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Priority Scale of Waste Management Policies that Support Environmental Hygiene in City of Ternate

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Abstract This study aims to analyze the city's garbage into complex problems in Ternate. One factor is the increasing population, economic activity and business as well as the dynamics of community life. Ternate has a problem concerning waste management ineffective. Every year the government allocates funds to Ternate huge waste problem. Department of Hygiene as a leading institution in the control of waste management in the city of Ternate is not going well. This has resulted in waste management in the city of Ternate is not operating effectively. These results explain that the hierarchical structure level I shows the results that the purpose of the planning waste managenent is operational waste management got the greatest score 0.866. Level II shows the hierarchical structure of the result that both of planning instruments, namely: lug system, temporary shelter systems and transport systems of the greatest scored 0,781. The third hierarchy is an indicator of the planning objectives. Indicators of Group II, consisting of (i). Dustbin/Plastic Trash and Garbage containers, (ii). Garbage Depots-based and Regional Function-based and (iii). Garbage Trucks and Carts / Garbage bike also scored highest 0.714. The fourth hierarchical structure, namely the formulation of public policy to explain that the first level is the Regulatory Policy and Institutional Waste Management with a score that is 0.453. The second level is the Policy and Mechanism of Solid Waste Management System with the highest score of 0.792. The third level of policy is a policy that optimizes Incentives and Public Participation with a score of 0.655. This means that a policy model that supports the management of municipal solid waste in the town of Ternate that can create a clean and healthy is a Waste Management System and Mechanism of the greatest score of 0.792.

Keywords Public Policy Formulation and Municipal Solid Waste

1. Introduction

Garbage is the waste arising from human activities. Waste volume is influenced by the level of economic and cultural consumption. High economic capability will increase the level of consumption and thus the greater the volume of waste generated. Waste that is not managed will potentially lead to a variety of environmental disturbances. Waste management policy in the city of Ternate is intended to improve public health and environmental quality of life and make the waste as a resource.

Garbage is an unwanted waste material after the end of a process of production/ consumption, but in a natural process, not the technical term is rubbish. Natural processes are related to each other in a cycle, in which the output of one process becomes the input of another process. Waste is a material that has no value or no value for ordinary or main purpose in fabrication or use of the goods damaged or defect in the manufacture or fabrication of the material surplus or rejected or discarded. Waste management that is held based on the insight that waste resources and not rely on the approach to throw garbage in landfill sites. All waste generated from everyday life of society disposed to final disposal of waste that ultimately provide very heavy pressure towards the end of the garbage dump, because it requires a long period of time so that waste can be broken down by natural processes. Within the natural process of decomposition, the waste should be managed, which means the necessary funds, manpower, time and space to manage. Therefore, the waste management needs to be formulated and designed into a system and mechanism in the form of waste management policy. Waste management is a new paradigm aimed at reducing the volume of waste disposed of to landfill through development efforts treating waste by reducing, reuse and recycling. Waste management is the new paradigm also asserts that waste management is a public service that aims to control waste generated communities through community empowerment supported by the implementation of the waste management policy.

The new paradigm of looking at waste as a resource that has economic value such as for energy, compost, fertilizer

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and industrial raw materials. Waste management is a new paradigm that can be done with the waste management activities that apply the concept of 3R (reduce, reuse and recycle) and waste management that implements the concept of community empowerment (empowerment). Waste management includes reduction, reuse, and recycling, while empowerment, namely: activity waste segregation, collection, transportation, processing, and final processing.

Waste management is directly part of the public policy level due to local government waste is a problem that requires the completion of the public. The solution to waste management is necessary to have a proper public policy and direction. Associated with the implementation of policies, Webster (1990) in Wahab (2000) argues: "The implementation of the policy is a process of implementing policy decisions are usually in the form of Local Government Regulation." Furthermore, Mazmanian and Sabatier (1983) in Wahab (2000) argues: "Implementation of the policy are events and activities that took place after the passing of wisdom guidelines that include efforts to administering nor for consequences/real impact on the communities or events". So that needs to be in the implementation of public policy is a form of action or implementation of a plan to the allocation. There four (4) factors that affect the implementation of public policies, as described by Edward III (1980); namely communication, resources, dispositions or attitudes and bureaucratic structures.

The advent of Law Number 18 of 2008 on Waste Management is a new milestone for urban waste management policy in Ternate City directing urban waste management policy on the concept of zero waste by emphasizing the importance of the role of the community in waste management. Waste management in the city, not in spite of public policy issued by local governments. In the aspect of resources, particularly in terms of funding sources, government of Ternate implement garbage fees as a source of revenue (the original income/PAD) and financial resources in the implementation of waste management services. The phenomenon is associated with this funding, namely the existence of two times the garbage fees to be paid by the community. First, levies in the form of monthly garbage fees administered by Neighborhood (RW) in waste management such as waste collection activities from the houses to the polls (TPS). While the latter form of levy garbage fees (at the time of payment of electricity) collected by the PD Health in the form of waste transporting activities of polls (TPS) to landfill.

In the aspect of the disposition, the Government of Ternate are required to have an agreement among the executive to implement the policy of urban waste management. In the aspect of bureaucracy, government of Ternate put PD Health as Regional-Owned Enterprises that conduct waste management in the city of Ternate. However, urban waste management conducted PD Health only focused on waste management in terms of transporting waste from the landfill to the polls (TPS). Local Regulation of Waste Management in the city of Ternate has not referred to in Article 5 and Article 6 of Law No. 18 of 2008 on Waste Management which mandates local governments to foster community participation in waste management. Municipal waste, especially waste management is a serious concern for the governance of a city that embraces the concept of green city like Ternate City. Therefore the problem focused is how the formulation of public policies that support waste management in the city of Ternate that support the realization of green city in the long run.

2. Research Methods

AHP Method (Analytical Hierarchy Process)

Analytical Hierarchy Process (AHP) is a functional hierarchy with the main input of human perception. Through the hierarchy, a complex and unstructured problem can be broken down into groups which are then organized into a hierarchical form (Permadi, 1992). The working principle of the AHP is a simplification of a complex issue that is not structured, strategic, and dynamic into a parts and arranged in a hierarchy. The level of importance of each variable was given a numerical value, subjectively about the importance of these variables and relative to other variables. After that, from then carried out the synthesis of a variety of considerations to set a variable that has a high priority and role is to affect the outcome of the system (Marimin and Maghfiroh, 2010).

Furthermore, Marimin and Maghfiroh (2010) graphically describes the problems that AHP decision diagrams can be constructed as multilevel (hierarchical). AHP begins with a goal or objective of the first level criteria, sub-criteria and finally alternative. There are various forms of hierarchies tailored to the substance of the decisions and problems can only be solved by AHP. Through AHP, the user can provide the relative weights of the criteria of a compound or compound alternative to a criterion. The weights given by pairwise comparisons (pairwise comparisons). Furthermore, pairwise comparisons are converted into a set of numbers representing the relative priority of each criterion and alternatif.AHP have the ability to solve the problem of multi-objective and multi-criteria are based on the comparison of the preferences of each element in the hierarchy. Thus, this model is a comprehensive model of decision making (Suryadi et al, 1998). Moreover, the AHP also test the consistency of assessment in case of deviation is too far from the value of perfect consistency it shows the hierarchy of assessment needs to be repaired or must be restructured (Marimin and Maghfiroh, 2010). The following are the advantages possessed by the AHP, namely:

1. Unity: AHP provide a single model of that is easy to understand, flexible for a variety of unstructured problems.
2. Complexity: Definition of AHP combines deductive and Definition based systems to solve complex problems.

3. Mutual dependence: AHP can deal with the interdependence of elements in a system and does not impose linear thinking.
4. Preparation of hierarchy: AHP reflects the natural tendency of the mind to sort out the elements of a system in a variety of different levels and the grouping of elements in Click or call now level-similar.
5. Measurement: AHP member of a scale to measure things and Realized a method to set priorities.
6. Consistency: AHP tracks the logical consistency of the Considerations that are used to assign different priorities.
7. Synthesis: AHP leads to a thorough assessment of the goodness of alternative Click or call now.
8. Fresh bid: AHP Consider the relative priorities of various system factors and allows Organizations choose the best alternative based on their goals.
9. Assessment and consensus: AHP not force consensus, but synthesizing a representative result from a variety of different assessment.
10. Repetition Process: AHP enables Reviews their organization to refine the definition of a problem and fixing Reviews their consideration and understanding through repetition.

The following are some of the processes that must be performed in the analysis of the AHP, the which is as follows (Maarif and Cape, 2003):

1. Identification of the system is performed to Determine the issues to be resolved in the form of the the target (goal) is to be Achieved, the factors/criteria that will be used, the actors Involved in the system and its objectives, and alternatives strategies.
2. Preparation of hierarchy is done by abstracting the components in the system. This abstraction must be interconnected, composed of the main targets down to the factors, then to the actors, the goals of the perpetrators, then strategies and provide ultimately the decision.
3. Preparation of a matrix of individual opinion for every criteria and alternatives is done through pairwise comparisons. Each element of the system with other elements at Each level of hierarchy in pairs compared to obtain a quantitative value of the interest element. The grading scale used for the qualitative opinion quantified as shown in Table 2.
4. The value of comparisons that have been made must be Obtained degree of consistency with CR ≤ 10%.
5. Preparation of matrix composite opinion, then do a vertical processing system to Determine the priority vector.

This study was conducted from July to December 2013. The primary data collection and is in Ternate City Map of research sites can be seen on the map below.

Figure 1. Research Location Map

Table 1. Scale for Pairwise Comparison Matrix Completion

Intensity	Definition	Explanation
1	Both elements are equally important	Two equally strong element in nature
3	Elements that one a little more important than the other elements	Experience and judgment slightly more support one element over another element.
5	One very important than the other elements	Experience and judgment strongly support one element over another element.
7	One element is clearly more important than the other elements.	One element strongly supported and didominasinya been seen in practice.
9	One element is absolutely more important than the other elements.	The evidence supporting the elements that have the highest degree of affirmation that strengthens.
2,4,6,8	Values between the two considerations	Necessary compromise between two considerations.
Opposite	If element i scored a comparison element j, then the element j has a value of 1 / a when compared element i.	

3. Empirical Result

3.1. Waste Management Public Policy Formulation in Ternate

Policy-making process is basically chose an alternative strategy in this case to support the waste management strategy which can realize to the city of Ternate were clean and healthy. In determining the development policy, especially with regard to public policy such as municipal solid waste management, each policy maker in this case and Sanitation Department officials/DKP related and community members are often faced with complex problems faced that led to many considerations and alternatives in decision making. Many of the considerations in determining policy appears in the decision-making process with many alternatives and are complex. Meanwhile, policy alternatives should be taken not only one or two, but includes a series of policies making it difficult to determine the priority of measures taken sometimes even when associated with each other becomes less consistent. In this framework, Analytic Hierarchy Process method (AHP) is used, namely as a tool to decide a policy priority has been to consider a wide range of criteria, other than that decision has a level of consistency is maintained.

The method used in the formulation of policies that support the management of municipal solid waste in Ternate is the method of Analytic Hierarchy Process (AHP). This method is a method of decision-making by using the main equipment is a hierarchy. In this hierarchy, a problem that is complex and unstructured divided, grouped and organized into a hierarchical form (Jamli and Joesoef, 1999: 17). The main data of the AHP is the perception of people who are considered experts. The criteria of the expert here does not mean genius, smart or doctoral degree or a professor, but more directed at people who are more familiar with the problems associated with waste management in the city of Ternate. Moreover, the AHP is a flexible model that gives ideas and define problems by making their own assumptions and to obtain the desired solution of it. This process also allows people to test the sensitivity of the results to changes in the information and is designed to better accommodate human nature rather than forcing us into ways of thinking that may be exactly the opposite of conscience. AHP is an appropriate process to address the political and socio-economic issues of complex (Saaty, 1991: 23).

AHP is also a theory of measurement that is used to find a good ratio scale of comparison pairs diskert or continuous. Comparisons can be drawn from the actual size or a basic scale that reflects the relative strength of the feelings and preferences. AHP has a particular concern about the deviation from consistency, measurements and the dependence within and between groups of structure elements. AHP is found in the decision-making for many criteria, planning, prediction and resource allocation so that the AHP can be termed as a versatile method and many consider controversial (Mulyono, 1989: 2). Thus, AHP can be considered as a model-multifactor multiobjective-multicriteria decisions (Harker and Vargas, 1987: 1383).

In Saaty (1991:30) mentioned two kinds of hierarchy, namely the structural hierarchy and functional hierarchy. The pattern of structural hierarchy, composed of a complex system into which the principal components in sorting decrease based on their structural properties. According to Ramadan (1998) AHP applications can be divided into two stages: the preparation stage of the hierarchy and the hierarchy evaluation. Preparation hierarchy commonly known as decomposition includes three most related process and sequence, namely: (1) identification and element level, (2) the definition of the concept, and (3) the formulation of the question. The first step is to identify the levels and elements in a level, then these elements are defined and used in the formula question. At the evaluation stage of the hierarchy there are two things you do, that means the assessment and synthesis of the results. Assesment the decision makers translates pair of elements. Perception or judgment is expressed in a scale of 1 to 9, and the results will form a matrix comparison pairwase. Once the matrix is filled with all the priorities of each element in the level sought by

finding the eigen vector is known as a local priority. The next step of synthesis is done by multiplying the local priorities with the priorities of the elements on the level above. This matrix will result in a global priority which declares the priority of each element at the previous level. AHP model does not require strict, but the last part remains checked again whether the inconsistency that occurs is minimized mungkin. In the event any inconsistency in the local priority of global priority can still be guaranteed consistent or inkonsistennya low. In the event of inconsistencies on the local priority of global priority can still be guaranteed to be consistent or low inconsistent.

Formulation of policies to support the Municipal Solid Waste Management in Ternate based on some empirical facts, among others, that: (1). The findings in the field, (2). Empirical data relating to the volume of waste, the amount of garbage transportation, garbage collection methods, facilities and supporting infrastructure etc. (3). The results of the workshop and the Sanitary Department of Ternate as well as (4). Forum Group Discussion/FGD of Waste Management City. The first step in formulating policy formulation is a formulation of the hierarchy should be structured. Formulation of policies that support the management of municipal solid waste in Ternate can be explained by using a hierarchical structure whose purpose is to identify performation right strategy as a supporting instrument of municipal solid waste management in Ternate.

Hierarchical structure and the formulation of appropriate policies and the right to support waste management in Ternate, are as follows:

Specification diagrams:

Goal: Develop Public Policy Formulation supporting Municipal Solid Waste Management in order to promote the city of Ternate were clean and healthy

Hierarchy Level 1: The Objective of Municipal Solid Waste Management Plan in Ternate

City Waste Management Organization: The objective of the waste management plan that focuses on organizational/institutional issues charge with municipal waste.

Waste Management Operational: The objective of the waste management plan that focuses on the operational level related to the field of municipal solid waste problem.

Society Participation: The objective of the waste management plan that focuses on societyy participation in solving the problems of municipal solid waste.

Hierarchy Level II: Waste Management Planning Instruments

1a. Regulatory Aspects: Part of the waste management planning instrument that is grounded in the rule of law and the strategic plan of the Hygiene Department of Ternate

1b. Aspects of Working Procedure: Part of the waste management planning instrument that rests on the governance aspects of the work of the agency responsible for waste management in the city of Ternate, namely the Department of Hygiene.

1c. Aspects of Financing: Part of the planning instrument which is based on the aspects of financing sources on waste management in the city of Ternate.

2a. Lug System: Part of the planning instrument that rests on the lug model system for waste management in the city of Ternate

2b. Temporary Shelter System: Part of the planning instrument that is grounded in a temporary shelter in a model system of waste management in the city of Ternate.

2c. Transportation System: Part of the planning instrument which is based on the system model of the transport of municipal waste in Ternate.

3a. Health socialization: Part of the planning instrument which is based on community participation to improve counseling and slogans of cleanliness in residential areas and office buildings throughout the community Ternate.

3b. Processing of Waste: Part of the planning instrument which is based on community participation to enhance and intensify the waste treatment into goods/products that have economic value throughout the city of Ternate.

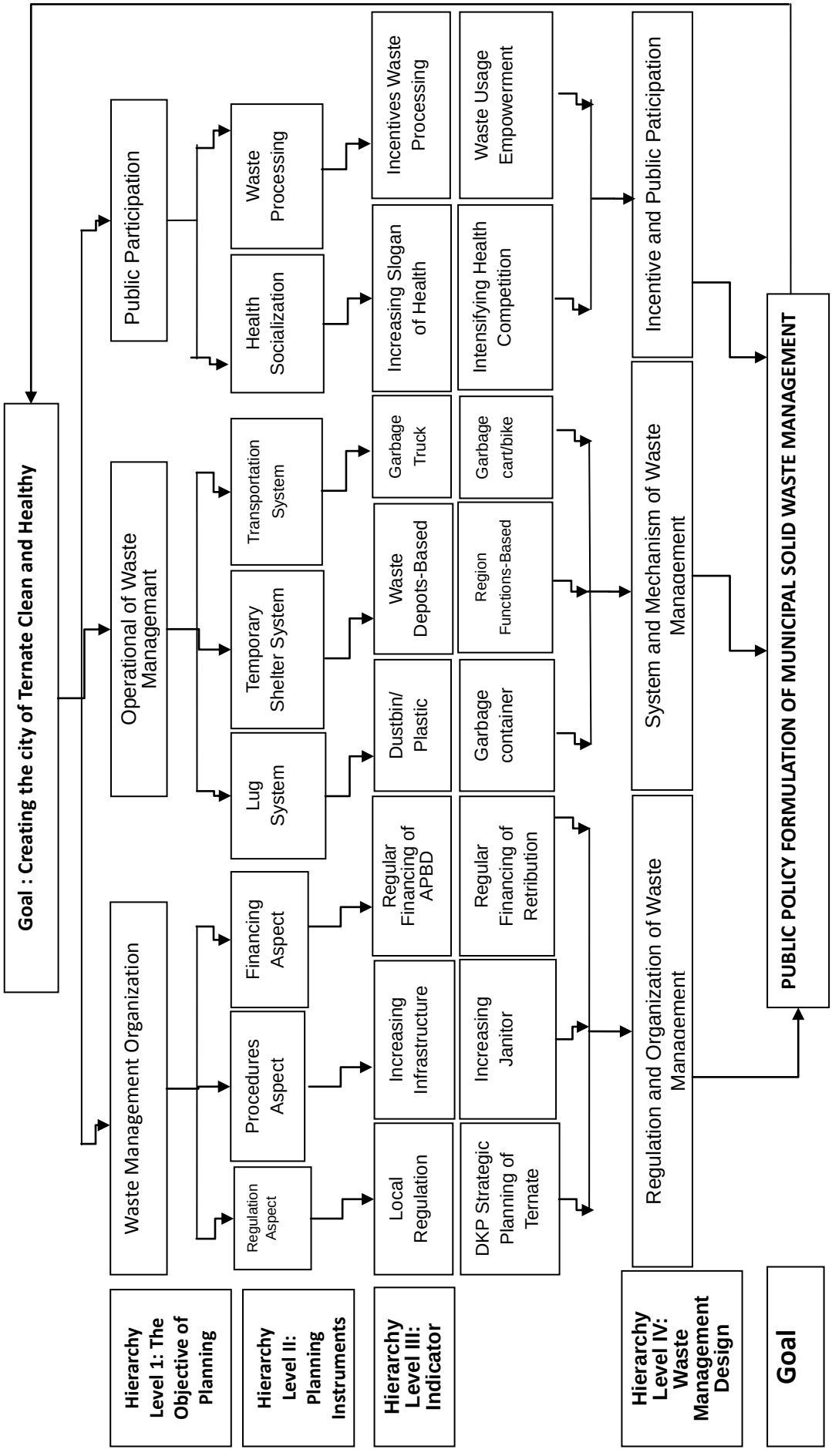
Hierarchy Level III: Indicators of Waste Management Planning Instruments

1a. Regulatory aspects: (i). Local Regulation of Ternate: Indicators of regulation in the form of regulatory aspects related to waste management in the city of Ternate and (ii). DKP Strategic Plan of Ternate: Indicators of regulatory aspects in the form of action plans within certain time.

1b. Aspects of Working Procedure: (i). Increase the infrastructure: Indicators of governance aspects of the work in the form of facilities and infrastructure for waste management in Ternate, and (ii). Increase the janitor: Indicators of governance aspects of the work in the form of a janitor in each region for the management of municipal waste in Ternate.

1c. Aspects of Financing: (i). Regular financing of the budget (APBD): Indicators of aspects aimed at legalizing the financing associated with the source of funding for municipal waste management in Ternate and (ii). Financing routine of retribution: Indicators of financial aspects that aim to regulate trash fees as a funding source for municipal waste management in Ternate

2a. Lug System Aspects: (i). Dustbin or plastic: Indicators of aspect-shaped lug system of dustbin or plastic as a medium for waste management in the city of Ternate. And (ii). Waste Containers: Indicators of aspect-shaped lug system of waste containers as a means of support for municipal waste management in Ternate.



Gambar 2 : Stuktur AHP Pengelolaan Sampah Kota

2b. Temporary Shelter System: (i). Waste Depots-Based: Indicators of temporary shelter systems based on waste depots for waste management in the city of Ternate. and (ii). Region Functions-Based: Indicators of temporary shelter system based on the function of the area for waste management in the city of Ternate.

2c Transportation System: (i). Garbage truck: Indicators of waste transportation system in the form of a garbage truck for waste management in the city of Ternate and ((ii). The cart/garbage bike: Indicators of the transport system in the form of garbage wheelie bins/bikes paddy for waste management in the city of Ternate.

3a. Health Socialization: (i). Increase the cleanliness slogan: Indicators of hygiene promotion in the form of slogans, posters or advertising to support fulfillment of waste problems and (ii). Intensifying Competition Health: Indicators of hygiene promotion in the form of race hygiene to support fulfillment waste problem of the city.

3b. Waste Processing : (i). Incentives Waste Processing : Indicators of waste processing in the form of incentives for those who commit to the management of municipal waste in Ternate and (ii). Community empowerment-based waste utilization: Indicators of waste processing in the form of community empowerment by cultivating the waste for municipal waste management in Ternate.

Hierarchy Level IV: Public Policy Formulation of Municipal Solid Waste Management in Ternate

Priority Scale of Public Policy Formulation supporting waste management so as to realize the city of Ternate were clean and healthy : (1). Regulation and Institutional Waste Management, (2). System and Mechanism of Waste Management and (3). Insentifying and Society Participation

3.2. The Result of Analytic Hierarchy Process (AHP)

Table 2. The Results of Hierarchy Perceptions Regarding Public Policy Formulation supporting Municipal Solid Waste Management in Ternate

Public Policy formulation toward Municipal Solid Waste Management	Group of Hygiene Dept.	Group of Local Governance	Group of Society	Group of NGO	Final Synthesis
Hierarchy Level 1: The Objective of Planning					
1. Waste Management Organization	0,150	0,053	0,068	0,108	0,667
2. Operational of Waste Management	0,825	0,769	0,595	0,889	0,866
3. Public Participation	0,686	0,668	0,238	0,703	0,770
Hierarchy Level II: Planning Instruments					
1. Regulatory Aspect, Procedures Work System and Financing	0,263	0,467	0,213	0,319	0,372
2. Lug System, Temporary Shelter System and Transportation System	0,747	0,866	0,444	0,548	0,781
3. Health socialization and Waste Processing	0,690	0,857	0,333	0,533	0,747
Hierarchy Level II: Indicator of Planning Objection					
1a. Local Regulation and DKP Strategic Plan of Ternate 1b. Increase the infrastructure and the janitor 1c. Regular financing of the budget (APBD) and retribution	0,209	0,319	0,226	0,442	0,466
2a. Dustbin/Plastic and Garbage containers 2b. Garbage Depots-based and Regional Function-based and 2c. Garbage Trucks and Carts/Garbage bike ong/Plastik Sampah dan	0,720	0,551	0,873	0,655	0,714
3a. Increasing Slogan of health and Intensifies health competition, and 3b. Incentives waste processing and waste utilization empowerment	0,571	0,460	0,702	0,503	0,651
Hierarchy Level IV: Public Policy Formulation of Municipal Solid Waste Management					
1. Regulation dan Waste Management Organization	0,441	0,228	0,369	0,316	0,453
2. System and Mechanism of Waste Management	0,726	0,618	0,791	0,618	0,792
3. Incentives and Public Participation	0,696	0,697	0,741	0,566	0,655
Inconsistency Index	0,746	0,7343	0,6809	0,0519	0,8662

Source: Calculated from Field Survey

The application model of Analytic Hierarchy Process (AHP) is different from the method of survey research in general. The adoption process of the opinion of the respondents in the AHP does not require a certain minimum number of respondents to represent a perception of problems but AHP requires only respondents who are competent and have a comprehensive knowledge of the issues raised and significantly influence decision making. Questionnaires were distributed totaling 60. Input data related to design formulation of policies that support the management of waste that can realize Ternate city clean and healthy be divided into three groups. The first group came from the Department of Hygiene and staff as well as the ranks of the janitor of the aspects of the system and mechanism of Municipal Solid Waste Management in Ternate. The second group of the society consisting of community leaders, PKK leaders as well as chairman of the board level RW/village, community waste facility owners and community of waste processing. The third group are those who enter the Organization Management group consisting of the Chairman of the Planning and regional development authority (BAPPEDA) Ternate, Chairman of the Parliament (DPRD) as well as the chairman of the Commission, the Chairman of Dispenda and his staff. The third group as a regulatory body responsible for the organization of waste management in the city of Ternate.

Based on the complexity field data field and conditions then arranged a sort of hierarchy aspects in determining the priorities of the formulation of policies that support the management of municipal solid waste that can realize Ternate be clean and healthy. Structured hierarchy further addressed by the respondent to produce qualitative data were quantified. Questionnaires were used as the matrix obtained pairwase comparison for each group of respondents. The results of the synthesis of each respondent recapitulated then geometrically averaged to determine the global priority of each criteria and alternatives to search. The perception of the respondents were calculated using pairwase comparison that can be known weight value of the priority of each respondent. The results of these calculations are averaged geometrically so that the total known weight of each alternative criteria and priorities to be observed. The results of the analysis can be seen in the table below.

Hierarchical structure IV is the lowest level of the hierarchy is the Formulation of Public Policies that support Waste Management in the city of Ternate as a policy model that assessed based on the factors above level. In the end the question of comparison (pairwase comparison) will lead to the determination of the order of the factors most decisive in the formulation of policies that support the implementation of the Municipal Solid Waste Management in Ternate. Furthermore, compared to the order of priority for level one and level two and their relationship to one another in order to obtain the order of priority formulation of policies that support the management of Municipal Solid Waste in Ternate. Calculation results can be translated at each hierarchy level. Each number indicates the priority of several options proposed. Level one describes the purpose of planning assumptions in the municipal waste management system as the determinants that influence the formulation of policies that support the management of Municipal Solid Waste in Ternate.

Synthesis at the end of the first level of the hierarchical structure that is the purpose of planning at the municipal waste management system in Ternate. Final results on the synthesis of the first hierarchical structure can be seen in the table below.

Table 3. Results of Synthesis Planning Objectives in Public Policy Formulations supporting the Municipal Solid Waste Management in Ternate

No	Planning Objectives	Score	Priority
1	Waste Management Organization	0,667	3
2	Operational Waste Management	0,866	1
3	Community Participation	0,770	2

Source: Calculated from Field Survey

The results of the data analysis is based on the perception of both the groups janitor, a group of local governments, community groups and group leaders and NGOs show that first, the organization of municipal waste management got a score of 0.667. Second, the operational waste management got a score of 0.866. Third, participatory community got a score of 0.667. The final results showed that there is a rank score ranging large to small, which means the operational waste management got the first rank (first). It shows that the goal of planning based on operational factors respondents believed by waste management group janitor, a group of local governments, community groups and group leaders and NGOs become the most dominant factor for a formulation of policies that support the management of municipal waste in Ternate.

Synthesis at the end of the second level of the hierarchical structure is an indicator of the purpose of planning a policy that supports the management of municipal solid waste that can realize Ternate city clean and healthy. Final results on the synthesis of hierarchical structure II can be seen in the table below.

Table 4. The Results of Destination Planning Synthesis Instruments in Public Policy Formulations supporting Municipal Solid Waste Management in Ternate

No	Instrumen Perencanaan	Score	Priority
1	Regulatory Aspect, Procedures Work System and Financing	0,372	3
2	Lug System, Temporary Shelter System and Transportation System	0,781	1
3	Health socialization and Waste Processing	0,747	2

Source: Calculated from Field Survey

Based on the existing scores can be concluded that the formulation of planning policy instruments that support the Municipal Solid Waste Management in Ternate, namely: First, Regulatory Aspects, Procedures Work system and

Financing score of 0.372; Second, lug Systems, Temporary Shelter System and Transportation System scored 0,781; Third, the planning instrument that focuses Health socialization and Processing of Waste scored 0,747. Based on ranking of scores above explains that planning instrument consisting of Regulatory Aspects, Work system and Financing score of 0.372. Instruments such planning is critical to the success of policy formulation that supports the Municipal Solid Waste Management in Ternate.

Synthesis at the end of the third level of the hierarchical structure is an indicator of policy formulation planning purposes that support the City Solid Waste Management in Ternate. Final results on the synthesis of hierarchical structure III can be seen in the table below.

Table 5. The Results of Synthesis to Objectives Planning Indicators in Public Policy Formulation supporting the Municipal Solid Waste Management in Ternate

No	Objectives Planning Indicators	Score	Priority
1	– Ternate City Regulation and the Department of Hygiene's strategic plan, – Increase the infrastructure and janitors and – Regular financing of the APBD and retribution,	0,466	3
2	– Dustbin/Plastic and Garbage containers, – Garbage Depots-based and Regional Function-based and – Garbage Trucks and Carts/Garbage bike	0,714	1
3	– Increasing Slogan of health and Intensifies health competition, and – Incentives waste processing and waste utilization empowerment	0,651	2

Source: Calculated from Field Survey

The third hierarchy is an indicator of policy formulation planning purposes that support waste management in Ternate. Indicator used to determine the purpose of planning consists of three, namely: group I, consisting of (i). Ternate City Regulation and the Department of Hygiene's strategic plan, (ii). Increase the infrastructure and janitors and (iii). Regular financing of the APBD and retribution, Group II, consisting of (i). Dustbin/Plastic and Garbage containers, (ii). Garbage Depots-based and Regional Function-based and (iii). Garbage Trucks and Carts/Garbage bike and group III, consisting of (i). Increasing Slogan of health and Intensifies health competition, and (ii). Incentives waste processing and waste utilization empowerment.

Based on the existing scores can be concluded that indacator to be prioritized to support the formulation of policies that support waste management in the city of Ternate, namely: First, Group II, consisting of (i). Dustbin/ Plastic and Garbage containers, (ii). Garbage Depots-based and Regional Function-based and (iii). Garbage Trucks and Carts/ Bike Garbage scored 0.466; Second, group I, consisting of (i). Ternate City Regulation and the Department of Hygienes's strategic plan, (ii). Increase the infrastructure and janitors, and (iii). Regular financing of the APBD and retribution got a score of 0.714; Third, Group III, consisting of (i). Increasing Slogan of health and Intensifies Health Competition, and (ii). Incentives waste processing and waste utilization empowerment scored 0.466. Based on ranking of scores above explains that indicator consisting of: (i). Dustbin/ Plastic and Garbage containers, (ii). Garbage Depots-based and Regional Function-based and (iii). Garbage Trucks and Carts/Bike Garbage scored 0.466; is a key indicator needed for policies that support waste management in the city of Ternate. Final synthesis at the hierarchical structure level IV are the design of formulation of policies that support waste management in Ternate. Final results on the synthesis of hierarchical structure IV can be seen in the table below.

Table 6. Public Policy Formulation supporting Municipal Solid Waste Management in Ternate

No	EdFormulation of Education System Strategy	Score	Priority
1	Regulatory and I	0,453	3
2	System and Waste Management Mechanism	0,792	1
3	Incentive and Public Participation	0,655	2

Source: Calculated from Field Survey

Synthesis of each level produces a priority order of the formulation that supports the management of municipal solid waste that can create Ternate city clean and healthy. There are three design policies that are formulated to support the waste management in the city of Ternate with the policy rests on three models, namely: Regulatory and Institutional Waste Management, Systems and Waste Management Mechanism and Incentive and Public Participation. Based on the existing value of the three models of the policies that support the management of municipal solid waste that can create Ternate city clean and healthy with the following results: First, the first level is the Regulatory Policy and Institutional Waste Management with a score that is 0.453. The second level is the System and Mechanism of Solid Waste Management with the highest score of 0.792. The third level of policy is a policy that optimizes Incentives and Public Participation with a score of 0.655.

Lug Systems, Temporary Shelter Systems and Transportation System a substantial instrument that supports the planning instrument to support the management of municipal waste that can create Ternate city clean and healthy. Instruments lug system, temporary shelter systems and transport systems related to the fact that the results of the field that describes the future challenges in the management of municipal solid waste consists of four issues, namely (1). Increasing the amount of garbage in urban areas very quickly/exponentially along with the rapid population growth as well as due to the consumption and production patterns are unsustainable, (2). Public, society, businesses and governments are still relatively low level of awareness and knowledge in managing waste, (3). Problems where the processing or disposal of waste also poses other than a

limited impact on the vulnerability of social and environmental values and functions, and (4). Management approach tends to prioritize end of pipe (get-carry-waste).

Waste Management is a systematic and continuous activities that include reduction and waste management (Ministry of Environment, 2007). Associated with waste management in accordance with the regulations, the environment ministers of the formulation of policy implementation that supports the management of municipal waste in Ternate is a Waste Management System and Mechanism. Elaboration of Waste Management Systems and Mechanisms include, the following activities:

1. Waste reduction, ie activities to prevent the surface of garbage from waste producers (households, markets, etc.), re-using waste from the source and/or on-site processing and recycling of waste at the source and or at the processing place. The activity included in waste reduction are: a. Setting targets waste reduction b. Developing clean technologies and product labels c. Using the production materials that can be recycled or reused d. Facilities or activities in order to recycle e. Develop awareness recycling programs or reuse.
2. Waste management, waste management is a series of activities that include sorting (grouping and separation of garbage by type and nature), collection (removing waste from waste sources to the polling station or place an integrated waste processing), transport (activities of removing waste from the source, TPS or integrated waste treatment facility, the processing of the final result (changing the form, composition, characteristics and the amount of trash in order to be further processed, used or restored natural and active processing of the waste management activities or the residue of the previous treatment in order to be returned into the environment.

Things to consider in the implementation of waste management in addition to collection, transportation and disposal, including the provision of equipment used, implementation of management techniques and administration. It aims for the successful implementation of waste management (Raharja, 1988). Management for waste management in developed countries revealed by Tchobanoglous in Ananta (1989: 7), is a combination of controlling the activities of the amount of waste generated, collecting, removal, transportation, processing and accumulation of waste in the TPA that meets the principles of health, economics, technique, conservation and environmental consideration is also responsive to the condition of the existing society.

Ideal Municipal Solid Waste Management System

Integrated Waste Management is one of the Municipal Solid Waste management efforts with the concept of developing a waste management system that is modern, reliable and efficient with environmentally friendly technologies. The system should be able to serve the entire population, improving public health standards and provide opportunities for the public and the private sector to participate actively. The approach used in the draft waste management plan is to improve the waste management system that can meet the demands of waste management based on community participation.

Aboejoewono (1999) stated that the need for municipal solid waste management policies are set in cities in Indonesia includes five activities, namely:

1. Application of appropriate technologies. The technology used to solve the waste problem is a combination of appropriate which include composting technology, handling technology of plastic, making technology of recycled paper, Integrated Waste Management Technology towards a "Zero Waste" should be an environment-friendly technology. The technology used in advanced processes commonly used are:

(a) Incineration technologies

In this way the resulting byproducts such as scrap metals and vapors that can be converted into electrical energy. Another advantage of using this tool are: (a). can reduce waste volume ± 75% -80% of the sources of waste without sorting process and (b). ash or slag from the combustion residue is quite dry and free from decomposition and can immediately be brought to the landfill on vacant land, swamp or low area as landfills.

(b) Composting technologies that produce compost for use as fertilizer or soil reinforcement structure.

Recycling technology that can potentially produce waste, such as paper, plastic metal and glass.

2. Public participation in waste management. Community participation in the management of waste is the most important aspect to be considered in an integrated waste management system. Community involvement in waste management is one of the technical factors to address the problem of municipal solid waste or residential environment from year to year more and more complex. Society always participate to the development process when there are factors that support, among other things: the needs, expectations, motivation, reward, needs facilities and infrastructures, moral encouragement, and the presence of both informal and formal institutional.

3. The need for the mechanism of benefit in waste management. Solutions to overcome the problem of waste can be done by improving the efficiency of all waste management program starts on a larger scale again. Eg through waste sorting activities ranging from the source to do the household or residential scale. This system will obtain the advantage of: transportation costs can be reduced because it can cut off the chain of transporting waste, does not require a large area for a TPA, can produce results of value-added utilization of waste into goods that have economic value, can be welfare management personnel of hygiene, are more economical and ecological, can empower communities to manage the cleanliness of the city.

4. Optimizing landfill. Basically, the pattern of waste

disposal is done by the system Final Disposal (TPA) is irrelevant to the increasingly cramped urban land and rapid population growth, because if this continues to be maintained would make the city under siege "sea waste" as a result of this pattern of greed to the land and the growing volume of waste. Disposal of waste disposal is done openly and in the open also result in increased pollution intensity. Treatment of municipal solid waste management model as a whole is a elimination TPA model of the long-term because in many ways of TPA management still very poor ranging from wastewater handling (leachet) to the handling of a very bad smell. The ideal way of solving the waste management in urban areas is to dispose of waste at a time use it so that in addition to cleaning up the environment, it also generates new usability. It is economically will reduce the cost of handling (Murthado and Said, 1987).

5. The institutional system of integrated waste management. In an ideal of municipal solid waste management, solid waste management system that was developed to be a management system based on the people at the start of waste management at the household level. In the waste management plan of the need for waste processing method the better, increase the participation of the institutions involved in improving the efficiency and effectiveness of waste management, empowering communities, increase economic aspects that include efforts to increase waste retribution and reducing financing costs and increasing the aspect legal in waste management.

6. End of Waste Management Methods. According to Iqbal and Nurul Wahid C. (2009: 279-280) about the stage of the management and extermination of the waste is done by two methods:

1. Satisfactory Method, comprising: (i). Sanitary Landfill Method (lahan urug saniter), ie annihilation waste by making a hole in the ground then put the waste and backfilled with soil and compacted as cover. This method requires that the terms should be available widely, available soil to bury it, and the great tools available, (ii). Inceneration, ie destroy by burning the waste in a special furnace. The benefit of this system is the volume of waste can be reduced to one-third, it does not require a vast space, the heat generated can be used as a source of steam, and management can be centralized with the schedule of working hours. As a result of the application of this method is to require a large cost, the location of the factory disposal is hard to obtain because of the existence of the population, and the equipment used in inceneration and (iii). Composting (used as fertilizer), which manages waste into compost; especially for organic waste.
2. The method unsatisfactory, consisting of: (i). Open Dumping Method, namely waste disposal system is done openly. This would be a problem if the waste generated is organic waste decomposing due cause interference smelling and aesthetics as well as a source of disease transmission, (ii). Dumping method in Water: waste disposal into the water. This damage can disrupt aquatic ecosystems. The water will become dirty, discolored, and lead to the source of water-borne diseases, and (iii). Burning method on premises (individual incineration) that waste incineration is done in households.

While according to SNI 19-2454-2002 about Municipal solid Waste Management Operational Engineering, in general waste processing technologies can be divided into 3 methods: Open Dumping method and Sanitary Landfill method (Lahan Urug Saniter) as described above and Controlled Landfill method. Controlled Landfill is improved open dumping system which is a transfer system of open dumping and sanitary landfill that is by closing the waste with a layer of soil is done after a full TPA compacted or after reaching a certain period.

4. Conclusions

Results of research conducted to provide solutions empirically and theoretically the basis of the results of the analysis of data that have been obtained in the field. The results of the empirical conclusions as follows:

1. In general, waste management in Ternate City is still wearing 3P system, namely: collection, transport and disposal. By simply wearing this model, it still leaves the problem that is related to the capacity of TPA is very limited. Because the 3P mechanism is still not pay attention annihilation process and the possibility of recycling could still have economic value both for society and Ternate city itself.
2. Regional of Department of Hygiene officials are still working at sthe level of the city faces, namely major roads as well as the town center and the center of the city's economy. Public awareness of hygiene and waste management in each village and the area is still not evenly distributed. As awareness of organic and inorganic waste sorting before being discharged to the TPS.
3. The old system of management strategies that rely on transportation systems, disposal and processing of materials into piles that need to be changed because it was not economical (cost center). The most appropriate approach for the future in waste management through an integrated waste management system that can change with paradigm from a cost center into a profit center by maximizing community participation and utilization of waste into materials that have value.
4. Need to involve communities in managing municipal solid waste. Starting from the disposal, sorting, utilization, processing until the funding. It is expected that with the involvement of the public can add economic value to the harness can also increase the level of cleanliness and comfort of Ternate City.

Results conclusions can theoretically be explained as follows: Waste management is an attempt to address the systematic and planned waste. And in practice there have

been technical and implementation instructions. But in operations that occurred in the city of Ternate mechanism run by the city government is still very simple. This means that the Department of Hygiene to focus on certain areas of cleanliness which is the face of the city or the economic center of the city only. While the village level of hygiene submitted to the village government to manage the overall. Judging from the Participatory Rural Appraisal (PRA) theory, the community participation in waste management has not been realized. Not to the implementation of public participation in the process of waste management in Ternate City due to weak regulation and legislation local are regulating community must be involved directly in the process of waste management. Good synergy between the government of Ternate with various sectors of society can not be realized. So what happens is an incorrect understanding of the community for affairs of waste management becomes the responsibility of the government only. Participation is meant here is how the community as a major producer of municipal solid waste could be involved directly in the management of municipal solid waste from the earliest stage to the final stage.

The results of the research that has been done to provide advice to municipal solid waste management in Ternate can create a beautiful and clean city. The suggestions are as follows:

1. There should be better coordination and synergy among the various sections of the society and the government of Ternate in the management of municipal solid waste. Where each party should be regulated the rights and responsibilities in the management of municipal waste. Hopefully, by the division or the setting position, rights, and responsibilities of general and fundamental to clarify and control the performance of each sector or element.
2. Improving the quality of waste management services to make the handling of waste into the roof. By designating one agency as the central coordination and control of waste management from the municipal level to the household. And also from the management retribution to the division of honorarium for waste workers.
3. It should be applied strict sanctions for anyone whether intentionally or unintentionally committing violations that have been applied in the management of municipal solid waste. It is intended to raise awareness or responsibility in creating waste conscious society.

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