Effects of Policy Implementation, the Competence of the Apparatus, Infrastructures and Community Empowerment on the Effectiveness of Waste Management in the City of Depok, West Java Province

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Abstract- **Waste management is one of the difficult problems faced by almost all cities and districts in Indonesia.This problem becomes mounting at least because of the lack of policy implementation, the competence of apparatus, the lack of infrastructure availability and the lack of community empowerment. However, the study to examine the main determinant of the above four factors has not yet been available. For this reason, the study aims to determine what variables influence significantly the effectiveness of waste management, taking the city of Depok, West Java as a case study. Methods used in this study are both quantitative and qualitative using questionnaires, in-depth interview, and field observation. The number of respondents collected using questionnaires were 311. These data were then analysed statistically using multiple regression analysis. The study found that all of the independent variables such as the policy implementation, the competency of the apparatus, infrastructures, and the community empowerment have significant influence on the effectiveness of waste management in the city of Depok, West Java. However, of these four variables it was found that the community empowerment and infrastructures have been more dominant in contributing to the effectiveness of waste management. Therefore, it is a must for the policy makers in the city of Depok, West Java to give serious attention to the above four variables, especially to the provision of infrastructure and the community empowerment.**

I. INTRODUCTION

Waste management has become as one of the difficult problems faced by the government in Indonesia. This problem becomes mounting due to the increasing number of population on one hand, and the limited land availability for disposing waste produced by the industries as well as by the people of Indonesia on the other hand. In addition, a bad human behavior and the lack of policy implementation have also play roles in making the waste management policy ineffective. As a result, both central and local governments have given serious concern to this problem by issuing the Law no, 18/2008. However, the implementation of this regulation has not yet   been effective.

Of the many cities and districts in Indonesia facing a serious waste management problem is the city of Depok located in the province of West Java. The annual growth of population in this city was estimated at 4.9 per cent between 2008 and 2012 (Central Board of Statistics, 2012).This rapid growth of population in the city is partly due to the high birth rate and the rate of migration from the surrounding areas such as Bogor, Tangerang, Bekasi (Botabek) and Jakarta as well   as from other provinces out side the province of West Java. Note

that, the increasing rate of migration to the city of Depok was also associated with the needs of urban housing of residents to the city of Depok and the greater availability of employment opportunity in this city. This problem is further led to the increasing volume of garbages in the city of Depok.

Of the many reasons why the waste management has been ineffective is as follows. First, it is because most of the people still considered that garbage has no economic value. Knowledge of the community to utilize garbages for energy, compost, manure or as the raw materials of industry is relatively low. Second, it is because of the lack of the implementation of the regulation associated with waste management. Third, it is because of the low quality of human resources responsible for garbage collection. Fourth, it is because of the lack of the infrastructure including the availability of land for disposing garbages produced by the industries and population in the city. Finally, there is a problem of the lack of community empowerment by the major of the city.

It is true that numerous attempts have been made by the government of the city of Depok in order to address the issue of waste management. These attempts include the establishment of garbage disposal areas, the introduction of the public bank whose main activity is to sort garbage into organic and inorganic garbage bins, waste recycling program, sanitation training for organic fertilizer and acquiring the dumping areas. However, the implementation of these programs is still sporadic.

Due to the above problems, a study to examine factors influencing the effectiveness of waste management in the city of Depok is a must. This is important not only to seek policy solution toward waste management, but it is also important to
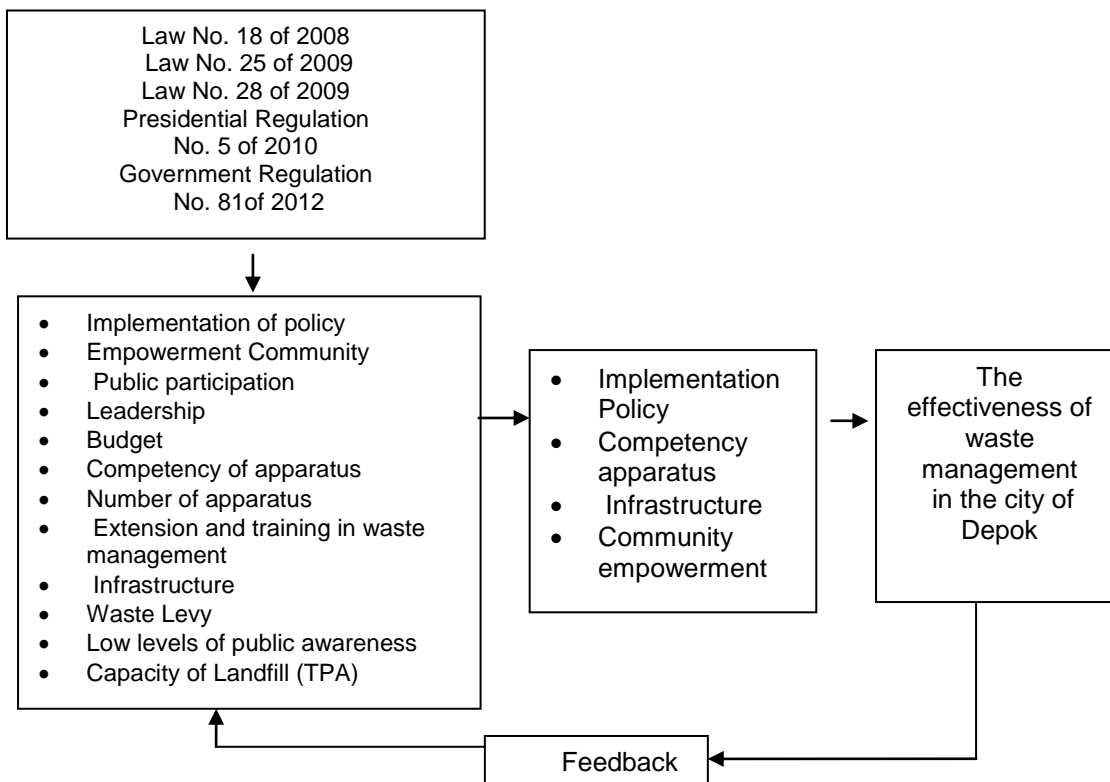
evaluate problems that associated with the implementation of waste management in the city of Depok, West Java province. However, before these research questions were examined, the following section deals with the brief background of the waste management policy in Indonesia in section 2. The section 3, then, discussed the research methods. Section 4 deals with results and discussion of the study's finding. Finally, concluding remarks were drawn in section 5.

A Brief Background of Waste Management Policy and Hypotheses

Waste management policy in various cities and districts of Indonesia has been done in three limited ways. After the garbages were collected, these garbages are then transported to the dump areas and further disposed to these areas. The waste management that involved the participation of the community have not been empowered by the government. In other words, waste management is still handled entirely by local governments. Also, there are problems associated with the lack of policy implementation, infrastructure availability and the lack of the quality of the administration apparatus.

The government has not only issued the Laws toward waste management, but it also introduced regulation and Presidential Decree. In these laws and regulation, it was mentioned the important role of public participation, leadership and community empowerment as well as budget. However, these programs have not been effective. Details aspects that have been provided by the government toward the waste management policy are shown at Figure 1.

FIGURE 1. GOVERNMENT REGULATION AND LAWS TOWARD WASTE MANAGEMENT

However, as there are so many factors affected the waste management policy, this study only focused on four factors. These factors are hypothesized as follows.

a. The implementation of the policy has influenced the effectiveness of waste management. The more effective implementation of policies, the more effective will be the waste management policy in the city of Depok, vice versa.
b. The competence of the apparatus has influenced the effectiveness of waste management. The higher the competence of authorities, the more effective will be the waste management policy in the city of Depok, vice versa.
c. Garbage infrastructure has influenced on the effectiveness of waste management. The better quality of infrastructure, the more effective will be the waste management policy in the city of Depok, vice versa.
d. The community empowerment has influenced on the waste management policy in the City of Depok. The more intensive community empowerment, the more effective will be the waste management in the city of Depok, vice versa.
e. The implementation of the policy, the competence of the apparatus, infrastructure and community empowerment have jointly influenced the effectiveness of waste management policy in the city of Depok. In other words, the effectiveness of waste management policy depends on these four factors.

II. RESEARCH METHODOLOGY

Methods used to to examine the above hypotheses and research questions are both quantitative and qualitative using questionnaires, in-depth interviews and direct observation at the field level. The respondents were selected from the population using the proportionate stratified random sampling method. Note that, the respondents under survey consisted of employees of the Department of Hygiene and Landscaping (DKP), related institutions, members of parliament, community involved in waste management and community in the city of Depok. The research was carried out in September 2013 until April 2014.

To determine how a minimum sample required, the Slovin calculation were used (Umar, 2008). In this method it was mentioned that if population size is known, then the following formula is used:

$$n = N/1 + Ne^2$$

where: n = sample size, N = population size, e = leeway inaccuracy due to sampling errors are tolerated, such as 5%.

Note that this formula is used under the assumption that there is a normal Gaussian population. Using the Slovin formula, it was estimated that the number of respondents that should be collected was 311 respondents.
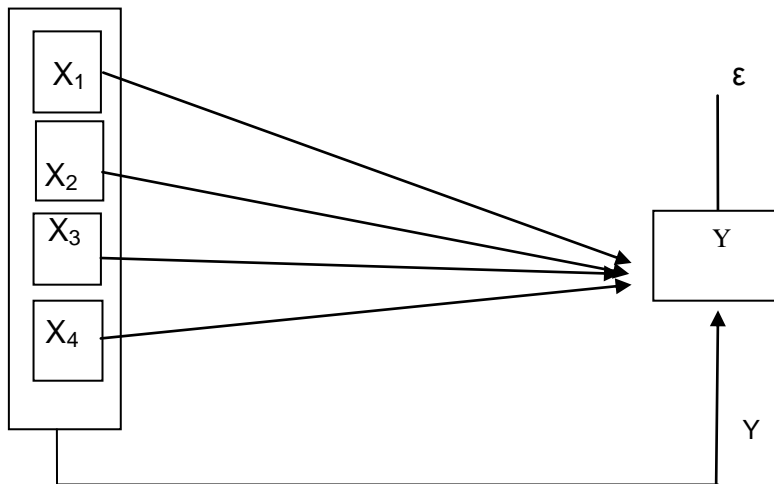
Apart from the primary data collected using questionnaires, the study also collected secondary data from many sources of publication. Apart from official publication, documents relevant to this study published by the local bureau in the local government of the city of Depok were also collected.

Furthermore, the data collected using questionnaires were also tested to examine the validity and the reliability of data. These testing was required to convince that the questions that were asked in the questionnaires were valid and reliable.

The questions structured in the questionnaires were in the form of close structure. The justification of the questions answered by the respondents was using Likert Scale. This Likert scale is used as the nature of questions in the questionnaires was in the qualitative form. In the Likert scale, there were five alternative answers, namely, strongly agree, agree, undecided, disagree and strongly disagree (Idrus, 2009: 101). The scale for those respondents who strongly agree is given the scale of 5, while for agree is given scale 4. The undecided answer was given scale 3, and for disagree and strongly disagree were given scale 2 and 1 respectively.

After the data were collected, the data were then analysed using statistical regression analysis. The regression method used is both simple linear and multiple regression analysis. This regression analysis was used to examine the magnitude of the influence of independent variables on the dependent variables. The independent variables analysed in the study are the implementation of the policy (X_1), the competence of the apparatus (X_2), infrastructure (X_3), and the community empowerment (X_4). Whilst the dependent variable under examination is the effectiveness of waste management (Y). Detail of the model and their relationship are exhibited at Figure 2.

FIGURE 2. REGRESSION MODEL

Where :

X_1= Implementation of the policy

X_2= Competence of the apparatus

X_3= Infrastructure

X_4= Community empowerment

Y= The effectiveness of waste management

ε (Epsilon) = Variables outside of the X_1, X_2, X_3, and X_4 the effect on Y not examined.

III. RESULTS AND DISCUSSION

Tests of Data Instrument and Regression Model Used

Using the Statistical Package for the Social Sciences (SPSS) for Windows version 20, we first tested the reliability of the questions in the questionnaires. This test is useful to examine the reliability of variables under examination. The results of the reliability test are shown at Table 1.

TABLE 1. RESULT OF THE RELIABILITY TEST

No	Variable	Cronbach's Alpha		Alpha Standard
		Trial (n=30)	Research (n=311)	
(1)	(2)	(3)	(4)	(5)
1	Implementation of the policy (X_1)	0.777	0,781	
2	Competence of the apparatus (X_2)	0.827	0,915	
3	Infrastructure (X_3)	0.776	0,738	0,60
4	Community Empowerment (X_4)	0.836	0,819	
5	Waste Management (Y)	0.799	0,735	

As shown at Table 1, the reliability test confirmed that the value of Cronbach Alpha was greater than 0.60. This means that the entire statement items (questions) expressed in the questionnaires were reliable. Hence, the data collected can be further estimated using the regression analysis.

After completing the reliability test above, it is also important to diagnose the regression model. This diagnostic test is aimed to examine the normality of the model used in the study. Also, to examine the multicollinearity of the independent variables used in the model. The results of the normality test is given at Table 2.

TABLE 2. NORMALITY TEST OF THE MODEL

No	Variable	The value of Kolmogorov-Smirnov Z
(1)	(2)	(3)
1	Implementation of the policy (X_1)	2,361
2	Competence of the apparatus (X_2)	2,080
3	Infrastructure (X_3)	1,065
4	Community Empowerment (X_4)	1,510
5	Waste Management (Y)	1,236

The results of the normality test showed that all five variables used in the regression model have Kolmogorov-Smirnov value (Z) greater than 0.05. This indicates that the data spread of each of the variables are normal. Hence, it is not violated the assumption of the normality of the regression models.

Similarity, the test of multicollinearity also confirmed that there was no relationship of the independent variables under the model. This is shown from the value of the variance inflation factors (VIF) which are less than 10. Thus, the model used in the study does not have multicollinearity problems. The details of the results of multicollinearity test are given at Table 3.

TABLE 3. MULTICOLLINEARITY TEST

No	Variable	Tolerance	VIF	Description
(1)	(2)	(3)	(4)	(5)
1	Implementation of the policy (X_1)	0,591	1,691	Multicollinearity does not occur
2	Competence of the apparatus (X_2)	0,566	1,766	
3	Infrastructure (X_3)	0,612	1,633	
4	Community Empowerment (X_4)	0,550	1,819	

The Effect of policy implementation on effectiveness of waste management

Using simple linear regression model, the result showed as the following equation:

$$\hat{Y} = 2.382 + 0.441\ X_1 ; R^2 = 0.284; t\ value = 4.085.$$

The estimation above showed that the implementation of policy has significant influenced on the effectiveness of waste management (ceteris paribus). However, the contribution of the independent variable on the dependent variables was only 28,4 %. This suggests that using simple linear regression model, the policy implementaion played role toward the effectiveness of waste management.

The explanation to the low contribution of the policy implementation on the effectiveness of waste management is because the local government of the City of Depok has not doing well in implementing the Law No. 18 of 2008 about waste management as stated in the article 44, paragraph (1). As stated that the local government should make planning to build the Waste Disposal area. Also, the government should give attention to the article in the paragraph (2) and the article 44, paragraph (1) and paragraph (2). However, these regulation has not been done as expected by the local government.

According to the respondents interviewed, the reason why the implementation of the waste management is not optimal is partly because the government is not so intensive in communicating the rules (Perda) No.5 of 2012 to relevant agencies, stakeholders, and the public. So, the public is unaware to contribute payment to their garbage disposal.

Hence, the government of the city of Depok has limitation to manage waste disposal produced by the industries and the community in the city of Depok.

Also, it was mentioned from the interview that some of the officers who manage the waste disposal do not submit the payment received from the community to the local government. In addition, the community does not pay the levy in accordance with the provisions of the waste. The community pays a levy based on the waste agreement with the local government in charge in waste management so called Dinas Kebersihan dan Pertamanan (DKP). This gives opportunity to the DKP apparatus for dishonest or irregularities/corruption.

The effect of competence of the apparatus on effectiveness of waste management

The result of the simple regression model on the effect of the competence apparatus on the effectiveness of waste management showed the following equation.

$$\hat{Y} = 2.719 + 0.358\ X_2 ; R^2 = 0.290; t\ value = 3.546.$$

The above equation again suggests that the competence of the apparatus have an effect on the effectiveness of waste management. The contribution of this variable again is relatively low at the amount of 29%. However, the t value of this variable is significant at 5 per cent level. The finding suggests that the competence of the apparatus has significant effect on the effectiveness of the waste management (ceteris paribus).

The lack of the competence of the apparatus certainly relates with many factors. Apart from the lack of motivation given to the apparatus, there might be problems associated with the leadership of the chairman of waste disposal division in the government. Also, it might be due to the low quality of apparatus in the division. The apparatus has been reported to be unprofessional and have limitation insight about waste management. As a consequence, the effectiveness of waste management becomes low.

This finding also indicated the low performance of the apparatus of the local government in charge in waste management division (DKP) in carrying out its work. Most households in the city of Depok, for instance, have never sorted their garbages into an inorganic and organic waste. In addition, the lack of competence of apparatus has been associated with the lack of infrastructures in managing the waste produced by the households and the industries. This finding support Wibowo's finding (2010: 342) in that he found motivation is a factor in the competence that should be given attention. By providing encouragement, appreciation of the work of subordinates, providing individual attention and recognition from superiors can have a positive influence on the motivation of a subordinate. If the direction of personal motivation may encourage a worker, then align with the needs of their business, you will often find an increase mastery in a number of competencies that affect performance. Competence of someone at work orientation led outcomes, the ability of affecting others, enhancing initiatives and so on. In turn, increased competencies will improve the performance of subordinates and his contribution to the organization to be on the rise.

Ubaedy (2007: 155) also support this findings. He stressed that a competent person has a great confidence. To have the confidence needed a nice self concept. According to Spencer in Ubaedy (2007: 157), confidence is the conviction of a person for versatility in carrying out its tasks. This includes among other things an expression of his beliefs in the face of challenges or problems, his decision in the realisation of the idea or the idea, and toughness in dealing with failure.

To improve the competence of authorities in waste management, then the motivation in working apparatus, apparatus for waste matter concern, initiative, adaptability apparatus against the environment, new technologies and capabilities, in cooperation with relevant agencies and the business world, creativity and proactive apparatus, analytically thinking ability in problem solving and conceptual thinking apparatus against waste management activities to be implemented should be improved either through training, guidance, courses, as well as education.

The effect of infrastructure on effectiveness of waste management

The simple regression result of the effect of infrastructure on the effectiveness of waste management is as follows.

$$\hat{Y}= 1,788 + 0,560\ X_3\ ;\ R^2= 0,364;\ t\ value = 5.678$$

The results showed that the infrastructure has significantly influenced the effectiveness of waste management as shows from the t value. The contribution of this variable, however, is greater at 36,40%. Based on the results of interviews with the staff of DKP, it was mentioned that the amount of waste that is able to be handled by the government is only 39% of the total waste generated by the community in the city of Depok.

The lack of infrastructure provided by the local government include limited number of garbage dump areas, the number of temporary waste storage (TPS) and other garbage dump areas. This limitation has led the households throw away trash or garbages in any place. Many households used to throw their waste to non cultivated land, to the river, to the public streets and by burning the garbages at any time they like without any concern to the health impact.

Given the limited capacity of the garbage dump areas, the government of the city of Depok recently has planned to expand the garbage dump areas to the Village of Pasir Putih, but these plans were opposed by the community in the village of Pasir Putih as it will affect their health and environment. Thus, this plans has been delayed by the government of the city of Depok.

Other issues faced in waste management is the limitations of the land or the difficulty to acquire land that can be utilized for infrastructure development. Many lands were owned by individuals without any legal agreement with the government. Also, there have been lands that should be used for garbage dump areas have been replaced for housing development.

Kodoatie (2005: 340) viewed that the infrastructure problems caused by many things. This can be due to weak human resources to manage complex infrastructure systems, both in the technical and non technical, institutional capacity and the ability of management of which still need to be improved both in quantity and quality, and lack of funds. Limitations of budget is one of the main causes of infrastructure issues related to the planning, implementation and maintenance.

According to Kodoatie (2005: 386), to be able to minimize the dependency on the land for dumping areas, the industry and the community need to build their owned garbage dump areas. This way practice can be able to minimize the responsibility of the local government and to encourage the community to manage their own garbages. However, this way is indeed easy than said.

The effect of community empowerment on effectiveness of waste management

Like the above three variables, the result of the effect of community empowerment on the effectiveness of waste management was also significant. The simple regression model of this variable is as follows.

$$\hat{Y}= 1,766 + 0,576\ X_4\ ;\ R^2= 0,426;\ t\text{-value} = 5.453$$

From this equation, it can be seen that community empowerment have greater contribution in affecting the effectiveness of waste management. The contribution of this variabel was about 42,6 %. Thus, effort made by the city government to empowering the community is a must. This, for instance, can be done by increasing the community knowledge, the abilities and skills of the community/households through training, such as sorting waste inorganic and organic waste.

To increase the community empowerment, the city government has made many cooperation with the Government of Japan. The cooperation is mainly on how to process the garbage easily. This technological cooperation have been undertaken since April 2012, which is financed by the Japan International Coorporation Agency (JICA). Apart from this

cooperation, the city government have developed Waste bank. This waste bank have been established since the year 2012. The number of waste bank in the city is now at about 171 units (see, Badan Lingkungan Hidup,2013). The main activity of the bank is to conduct waste sorting of inorganic waste (paper, plastic, metal and glass) for sale to the waste bank of Depok/ collectors/traders. From the waste bank/traders/ collectors, then further sorting is done being 18 items with details for paper into 6 items, plastic into 7 items, metal into 4 items, and 1 glass items. Once sorted into 18 items, waste were sold to merchant processing waste to be processed further.

Other efforts by the government has been on giving assistance to the community in the form of a motor cart, garbage cart, the trash, scales composter and compost-making place. The efforts that need to be done have been constantly improved in a broader scale, and its development and utilization is monitored on a regular basis, so that if there are problems faced by society can be solved. Through community empowerment activities expected amount of garbage and organic waste either inorganic garbage can be processed further, so that it will have implications for the less amount of waste transported to garbage disposal areas. Therefore, the community as the main producer of garbage is expected to have an important role in addressing the issue of garbage in the city of Depok.

Apart from the above efforts, Zubaedi (2013: 122) suggests that community empowerment in any case can be done through three ways: 1) create an atmosphere or climate that allows developing community potential. 2) strengthens the potential or power possessed by the people by applying real steps, holding a variety of inputs, providing infrastructure, and means both physical and social events accessible to the public. 3) the lowest layer empowers people in the sense of protecting and defending the interests of the community are weak. In the process of empowerment should be prevented lest the weak grow increasingly weak or marginalized in the face of the strong.

The Effects of All Independent Variabels of the Dependent Variable

The result of the multiple regression estimation is as follows. As shown at the equation below that the largest coefficient of the variables was from the community empowerment (X_4). The second largest coefficient was from the infrastructure (X_3), followed by policy implementation (X_1) and the competence of the apparatus (X_2) respectively.

$$\hat{Y}= 1,072 + 0,118X_1+ 0,084X_2+0,252X_3+ 0,312X_4 ;$$
$$R^2= 0,538 ; F \text{ value} = 6.78.$$

However, it should be noted that the contribution of the four independent variables was only 53.8 percent. These findings support the above simple regression results discussed previously in that all the independent variables under study were significant bith partially and jointly to the effectiveness of the waste management in the city of Depok, West Java.

Therefore, we can conclude that the policy implementation, the competence of the apparatus, infrastructure and the community empowerment have significant effect on the effectiveness of waste management in the city of Depok. While this study focusing in the city of Depok, the findings derived from this study might be important to be used as the policy inputs toward waste management in other cities or districts

IV. CONCLUDING REMARKS

This study aims at estimating the effects of the policy implementation, the competence of apparatus, infrastructures and the community empowerment on the effectiveness of the waste management in the city of Depok, West Java. The findings of this study were as follows.

First, the implementation of the policy has significant effect on the effectiveness of waste management. The magnitude of the influence of the implementation of the policy against the effectiveness of waste management, mainly due to the understanding of administrative districts and authorities with respect to waste management which tend to be less well; apparatus of Service Cleanliness and Landscaping (DKP) not yet fully implement the waste management policies consistently; the number and qualifications of officers tend to be less than adequate; caring of administrative districts and authorities tend to be less; DKP apparatus tend to behave honestly and not democratic in implementing waste management policy; expository or follow-up to the government's policy on waste management has not been fully carried out by DKP.

Secondly, there is significant influence of the competence of the apparatus on the effectiveness of waste management. The magnitude of the influence of the competence of the authorities of the effectiveness of waste management mainly due to the motivation of apparatus tend to be less; the ability of the apparatus affects the others tend to be inadequate; DKP apparatus in the ability to adapt to new technologies and the environment are likely to be inadequate; lack of initiative apparatus in waste management; DKP apparatus tend to be less professional, and lack of insight in the field of waste management; the lack of creativity and proactive in waste management activities; DKP apparatus is less likely to think analytically in solving problems associated with waste management.

Third, there is significant influence of the infrastructure on the effectiveness of waste management. The magnitude of the influence of the infrastructure on the effectiveness of waste management mainly due to the presence of waste transport fleet, a bulletin board, the number of TPS and waste processing unit, capacity of landfill (TPA), and the availability of land is inadequate. In addition, the existing infrastructure has not been utilized optimally, the officer who handled the waste management infrastructure is less professional, and existing infrastructure conditions tend to be less good and less viable for implemented.

Fourth, there is significant influence of the community empowerment on the effectiveness of waste management. The magnitude of the effect of community empowerment against the effectiveness of waste management, among others, due to lack of cooperation between DKP, relevant agencies and the business world with the community group of waste; the lack of venture capital assistance and assistance means effort/input for community groups who of waste; and less intensive of extension and monitoring in community empowerment; and less intensive of meeting between relevant agencies and community groups in the field of waste periodically/regularly.

Fifth, there is significant influence of the implementation of the policy, the competence of the apparatus, infrastructure and community empowerment jointly on the effectiveness of waste management. However, as the contribution of these four variables on the effectiveness of the waste management was only 53,80%, it is therefore important to seek other variables to be examined in the form of other regression model. However, these study's findings suggest the importance of the four variables to be used by the city government of Depok as the policy inputs in making the waste management effective.

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