

INSTITUTIONAL DEVELOPMENT MODEL OF URBAN WASTE MANAGEMENT (Survey in Bogor Waste Management)

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ABSTRACT

Generally, waste management in major cities in Indonesia are still relying on landfilling that requiring large land and continue to grow along with the increasing volume of waste generation from day to day. Meanwhile the land where the final disposal (landfill) of waste in large cities increasingly limited. This study aims to develop a model of waste management through waste reduction, ranging from the source. There are several criteria and sub-criteria that should be considered in developing a model that negative impacts arising can be minimized. Based on the results of previous studies, using Analytical Network Process (ANP), the chosen model for the handling of waste is individual models on a scale of RT/RW. In order to implement this model required an appropriate institutional because it involves community participation as the key to success. By using Interpretive Structural Modeling (ISM) showed that the treatment of urban waste must be oriented on raising awareness of the public to maintain cleanliness and environmental health through the concept of 3R (reduce, reuse and recycle). To overcome the obstacles faced during the Local Government should need to restructure the organization of waste management by establishing a Public Service Board/BLUD business Waste and Waste Management Commission of the City/KPSK.

KEYWORDS

Volume of waste generation, Public Service Board

1. Introduction

Increased waste generation in urban areas in Indonesia along with the increasing rate of population growth through urbanization as a result of the globalization process. Increased waste generation rate this needs to be balanced with efforts to better waste management so that the negative impact caused can be anticipated early.

Until recently, most management is done by collecting garbage-hauling-throw by relying destruction of waste through landfill into the ground in Landfill. The land requirement for landfilling is increasingly widespread. While landfill garbage in urban areas is increasingly limited as the impact of the development of settlements. Therefore, the Government through Law No. 18 of 2018 to apply the new paradigm of waste management is to reduce waste from its source to the concept of 3R (reduce, reuse and recycle).

Based on previous research results obtained by ANP method chosen waste management model is the individual scale (RT/RW). But the model when applied they must answer questions such as how to manage so that the system can run effectively, institutional forms such as what should manage, how the system is financed and the most important is to involve the community of the waste in their daily activities in dealing with garbage, Therefore, in developing a waste management model is needed experts from various disciplines such as urban planners, health, environmental, social, demographic, and specialist communications.

2. Theoretical

2.1 Waste Management

According to Government Regulation No. 33/2010 the handling of waste by local authorities conducted in the following manner:

- a. Sorting, waste sorting is done by providing facilities where organic and inorganic waste in the waste sources
- b. Collection, garbage collection is done since transferring waste from household garbage/TPS to the polls to landfill/ TPA while ensuring the separation of waste according to the type of rubbish.
- c. Transportation, transporting waste a shared responsibility between the government and society.
- d. Processing, processing is done by changing the characteristics, composition, and the amount of waste that was held in TPS and TPA
- e. Final processing of garbage. final processing of garbage is done by returning waste and/or the residue of the processing into the environment safely.

Waste management emphasis on waste reduction of resources and the reduction of the negative impacts of garbage. In this way the trash is managed with a comprehensive approach from upstream to downstream, since before produced a product that could potentially become garbage until the product has been used as litter, which is then processed and returned to the environment

safely. Waste management is known as the 3R principles: 1) reduce waste at the source; 2) reuse so as not to waste without any processing and 3) which recycles recycle materials that have been unusable (trash) into new goods after processing.

2.2 Public Participation in Waste Management

Public participation in waste management is very important because the garbage is the main producer of society, the success of the waste management depends on community participation. The importance of community participation in waste management is also set forth in Law No. 18/ 2008, due principally waste management includes not only technical aspects, but also non-technical such as how to organize, manage, finance and involve communities in addressing the waste-bins.

3. Institutional Business Trash

In Indonesia, the policy formally municipal waste management is the ministry's policy PUPR as technical ministries that foster urban waste managers in Indonesia. Planning and organization of election forms must be adapted to 1) government regulation; 2) the pattern of operational systems; 3) the system work capacity, and 4) the scope of work and tasks that must be addressed.

Institutional forms of waste management according to the Ministry PUPR city was like in the following table.

Table 1.

Institutional Model for Waste Management

| No. | Trash Agency Business | Conditions |
|-----|--|---|
| 1 | Section of Hygiene under one department (eg Department of Public Works) | Problems cleanliness of the city can still be dealt with by a section under the agency. |
| 2 | Technical Implementation Unit (UPTD) under an agency (eg Department of Public Works) | In the organizational structure has been no special section under the department that manages the cleanliness, so more emphasis on operational issues, and has greater autonomy than Section. |

| | | |
|---|--------------------------------|--|
| 3 | Department of Hygiene | If the acceleration and will provide services to the community and non-profit. This office needs to be formed due to the activity and volume of work has increased. |
| 4 | Local Company (PD) Cleanliness | Management organization that was formed when the problem in the city is quite large and complex. In principle, these regional companies are no longer subsidized by the local government (local government), so that the effectiveness of the withdrawal of the levy will be decisive. This form is suitable for metropolitan. |

Source: Waste Management Diktat TL-3104 (2008)

4. Methodology

Until now, the waste problem has not been handled properly, especially in urban areas. Garbage has become a national issue which must be managed in a comprehensive and integrated from upstream to downstream in order to provide economic benefits, healthy for the community, safe for the environment. Survey research development model of the city waste management will be conducted in the Bogor.

Data collected through questionnaires and in-depth interviews with experts in the academic field, relevant agencies and stakeholders of waste management. The method used to develop the institutional model of waste management is a method of Interpretive Structural Modeling (ISM). ISM is made in order to understand the behavior of the system as a whole after the identification of relationships between sub-elements of the system in every element of the system (Eriyatno, 2003). ISM method steps are as follows:

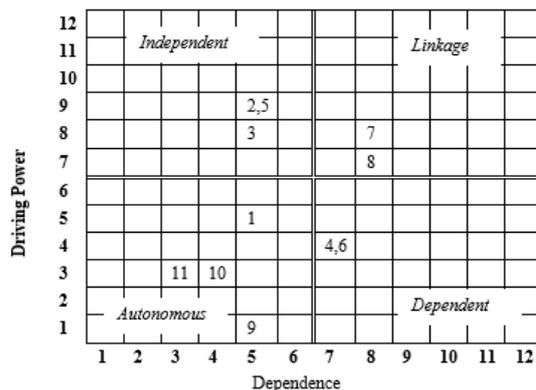
1. Preparation of sub-elements of the supply chain needs and institutional structures obtained from the experts
2. Analysis of the contextual relationship that one sub-element (sub-element i) support the existence of other sub-elements (sub-element j) with the following provisions:
 - V: sub-elements i support the existence of sub-elements j, but not vice versa
 - A sub-element j support the existence of sub-elements i, but not vice versa

- X: sub-elements i and sub-elements j mutually supportive presence
- O: sub-elements i and sub-elements j mutually supportive presence.

Structural Self Interaction Matrix (SSIM) is based on contextual relationships obtained from the experts

3. SSIM is transformed into a binary matrix form called early reachability matrix by substituting V, A, X, O with the numbers 0 and 1. Transitivity contextual relationships are then examined to obtain the final reachability matrix.
4. Group reachability and antecedent groups for each sub-element of the matrix obtained reachability end.
5. The structural model can be made of the final matrix reachability.
6. Analysis of the institutional model is done by classifying each sub-element into 4 sub sector to determine which elements are included in the autonomous variables (sector 1), dependent (sector 2), linkage (sector 3) or independent (sector 4). The characteristics of each sector according to Eriyatno (2003) are as follows:
 - a. Autonomous: Sub elements are in this sector is generally not associated with the system, it may have little relationship although the relationship can be strong.
 - b. Dependent: Sub elements are in this sector is generally sub-elements that are not free or influenced by other sub-elements.

- c. Linkage: Sub elements that fall in this sector needs to be studied carefully because the relationship between sub elements are unstable. Any action on the sub-elements will have an impact on other variables and feedback effects can be greater.
- d. Independent sub-elements that are in this sector is generally a sub-free element that has a great driving force to the other sub-elements.



5. RESULTS AND DISCUSSION

5.1 Results

Based on discussions with experts, from 9 elements developed by Saxena (1994), obtained five elements elected as the dominant influence on the institutional model of waste management, namely:

- 1) The purpose of the program;
- 2) Sectors affected communities;
- 3) The main obstacle courses;
- 4) Changes desired;
- 5) Institutions involved in the program implementation.

a. Program Objectives

The results of discussions with experts in the field and related parties related there are 11 sub-elements, program objectives, namely:

- 1) Reduce the amount of waste from the source (Reduce);
- 2) Recover waste that is still useful (Reuse);
- 3) Perform waste recycling (Recycle);
- 4) Maintain Hygiene and Environmental Health;
- 5) Increase Community Involvement;
- 6) Reduce dependence on land;
- 7) Create jobs;
- 8) Increasing people's income;
- 9) Reduce operating costs;
- 10) Protect your investment in facilities and infrastructure;
- 11) Increase PAD.

The result of a questionnaire, which can be arranged matrix MICMAC 11 sub element grouping them into four clusters as follows:

Figure 1. Matrix MICMAC Program Objectives

Figure matrix above shows that the program's objectives must be oriented to reuse waste that is still useful (2) and recycling bins (3) to increase community involvement (5) for the third sub-element has the driving force greatly to sub-elements more, While sub element to create jobs (7) and improve public opinion (8) must be studied carefully because the sub-element is unstable and can provide greater feedback sub influence on other elements.

b. Communities Affected Sectors

The results of discussions with experts in the field and other interested parties there were 11 sub-elements related sectors of society are affected, namely:

- 1) Housewife;
- 2) Merchant;
- 3) Workers and Employees;
- 4) Employers Manufacturing;
- 5) Scavengers;
- 6) Figures Society / Religion;
- 7) Students
- 8) People Formal;
- 9) Employers Compost / Recycling;
- 10) Users Compost / Recycling
- 11) Youth and Adolescents.

While MICMAC matrix is as follows:

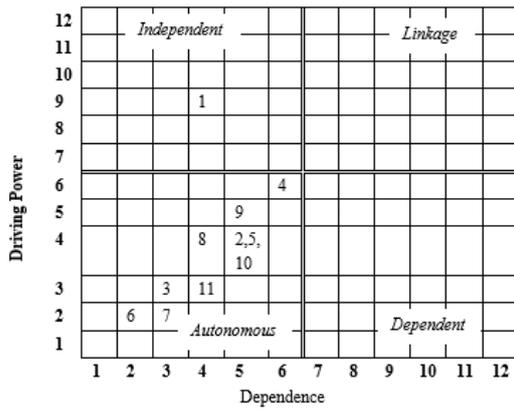


Figure 2. Matrix MICMAC Communities Affected Sectors

The above picture shows that the most affected sectors of society and has a major driving force to the other sub-elements in waste management is a Housewife (1).

c. The Main Obstacle Courses

The results of discussions with experts in the field and related parties, there were 13 sub-elements related major constraint program, namely: 1) Support Shelter Garbage; 2) Means of Transport; 3) Knowledge Societies Waste Management; 4) Community Awareness; 5) Government / Regulations; 6) Coordination among agencies; 7) The quality and quantity of human resources; 8) Law Enforcement; 9) Lack of Technology; 10) Service System; 11) Support Fund; 12) Organizational Structure Cleanliness agency business; 13) Community Mental Attitude. While MICMAC matrix is as follows:

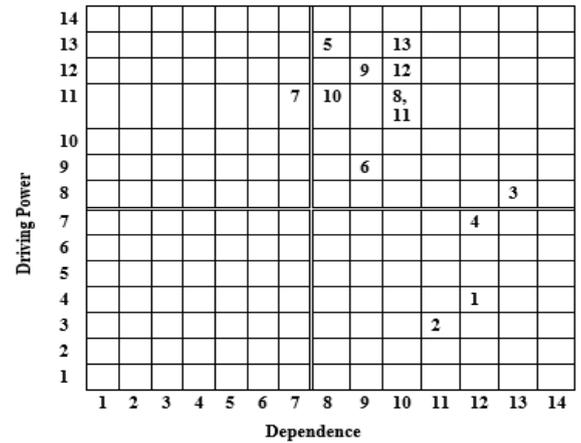


Figure 3. Matrix MICMAC Main Obstacle Courses

The above picture shows that the increased local revenues (7) in waste management is the main constraint. Because the goal of waste management is to keep the environment clean and healthy not to increase local income and even the local government must budget funds allocated to finance the operations of waste management.

d. Changes Desired

The results of discussions with experts in the field and related parties related there are 7 sub elements desired changes, namely: 1) Reduced Waste volume; 2) Hygiene and Environmental Health; 3) Increased public awareness; 4) Decrease Operational Costs of Waste Management; 5) Community Income Rises; 6) The need for landfill Decreasing land; and 7) Local Revenue (PAD) Ascending. While MICMAC matrix is as follows:

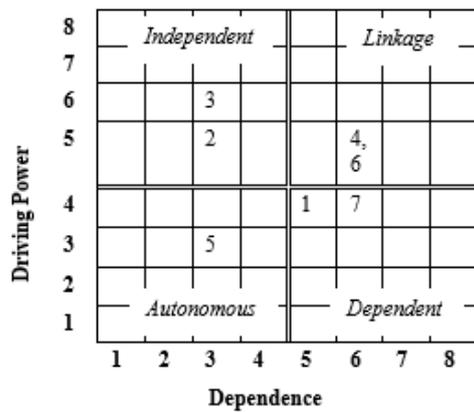


Figure 4. Matrix MICMAC Changes Desired

Figure matrix above shows that the desired changes should be oriented towards increasing public awareness (3) to maintain the cleanliness and health of the environment (2) because it has a great driving force to the other sub-elements. While lowering operational costs of waste management (4) and reduce the need for landfill (6) is to be examined carefully because of the sub element is unstable and can give negative feedback bigger influence on other sub elements.

e. Institutions Involved

The results of discussions with experts in the field and other interested parties there were 21 sub-elements related institutions involved, namely: 1) the Mayor; 2) the District; 3) Village; 4) RT / LKMD; 5) Local Revenue; 6) Hygiene and; 7) Health; 8) Control of Building and Housing; 9) Agriculture; 10) Education; 11) Culture, Tourism and Creative Economy; 12) Agency for Community Empowerment and Family Planning; 13) Environmental Management Agency (BPLHD); 14) PD Pasar Jaya Pakuan / business market; 15) Police; 16) the State Attorney; 17) District Court; 18) Media Period; 19) Non Governmental Organization (NGO); 20) Institutions and 21) Association Profession. While MICMAC matrix is as follows:

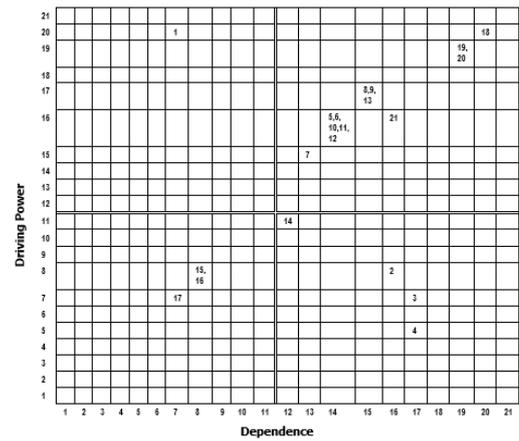


Figure 5. Matrix MICMAC Institutions Involved

The figure shows that the mayor is an institution that has the greatest driving force in influencing other sub elements. Issued by local regulations may become the legal basis for the relevant agencies in carrying out their duties and functions.

6. Discussion

Sanitation Department as an organization of waste management in the Bogor city in carrying out their duties and functions of overlap. Besides, as a supervisor and regulator as set forth in Regional Regulation No. 3/2010, it also acts as an executor must be supervised by a supervisor who is none other and Sanitation Department itself. In addition to the Department of Hygiene and in addition receive budget funds also make withdrawals waste retribution (Article 54 Bogor Regional Regulation No. 9/2012) to fund its operations. Overlapping duties and functions of this complicates performance measurement.

It is necessary for the restructuring of the management body of waste by forming Public Service Agency /BLUD business Waste and Waste Management Commission of the City /KPSK. BLUDs principal task is to manage funding from the local government and the community levy to

fund waste management activities. While KPSK oversees waste management activities undertaken by the institution managing the waste that can be derived from the company owned area /BUMD or private designated by KPSK. KPSK membership consists of representatives of community members from various groups such as religious leaders, experts from various disciplines, businessmen and

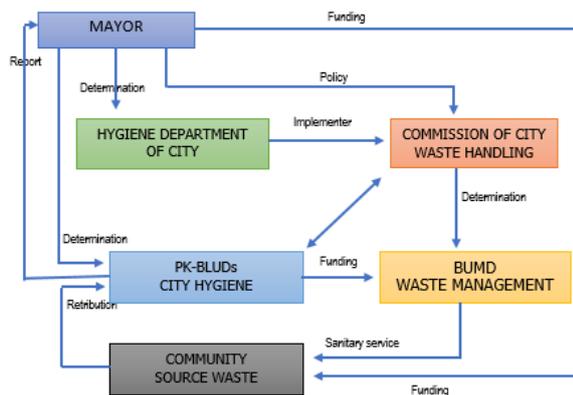


Figure 6. Model Municipal Solid Waste Management Institutional

From the picture above appears that there are basic tasks and functions between the executive, supervisory, regulatory and financial manager. With the model of waste management are expected to be more effective, productive and efficient that can be enjoyed by people of the city in the form of hygiene and environmental health is always maintained in accordance SPM set.

7. Conclusions And Recommendations

7.1 Conclusion

Based on the results of research and discussion can be concluded as follows:

Handling of municipal waste should be oriented towards increasing public awareness to always maintain the cleanliness and health of the environment through community involvement to recover the waste that is still useful and recycling bins to reduce the amount of waste from the source.

chaired by the Head of the Department of Hygiene and as representatives of the government In performing its duties BUMD/private as management of garbage, have minimum service standards/ SPM that must be met and reported periodically to the KPSK. For more details, institutional development model of waste management can be described as follows:

Constraints faced in the handling of municipal waste is still unclear regulations that adversely affects the quality and quantity of human resources in dealing with garbage, lack of financial support and waste management organizations that have not been right. Handling waste by involving the community needs the support housewife for a very large role in influencing the public to keep the environment clean. To meet the demands of the public against the government which is increasingly rising in waste handling, considerable restructuring of waste management institutions by establishing a Public Service Board /BLUD Sanitation and Waste Management Commission of the City /KPSK.

It should be examined more particularly those relating to the establishment of Regional Public Service / BLUD in municipal waste management. In the face of constraints in the handling of municipal waste is need for local regulation (Perda) for organizational restructuring waste manager who has not been proper and sufficient operational funds to increase the quantity and quality of human resources / human waste manager.

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