criteria and indicators of sustainable city; (2) measuring performance and sustainability level of a city and (3) identifying the influential indicators that increase the city sustainability status. The criteria of sustainability framework were developed based on the Triple Bottom Line (TBL) Sustainability of people, planet, and profit. Subsequently, the level of sustainability is measured by using a weighted-score method. This paper presented the results of the performance and sustainability assessment of two cities in the Lampung Province (Bandar Lampung and Metro City) based on the performance and sustainability framework developed in this study. It can be concluded that Bandar Lampung City is less sustainable than Metro.

Keywords: city sustainability, infrastructure, in-depth interview, SUD Index

1. Introduction

Sustainable city development is influenced by the availability of sustainable infrastructure [1, 11]. Rapid physical development and high population growth in city areas have implications for the improvement of the community infrastructure needs. At present, the relationship between cities and infrastructure is emerging as a major problem of sustainability city policy [4]. There are many relevant aspects and actors involved in city infrastructure development and planning and it requires a comprehensive and integrated policy to be sustainable [2, 4, 6, 7, 12]. Strategies, policies, plans, and programs for the development of an integrated and sustainable infrastructure in urban areas have been prepared, however, the development of urban infrastructure still faces unresolved issues [5, 13]. Since infrastructure development does not only affect the aspect of economic, but also social and environmental aspects, those three are the main dimensions of sustainable development. Hence, it is important to determine the

measuring instrument to identify the ability to build sustainable infrastructure based on those three sustainability aspects. The definition of sustainable infrastructure refers to designing, building, and operating structural elements in ways that do not neglect the social, economic and ecological processes needed to maintain human well-being, diversity, and function of natural systems [14].

Previous studies from 2000-2013 of sustainable infrastructure reflected the need to design and manage engineering systems by considering the environment, social and economic factors [8]. The study includes municipal water system sustainability criteria, sustainable transportation, drinking water system, wastewater systems, rainwater systems, green infrastructures, and solid waste. Based on these studies it is known that there a lack of research on criteria and indicators for integrated and sustainable infrastructures [8]. Therefore, the main objective of this paper is to develop a sustainable infrastructure development policy, with specific objectives as follows: (1) to define criteria and indicators of sustainable infrastructure development of a city; (2) to measure the level of sustainability of city's infrastructure, and (3) to identify the influential indicators that increase the city sustainability status.

2. Research Method

The scope of city infrastructure research is restricted to a basic network infrastructure that influences city development, including transportation, water systems (drinking water, stormwater, wastewater), green open spaces and solid waste. The research areas of this study are Bandar Lampung and Metro City in Lampung Province, Indonesia. Bandar Lampung City represents a major city and Metro City represents a town in Indonesia. The data used were primary and secondary data. The primary data were obtained directly from the relevant sources or experts whereas the secondary data were obtained from statistical reports related to the observed objects such as demographic, environmental, economic, social and documents related to the cities' planning.

The survey method applied to gather information and knowledge of the stakeholders and experts were using *in-depth interviews* with predetermined samples that selected intentionally or *purposive sampling*. The sampling units or respondents in a *purposive sampling* method are selected based on certain considerations, characteristics or criteria. For this research, the selection of experts to serve as respondents were based on the consideration: 1) Having sufficient experience in the research field; 2) Having position, reputation and credibility as stakeholders and 3) Willing to be a respondent and available for an interview. The number of experts interviewed were 11 people consisted of academics, governments, professionals and NGO's. The framework indicators of sustainable infrastructure development for this study were developed from the previous study conducted by Persada [8], these studies employed 5 criteria that can be further broken down into 50 indicators (see Table 1).

Table 1. Criteria and Indicators of Sustainable Infrastructure.

Environmental Criteria	Social Criteria	Economic Criteria	Technology Criteria	Good Governance Criteria
1 Land carrying capacity	1 Population growth	1 Economic growth	1 Drainage systems	1 Regulation
2 Conservation area damage growth	2 Number of poor	2 City revenue growth	2 Sewage system	2 Planning (sectoral)
3 Built up area growth	3 Human Development Index (HDI)	3 Investment growth	3 Drinking water system	3 Inter-sector institution
4 Slum area growth	4 The community sewage system	4 The city budget growth	4 Water leakage	4 The visionary leadership
5 Air quality	5 Cathment areas by public	5 Level of per capita income	5 Solid waste management	5 Spatial planning
6 Water quality	6 Processing trash by community	6 Minimum city wage	6 Green open space systems	6 Law enforcement
7 Land quality	7 Artesian/shallow wells by community	7 Levels of local economic growth	7 Road systems	7 Socio-political conditions
8 Availability of water resources	8 Levels of security and safety	8 Infrastructure services fee	8 Bicycle lanes/non-motorcycle	8 Call center
9 Traffic congestion level	9 Unemployment rate	9 Land value	9 Facilities for pedestrians	9 Budgeting
	10 Levels of traffic accident		10 Public transportation	10 Human resource capacity in government
	11 Communities behaviour (culture)			11 Community participation

Source: Persada, 2014

The method of assessment applied in this study was the scoring and weighting method. A set of criteria and indicators selected from the literature review were used as parameters in determining city sustainable infrastructure development. The index of sustainable infrastructure development was achieved by assessing the indicators based on objective data and expert perceptions. Thus, indicators were scored and weighted in two stages. Firstly, the set of indicators were scored and weighted by

experts through in-depth interview; and secondly, it was scored and weighted through secondary data assessment indicators. The weight applied to each criterion was different according to its importance to sustainability. Whereas, the scores applied were a range of values from 1 to 4. The structure of scoring and weighting can be seen in Table 2 and the index of sustainability can be seen in Table 3.

Tabel 2. Formulation of Assessment of City Sustainable Infrastructure Development.

Criteria	Primary Data				Secondary Data			
	Weight	Total Indicator	Max. Score	Max.Total Score	Weight	Total Indicator	Max. Score	Max.Total Score
Environment	2	10	4	880	2	10	4	80
Social	2	11	4	88	2	11	4	88
Economic	2	9	4	72	2	9	4	72
Technology	3	9	4	108	3	9	4	108
Good Governace	3	11	4	132	3	11	4	132
Total	10	50		480	10	50		480
Total (%)				60 %				40 %

The urban sustainable infrastructure index is measured using the scoring and weighting method as in Table 2. The final value of the urban infrastructure sustainability index is the sum of the total score and weighting of primary and secondary data in Table 2. Furthermore, the maximum total scores (480) is divided into 5 levels of sustainability, namely: poor, less, fair, good and very good. By adopting a Sustainable Urban Development (SUD) Index [3] the quantitative value of subjective dimensions above was divided into five levels as shown in Table 3.

Table 3. Sustainability Index and Status of City Infrastructure.

Index	Category
< 97	Poor (not sustainable)
97 - 192	Less (less sustainable)
193 - 288	Fair (fairly sustainable)
289 - 384	Good (sustainable)
385 - 480	Very good (very sustainable)

3. Result and Discussion

3.1. Sustainability Status of City Infrastructure Development

Table 4 shows the assessment results of the sustainable infrastructure development of Bandar Lampung and Metro City. It can be seen from Table 4 that the total weighted score of a sustainability index for Bandar Lampung City is 130.4 (less sustainable). This value demonstrates the status of infrastructure development sustainability of this city is quite critical. Almost all indicators have low value. The low value of environmental indicators index is due to environmental problems commonly caused by population growth pressure and urbanization such as the reduction of land and water carrying capacity, pollution of air, water and soil, the damage of protected areas and water resources, problems with municipal solid waste and wastewater. The low social sustainability index is closely related to environmental problems and other problems such as security, unemployment rate and social welfare, and public behavior towards infrastructure facilities. The low value of the technology index is caused by inadequate infrastructure facilities and technology. Whereas, the low value on governance index is generated by weak law enforcement and inadequate development planning, lack of leadership, community participation, budget and resources, and political conditions. On the other hand, the economics sustainability index is better than other sustainability indexes. Table 4 also shows the total weighted score of the sustainability index of Metro City, which is better than Bandar Lampung City.

The value demonstrates the status of infrastructure development sustainability of this city is fairly sustainable with a score of 212.13.

3.2. Efforts on Improving Sustainability Status of City Infrastructure

The status of sustainable infrastructure development criteria can be increased in the future through sustainable infrastructure planning. Sustainable urban infrastructure planning is part of the infrastructure development process that takes into account the balance between sustainable development criteria of economic, social and environmental as well as a choice of technology and good governance. Table 5 shows the influential indicators to increase the sustainability status of Bandar Lampung City and Metro City based on stakeholder's perspectives and based on *Rencana Pembangunan Jangka Menengah Daerah* or RPJMD (Mid-Term Local Development Planning) documents. RPJMD is the reference for development in a Spatial Plan.

Table 4. Assessment Results on Sustainable Infrastructure Development of Bandar Lampung and Metro City.

No.	CRITERIA and INDICATOR	THE CITY OF BANDAR LAMPUNG								THE CITY OF METRO							
		Secondary Data				Primary Data				Secondary Data				Primary Data			
		Score	Weight	%	Score	Score	Weight	%	Score	Score	Weight	%	Score	Score	Weight	%	Score
A	Environmental Criteria																
	Land carrying capacity	2	2	60	2.4	1	2	40	0.8	2	2	60	2.4	2.143	2	40	1.714
	Conservation area damage growth	0	2	60	0	0	2	40	0	2	2	60	2.4	2	2	40	1.6
	Built up area growth	1	2	60	1.2	1	2	40	0.8	2	2	60	2.4	2	2	40	1.6
	Slum area growth	0	2	60	0	1	2	40	0.8	2	2	60	2.4	1.857	2	40	1.486
	Air quality	3	2	60	3.6	2	2	40	1.6	3	2	60	3.6	1.857	2	40	1.486
	Water quality	2	2	60	2.4	2	2	40	1.6	2	2	60	2.4	1.857	2	40	1.486
	Land quality	1	2	60	1.2	2	2	40	1.6	2	2	60	2.4	1.857	2	40	1.486
	Availability of water resources	2	2	60	2.4	1	2	40	0.8	2	2	60	2.4	2	2	40	1.6
	Traffic congestion level	1	2	60	1.2	0	2	40	0	0	2	60	0	1.571	2	40	1.257
B	Social Criteria																
	Population growth	1	2	60	1.2	0	2	40	0	1	2	60	1.2	1.167	2	40	0.933
	Number of poor	2	2	60	2.4	2	2	40	1.6	2	2	60	2.4	2	2	40	1.6
	Human Development Index (HDI)	1	2	60	1.2	0	2	40	0	2	2	60	2.4	2.857	2	40	2.286
	The community sewage system	1	2	60	1.2	0	2	40	0	0	2	60	0	1	2	40	0.8
	Cathment areas by public	0	2	60	0	0	2	40	0	0	2	60	0	1.143	2	40	0.914
	Processing trash by community	1	2	60	1.2	0	2	40	0	3	2	60	3.6	1.714	2	40	1.371
	Artesian/shallow wells by community	1	2	60	1.2	1	2	40	0.8	0	2	60	0	1.143	2	40	0.914
	Levels of security and safety	0	2	60	0	0	2	40	0	1	2	60	1.2	1.571	2	40	1.257
	Unemployment rate	1	2	60	1.2	1	2	40	0.8	0	2	60	0	2.143	2	40	1.714
	Levels of traffic accident	1	2	60	1.2	1	2	40	0.8	3	2	60	3.6	2.714	2	40	2.171
	Communities behaviour (culture)	0	2	60	0	0	2	40	0	0	2	60	0	0.429	2	40	0.343
C	Economic Criteria																
	Economic growth	2	2	60	2.4	2	2	40	1.6	2	2	60	2.4	2	2	40	1.6
	City revenue growth	1	2	60	1.2	2	2	40	1.6	2	2	60	2.4	2.286	2	40	1.829
	Investment growth	1	2	60	1.2	1	2	40	0.8	3	2	60	3.6	1.571	2	40	1.257
	The city budget growth	1	2	60	1.2	1	2	40	0.8	1	2	60	1.2	1.571	2	40	1.257
	Level of per capita income	2	2	60	2.4	2	2	40	1.6	1	2	60	1.2	1.571	2	40	1.257
	Minimum city wage	2	2	60	2.4	1	2	40	0.8	1	2	60	1.2	1.429	2	40	1.143
	Levels of local economic growth	2	2	60	2.4	2	2	40	1.6	3	2	60	3.6	1.571	2	40	1.257
	Infrastructure services fee	2	2	60	2.4	1	2	40	0.8	2	2	60	2.4	1.714	2	40	1.371
	Land value	1	2	60	1.2	1	2	40	0.8	1	2	60	1.2	1	2	40	0.8
D	Technology Criteria																
	Drainage systems	1	3	60	1.8	1	3	40	1.2	3	3	60	5.4	1.429	3	40	1.714
	Sewage system	1	3	60	1.8	0	3	40	0	0	3	60	0	1.714	3	40	2.057
	Drinking water system	0	3	60	0	0	3	40	0	0	3	60	0	1.286	3	40	1.543
	Water leakage	1	3	60	1.8	1	3	40	1.2	2	3	60	3.6	1.5	3	40	1.8
	Solid waste management	2	3	60	3.6	1	3	40	1.2	1	3	60	1.8	1.571	3	40	1.886
	Green open space systems	2	3	60	3.6	1	3	40	1.2	2	3	60	3.6	1.857	3	40	2.229
	Road systems	0	3	60	0	1	3	40	1.2	1	3	60	1.8	2.286	3	40	2.743
	Bicycle lanes/non-motorcycle	1	3	60	1.8	0	3	40	0	2	3	60	3.6	2	3	40	2.4
	Facilities for pedestrians	0	3	60	0	0	3	40	0	2	3	60	3.6	2	3	40	2.4
	Public transportation	1	3	60	1.8	0	3	40	0	2	3	60	3.6	1.571	3	40	1.886
E	Good Governance Criteria																
	Regulation	2	3	60	3.6	2	3	40	2.4	2	3	60	3.6	2.143	3	40	2.571
	Planning (sectoral)	2	3	60	3.6	2	3	40	2.4	2	3	60	3.6	2.429	3	40	2.914
	Inter-sector institution	0	3	60	0	0	3	40	0	3	3	60	5.4	2.571	3	40	3.086
	The visionary leadership	2	3	60	3.6	2	3	40	2.4	2	3	60	3.6	2.429	3	40	2.914
	Spatial planning	2	3	60	3.6	2	3	40	2.4	2	3	60	3.6	2	3	40	2.4
	Law enforcement	0	3	60	0	0	3	40	0	2	3	60	3.6	1.714	3	40	2.057
	Socio-political conditions	1	3	60	1.8	0	3	40	0	2	3	60	3.6	2	3	40	2.4
	Call center	3	3	60	5.4	3	3	40	3.6	3	3	60	5.4	2.714	3	40	3.257
	Budgeting	1	3	60	1.8	1	3	40	1.2	1	3	60	1.8	1.833	3	40	2.2

No.	CRITERIA and INDICATOR	THE CITY OF BANDAR LAMPUNG								THE CITY OF METRO							
		Secondary Data				Primary Data				Secondary Data				Primary Data			
		Score	Weight	%	Score	Score	Weight	%	Score	Score	Weight	%	Score	Score	Weight	%	Score
	Human resource capacity in government	1	3	60	1.8	1	3	40	1.2	2	3	60	3.6	1.857	3	40	2.229
	Community participation	1	3	60	1.8	1	3	40	1.2	2	3	60	3.6	2.714	3	40	3.257
	TOTAL SCORE	85.2				45.2				122.4				89.7			
	TOTAL PRIMARY & SECONDARY	130,4								212,13							
	SUSTAINABILITY STATUS	LESS SUSTAINABLE								FAIRLY SUSTAINABLE							

The RPJMD of the City of Bandar Lampung Year 2010-2015 includes the 5 criteria of sustainable development, consisting of environmental, social, economic, technology and good governance. However, it only contains 28 out of 50 indicators of sustainable infrastructure development. Similarly, the RPJMD of Metro City Year 2010-2015 includes the 5 criteria of sustainable development and contains 23 out of 50 indicators of sustainable infrastructure development. Based on this evaluation, there are additional indicators that should be included in future RPJMD [9,10] to increase the sustainability infrastructure development status of the cities. On the other hand, some indicators exist in RPJMD but having low value. The following table shows the additional indicators for future RPJMD as well as indicators that need to be optimized.

Table 5 and Table 6 show that indicators that often appear are indicators that influence the sustainability of urban infrastructure. The analysis shows that the 8-most influential indicators in sustainable infrastructure development of a city are: (i) local economic growth, (ii) infrastructure planning, (iii) infrastructure budgeting, (iv) availability of clean water system, (v) public participation, (vi) public behavior/culture toward infrastructure facilities, (vii) air quality, and (viii) built environment usage.

3.3. Policy Recommendation of Sustainable Infrastructure Development

The results of the analysis show that several indicators that must be improved to improve the sustainable status of cities. As shown in Table 7 on Policy guidelines for priority in sustainable infrastructure development, it is suggested that the city authorities should carry on the followings: (i) local economic growth that pays attention to the microeconomics infrastructure needs, (ii) integrated infrastructure planning, (iii) effective and efficient use of improved infrastructure budget, (iv) equal distribution of available water resources and implementation of 5R principle to increase freshwater quantity; (v) public participation through agreement and information transparency, (vi) urban infrastructure management based on local community culture, (vii) air quality improvement through public transportation system, regular vehicle emission test, eco-friendly energy, green industry and eco-friendly waste management, and (viii) built environment in-line with city spatial planning requirement of at least 30% of green open space, efficient use of city spatial, and conservation areas. Based on the previous evaluation, guidelines for development policy should be rectified. Table 7 shows the proposed revision on a guideline for development policy for both cities.

Tabel 5. The influential Indicators to Increase the Sustainability Status of Bandar Lampung and Metro City.

Criteria	Primary Data - Stakeholders' Perspectives		Secondary Data - RPJMD Planning Documents	
	The City of Bandar Lampung	The City of Metro	The City of Bandar Lampung	The City of Metro
Environment	Destruction rate of protected areas (mountains, slopes and hills)	Availability of fresh water resource	The rate of mountains and hils destruction	Carrying capacity of urband land
	Urban slums condition	Congestion points	Urban slums condition	Quality of urban fresh water
	Quality of the groudwater/river/sea	Built area development	Air pollution of catcment areas and water resources	Availability of urban fresh water
	Congestions points		Congestion points	Urban road congestion
	Built areas			
	Quality of fresh water resource			
	Carrying capacity of land			
Social	Community eco-friendly waste management	Community eco-friendly waste management	Human development Index	Number of poor people
	Social security and stability (harmony and order)	Domestic and communal waste water treatment (septic tank)	Number of poor people	Level of education, health and incomes
	Community support on sustainable infrastructure	Number of unemployment	Social stability, harmony and order	Public waste management
	Number of community drilled-wells	Community support towards sustaainable infrastructure development	Community waste manegement	Level of security and order
	Illegal urban (kerb) dwellers	Number of community drilled-wells		
	Community backyard biopori to increase infiltration	Illegal urban (kerb) dwellers		
	Number of domestic and communal waste water treatment (septic tank)	Social stability, harmony and order		
	Number of urban unemployment			
	Number of road accidents			
Economics	Infrastructure services	Budget	Investment growth rate	Economics and GDP growth rate
	Urban landplot price	GDP per capita	Revenue growth rate	Rebenue growth rate
	Investment rate	Price of urban landplot	GDP grouwth rate	Investment grouth rate
	Budget		Local economy (small and medium-sized enterpries or SMEs) growth rate	Local economy (small and medium-sized enterpries or SMEs) growth rate
			Regional minimum wage (UMR) based on proper life	
Tecnology	Water service system	Domestic, communal and urban waste water treatment facility	Waste management	Urban drainage system
	Urban carrying capacity	Water service system	Urban road network and environment	Water service system
	Urban drainage system	Waste management system	Green open space (RTH)	Waste management system
	Domestic, communal and urban waste water treatment facility	Road network	Sedimentation of rivers and drainage	Availability of green open space
	Level of water leakage	Pedestrian facilities	Water services	Availability of transportation netwoks
	Waste management system	Urban drainage system	Sewer network	Urban drainage system
	Green open space	Level of water leakage	Availability of transportation facilities and mass transportation transit	Liof transl yplf water leof transl transportation rpofrl ntion transitransportationf ation transitr
	Availability of bicycle lane		Waste handling	
	Pedestrian facilities			
	Acces to comfortable and cheap mass transportation transit			
Good Governance	Cross sectoral integrated infrastructure	Infrastucture budgeting	Number of new legislations issued	Cross sectoral arrangement
	Law enforcement	Law enforcement in infrastructure	Increase capacity of government employees through and education	Local political and social conditions
	Conducive social and political conditions		Availability a call center	Infrastructure capacity building
	Infrastucture budgeting		Availability of information on development planning and implementation	Community participation
	Government HR		Urban regional financial management	
	Community participation in infrastucture planning			Infrastructure capacity building

Tabel 6. Proposed Additional Sustainable Infrastructure Development Indicators to be Included in Future RPJM and Sustainable Infrastructure Development Indicators to be Optimized.

Criteria	Proposed Additional Indicators for Future RPJMD		Existing Indicators to be Ofrimized	
	The City of Bandar Lampung	The City of Metro	The City of Bandar Lampung	The City of Metro
Environment	Quality of water resouces (ground, river and sea)	Restrain the development rate on built environment	Proteted areas (mountain and hill)	Fresh water resources
	Restrain the development rate on built environment		Improved urban slums	Congestian point
	Land carrying capacity		Congestian point	
	Paedestrian walks		Fresh water resources	
Social	Community support towards sustainable	Domestic and communal waste water treatment (septic tank)	Community eco-friendly waste management	Community eco-friendly waste management
	Infrastructure development	Community support towards sustainable	Social security and order	Number of urban unemployment
	Community/private wells drilling	Community/private wells drilling	Number of urban poor	Social security and comport
	Urban population growth rate	Urban population growth rate	Number of urban unemployment	
	Community biopori to increase infiltration			
	Domestic and communal waste water treatment (septic tank)			
	Number of accidents on the road			
Economics	Level of infrastructure services	City budgeting	Imvestment growth	Domestic Product Regional Bruto (Produk Domestik Regional Bruto or PDRB) Rate
	Rate of urban land employment	Rate of urban land employment		
	City budgeting			
Tecnology	Pedestrian walks/facilities	Level of water leakage	Level of water services	Level of water services
			Urban road and environment	Urban road and environment
			Drainage system	Municipal solid waste management
			Communal wastewater treatment system	Drainage system
			Municipal solid waste management	
			Green open space	
			Availability of public transport and transportation transit	
Good Governance	Cross sectoral institutions of integrated infrastructure	Law enforcement on infrastructure	Infrastructure budgeting	Infrastructure budgeting
	Conductive social and political conditions		Capacity of government HR	
	Community participation in infrastructure planning process			

Table 7. The Guidelines of Development Policy for Sustainable Infrastructure Development.

Management Instruments	Goals (Sustainability Principles)	Key/Influential Indicators	Development Strategies	Limitation	Policy Instrumentation
Identification of needs and planning	Efficiency and effectiveness	Restrained the development rate on built environment	Social prosperity through infrastructure development for the increase of local economy	Sectoral	Master plan on regional spatial planning (RTRW)
		Improved water quality		Spatial (regional)	Sectoral master plan
		Expansion of local economic to increase gross domestic products			Development program
		Increased public participation			
		Increased public awareness/behaviour	Social justice through equal access to infrastructure to all level of community		
		Develop mass rapid transportation and pedestrian walks			
		Increased cooperation and coordination	Sustainable environment throught conservation of protected areas		
		Increased infrastructure budget			
Organization and budgeting	Integration	Increased budget integration	Viability of budget (financial)	Financial capacity (APBD)	Mid Term Integrated
		Increased budget transparancy	Social feasibility	Public investment	Planning and Program on Infrastructure Investment (RTPI)
		Increased public and private participation	Environmental feasibility	Private investation	
Implementation	Harmony	Increased cooperation and coordination at cross sectoral in a deparment	Government-public and private coorperation	Standard and quality of infrastructure facilities and sevices	Increased competencies
		Increased integration in infrastructure cross sectoral			Increased capacity of departments
		Increased awareness/anticipation on environmental, social an economics impacts			Workshop and training
		Increased quality of HR in government			
Monitoring and Evaluation (Control)	On time	Increased public involvement	Transparency	H.R. capacity	Performance indicator (Midterm Local Development Plan/RPJMD)
	Correct target	Increased law enforcement	Accountability	Departmental capacity	
	Proper function	Increased public awareness and care	Inclusive (stakeholder involvement)	Monitoring	Focus on: - Law enforcement - Public monitoring (call center) - Audit

4. Conclusion and Suggestion

The following are the conclusions drawn from the study:

1. The framework of sustainable infrastructure development that was developed based on literature review contains 5 criteria and 50 indicators.
2. The sustainability status of infrastructure development of the City of Bandar Lampung is less sustainable, with an index value of 130,4. This means that the current infrastructure needs to be upgraded so that its sustainability status also improves. The total score of the sustainability index of Metro City, which is better than Bandar Lampung City. The value demonstrates the status of infrastructure development sustainability of this city is fairly sustainable with a score of 212.13.
3. Base on research analysis, it can be concluded that the 8-most influential indicators in sustainable infrastructure development of a city are: (i) local economic growth, (ii) infrastructure planning, (iii) infrastructure budgeting, (iv) availability of clean water system, (v) public participation, (vi) public behavior/culture toward infrastructure facilities, (vii) air quality, and (viii) built environment usage.

Based on the conclusion, it is suggested to:

1. Policy guidelines for priority in sustainable infrastructure development, it is suggested that the city authorities should carry on the followings: (i) local economic growth that pays attention to the microeconomics infrastructure needs, (ii) integrated infrastructure planning, (iii) effective and efficient use of improved infrastructure budget, (iv) equal distribution of available water resources and implementation of 5R principle to increase freshwater quantity; (v) public participation through agreement and information transparency, (vi) urban infrastructure management based on local community culture, (vii) air quality improvement through public transportation system, regular vehicle emission test, eco-friendly energy, green industry, and eco-friendly waste management, and (viii) built environment in-line with city spatial planning requirement of at least 30% of green open space, efficient use of city spatial, and conservation areas;
2. Extend the study to other cities in Indonesia since the influential indicators might be different according to characters and problems of a particular city;
3. It is suggested to expand the study by implementing the dynamic model to accommodate the estimation of urban infrastructure sustainability as well as to engineer a policy model of urban sustainable infrastructure development.

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