

Role of Motivation and Policy Factors on Waste Management Performance in Makassar, Indonesia

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Abstract Municipal waste management is still focused on technical efforts, so to solve and manage waste comprehensively need to include non- technical aspects, such as worker motivation, and management policy support. The purpose of this research is to analyze the role of motivation factor of workers and the factor of policy support to the waste management performance in Makassar, Indonesia. The research type is descriptive qualitative, collecting data through a questionnaire from the respondent according to the applicable provision, the result of data tabulation is processed by Structural Equation Modeling (SEM-PLS) method. Result of analysis obtained, that the role of motivation factor of worker to waste management have a coefficient with positive direction. The calculation result shows that the coefficient of path equal to 0.185 with t-statistic amounted to 2.968 ($p < 0.05$), it gives a decision that work motivation have significant effect to waste management performance. Good work motivation will improve waste management performance. While solid waste management policies have a coefficient with a positive direction. The calculation results show that the path coefficient of 0.160 with t-statistics of 2.129 ($p < 0.05$) gives the decision that the waste policy has a significant effect on waste management. A good waste policy on waste management system will improve waste management performance.

Keywords Motivation, Policy, Performance, Waste

1. Introduction

Municipal solid waste management is one of the major environmental problems of most developing countries, though the scale of the problem differs from one country to another country [1, 2]. The problem of waste on earth, in general due to the population growth rate and the flow of migration or the movement of the population between one country to the other countries, both in developed and developing countries. Particularly in Indonesia as a developing country, waste issues are a serious concern, as population growth continues to increase. The waste producing is not balanced with the support of human resources, infrastructure, rule support as well as proper allocation of financing to handle.

Indonesia is in a state of waste emergency with 175,000 tons of waste per day, and this continues to grow in line with the annual population growth rate and on the other hand the government together with all parties have not focused to control and solve the waste problem, by balancing the growth of the amount of waste volume products to human

resources support, facilities, infrastructure and non-technical aspects support that are proportional [3].

Makassar is one of big city in Indonesia, located in South Sulawesi. The general description Makassar has problems of waste management. Makassar is the city of about 1.5 million inhabitants that produce 600 to 800 tons of waste per day, from the data in 2015. That number increased dramatically compared to the previous years. The waste production per person per day about 2.75 to 3.5 liter per person per day (Indonesian National Standard), hence the amount of actual waste is 3.0 liter per person per day if we take the production number per person per day, then the waste volume reaches 4,500 m³ per day, or 1,008 ton per day. This waste volume of handling level achievement, only reaches 60-70% per day or about 3,150 m³ per day, and the remaining 1,350 m³ per day waste that is not handled. The rest of the untreated waste is widespread in the city and partially treated by burning, disposing of the river, canal, drainage, and dumped in the soil. Waste treatment, is the beginning of the emergence of environmental problems in general, especially in urban areas.

Based on the results of the previous research, the problem of waste is increasingly and become complex in various aspects, both in technical aspect and non-technical aspect. The result of research has been done in 2014 to 2017. On the technical aspects include several things. Support of facilities

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and infrastructure is still far from the fulfillment of the amount of production volume of municipal waste per day to the needs of facilities and infrastructure. Human support or management, both the status of civil servant and contract worker, on the aspect of quality and quantity is not sufficient. Financing support for both equipment investment and operational and maintenance financing, the financing between the target and the acquisition has only reached approximately 67.98%, which means deficit to 32.02%. Support for the policy implementation on waste management in the new paradigm has not been able to be applied due to the lack of public understanding generally.

The non-technical aspect, covering several things: the support of motivation to the workers has not been maximized, marked by the minimum wage value for the existing contract workers as the spearhead of waste management in the field. The support of community participation is still low as a producer of waste per day, particularly on the aspect of participation of financing operational management services. The behavioral pattern does not yet have awareness of how waste should be treated in relation to the impact it has. Policy support and the rules have not been implemented well and firmly with any sanctions against deviations based on the existing provisions. Performance at the level of waste management services, which influenced especially on the non-technical aspects, only reaches 60-70% per day.

Particularly in non-technical aspects, the local government still expects the involvement of the community towards the waste management comprehensively. Community participation in waste management generally has the least cost option and there is a strong case for comprehensively involving community participation in waste management [4]. It is conveyed by the city authorities, the importance of an approach to maximize how the city can participate, behave, supported by policies and foster motivation of the waste collectors through the attention to its existence, through the improvement of basic needs of life, completeness of safety and safety as well as providing health insurance and long term care insurance.

Technically, the concept of waste management has been done with various thoughts starting with planning related to the amount of waste volume which involves the population as waste sources. Making a mathematical approach to how much the management facilities need from the waste per day production, and how to prepare the schedule to manage the waste from source to final disposal consistently and continuously. The objective of this study is to analyze the role of motivation factor of workers and the factor of policy support to the waste management performance.

2. Research Methods

2.1. Research Design

According to the data type review of research approach used in this study is a qualitative approach.

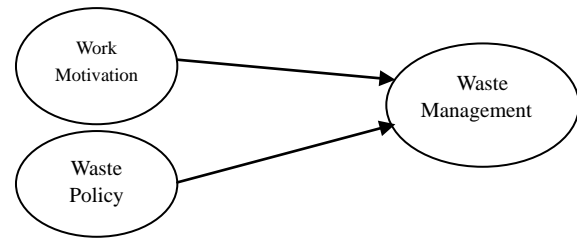


Figure 1. Concept model between variables

The model picture of the relationship between the research variables above shows that in this study there are two exogenous variables (variables that are not influenced by other variables in a relationship model or often known as independent variables), the variables are; motivation Workers (X1) and Waste Management policies (X2), with one endogenous variable (variables that are influenced by other variables within a relationship model or often known as "dependent variable") are the Waste Management Performance (Y3) variable. In modeling, it will involve all indicator variables so that all variables are latent. In accordance with the above relationship model, the data analysis technique to be used in this research is structural equation modeling (SEM), where the independent variable will be divided into a number of arranged blocks.

2.2. Population and Sample

The population in this research is the people of Makassar. Based on the data collection plan there are two sub-districts of 14 sub-districts, consisting of 21 urban villages of 134 urban villages, each urban village is assigned as many as the respondents that are being targeted on neighborhood block area and the community leaders as well as the urban villages staff, including the Department of Sanitation staff and the staff of Department of Garden that are stated in the sub-district area according to the new provisions, that the urban waste operation is done by each urban villages, including some citizens who are generally as the towns people to participate as the respondents, i.e. students and teachers.

2.3. Data Analysis

After the research data is collected, the undertaken activities are analyzing research data with data analysis techniques in accordance with the type of research. Data descriptive technique used descriptive statistical analysis. Data analysis used in inferential statistical method in this research is partial least square (PLS). PLS has several advantages compared to other analytical tools: (1) can analyze complex models, (2) data do not need normally distributed, (3) can use small samples and (4) can handle the missing values.

This study was analyzed using primary data collected through questionnaires using survey method. The questionnaire of this research consists of questions about four variables or constructs measured by a number of indicators. Each respondent is asked to convey his

perceptions of the indicator of the variable by selecting a number from a scale of 1 to 5. Therefore, each construct needs to be tested whether it is valid and reliable.

The final analysis in this research is hypothesis testing. The analysis tool used to test the hypothesis is Smart Partial Least Square (Smart PLS) software version 3.2.6. The reason for the use of Partial Least Square (PLS) is that there are several research hypotheses that do not have a solid theoretical basis yet. Another reason is that PLS is able to analyze constructs with reflective and formative indicators [5]. The PLS is a powerful analytical method, because it is not based on many assumptions, the data should not be normally distributed, the sample should not be large, and be able to explain the relationship between the latent variables [6].

Another advantage of PLS is that can be used on the data of different types of scales, its capability in managing multi-collinearity problems among the independent variables, and fixed results (robust) despite abnormal and missing data [7].

The use of PLS as an analytical method requires several steps of structural equation modeling. The steps of the PLS can be explained as follows:

1. Designing a structural model (inner model) is designing relationships between variables (constructs) based on the research hypothesis.
2. Designing a model of measurement (outer model) is designing the relationship between latent variables with the indicator. This study uses formative indicators.
3. Construct the path diagram.
4. At this stage a path diagram is made to illustrate the relationship between latent variables (constructs) both exogenous and endogenous. The path diagram is presented in Figure 1.
5. Convert the path diagram into the system of equations. The system of equations shows the relationship between latent variables (inner model) and the relationship indicator with the variable (outer model).

2.4. Location of Research Study

The location of the research is Makassar in the South Sulawesi Province, it focused on two sub-districts, namely Makassar and Biringkanaya Sub-district. The focus was on 14 urban villages in Makassar Sub-district and 7 urban villages in Biringkanaya Sub-districts. Research Objects, is the performance of waste management includes the start of the emerge waste to the process of activities ranging from the source of waste incidence to the final dumping place on landfills. Research subject is a source of data that asked for information in accordance with the research problem. As for the data sources in the research is the subject from which the data was obtained [8]. To obtain the right data, it is necessary to determine the respondents who have the competence and in accordance with the needs of the data (purposive), they were the town people and it is focused on the citizens in two

sub-districts, as well as the entire of Department of Public Cleanliness and National Environment Agency in Makassar. This study describes how the response of the citizens as the object, viewed from the aspect of workers motivation, which is supported by the factor of management policy if it is correlated with the performance of garbage collectors.

3. Results and Discussion

This research used SEM PLS model and processed with Smart PLS version 3.2.6 to evaluate research model. Hypothesis testing through two stages namely outer model testing and inner model testing, outer model testing aims at determining the correlation value of latent variables, cross loadings, validity and reliability of constructs and R Square (R^2). Inner model testing aims to know the value of path coefficient, inner model T-statistic, and total effect value that indicates the level of variation of independent variable changes to the dependent variable [7]. Model evaluation results are presented in the appendices.

3.1. Statistical Testing of the Linearity Assumptions

Before performing further evaluation of this analysis, it is necessary to first perform the linearity assumption test, i.e. the relationship between the constructs to be tested whether having a linear relationship or not. Therefore the first step in the SEM PLS model is to test linearity assumptions. The relationship between variables in the analysis of this model is linear. Testing this assumption of linearity test used test of linearity. The linearity assumption in path analysis is only related to structural equation modeling and is not related to hypothesis testing, i.e. the relationship between variables in the structural model is linear. This means that the increase or decrease of variation in the criteria is followed consistently by the increase or decrease of variation on the criterion of the predictor so that the relationship will form a straight or linear line.

Table 1. Statistical Testing of the Linearity Assumptions

Relation	Linirity		Information
	F	P	
Work Motivation with Waste Management Performance	162.883	0.000	Linier
Policy with Waste Management Performance	216.207	0.000	Linier

The linearity result explains that all paths meet the linearity assumption that the result of F test on linearity is significant ($p < 0.05$). There is a supporting test result in the other part that is deviation from linearity which aims to test whether linarites fulfilled and supported by low match model for non linier relationship. If the deviation from linearity test result is not significant ($p > 0.05$), it means that the relationship between the two variables is indeed linear. However, if the deviation from linearity test result is

significant ($p < 0.05$), then the relationship between the two variables can be linear and not linear. Thus, the assumption of linearity is fulfilled if the part of test results linearity is significant. This analysis gives the conclusion that the linearity requirement has been fulfilled in all paths in the hypothetical model. Based on the result of linearity, it shows that the test result of F test is significant ($p < 0.05$).

3.2. Construct Validity and Reliability

The examination of the validity and reliability of the construct on the formative relationship is done using a number of different ways with the reflective latent variable. In a latent construct with a reflective correlation, the test is performed to assess the convergence validity, discriminant validity, and reliability. A model has convergent validity when outer loading values > 0.7 ; communality > 0.5 and average variance extracted (AVE) > 0.5 [7]. While, in the formative relationship, the indication that is used to assess the items is based on the test results of the significance of outer weight coefficient and the value of variance inflation factor (VIF). All indicators are still used in measuring the latent constructs although their coefficients are tested insignificant provided there is no high multicollinearity problem ($VIF > 5$).

The latent variable of work motivation is measured formatively by 7 indicators. All coefficients marked positive and partially tested are not significant ($p > 0.05$). Significant coefficients of indicators for work motivation include material (X1.1), willingness (X1.3), skill (X1.5) and education (X1.7). VIF values in the range of 1.166 - 2.182 indicate that there is no high multicollinearity problem.

Table 2. Loading Factor and VIF Value

Variabel	Indikator	Outer Weight	VIF
Work Motivation	X1.1	0.107	1.805
	X1.2	0.180	1.721
	X1.3	0.257	2.023
	X1.4	0.278	2.182
	X1.5	0.141	1.896
	X1.6	0.044	1.393
	X1.7	0.439	1.166
Policy	X2.1	0.199	1.209
	X2.2	0.191	1.605
	X2.3	0.405	1.582
	X2.4	0.429	1.136
	X2.5	0.299	1.123
Waste Management	Y1	0.095	1.541
	Y2	0.507	1.989
	Y3	0.160	1.538
	Y4	0.222	1.378
	Y5	0.407	1.196

The latent variable of waste policy is measured formatively by 5 indicators. All coefficients marked positive

and tested significant ($p < 0.05$). VIF values in the range 1.123 - 1.605 explain that there was not a big multicollinearity problem among the indicators. Two large coefficients were in the waste volume reduction indicator (X2.1) and the scheduling (X2.4).

The latent variable of waste management performance is formatively measured by 5 indicators. All coefficients are marked positive and for the most part was significant ($p < 0.05$). Significant indicator coefficients on waste management performance include technical (Y2), social (Y4) and environment (Y5). VIF values in the range of 1.196 - 1.989 explain that inter indicators do not occur high multicollinearity problems. The biggest coefficient is in social indicator (Y4) i.e. the presence of high social attitudes between the community and the waste collectors, as well as conducting collaborative work weekly in each district.

3.3. Testing of Structural Model (Inner Model)

In the three variables that exist in the model has a correlation coefficient marked positive with the range of 0.510 to 0.664. Correlation coefficient on the relationship between variables is significant, because the critical value of correlation coefficient on the sample size of 350 is 0.105. The following table is the correlation matrix between variables.

The correlation coefficient between work motivation and policy on waste management performance of 0.609 and 0.606 explains the positive correlation in these three variables. The performance of waste management tends to be better if the work motivation of the implementers in the field is high and the supporting policies are successfully established well.

Table 3. Coefficients Dependent Variable

Construct	Motivation	Policy	Management
Motivation	1.000		
Policy	0.609	1.000	
Management	0.606	0.638	1.000

Assessing the results of the structural model test (inner model) can be seen in R-square (R^2) in each endogenous construct (community participation and behavior), coefficient path value, t and p in each interconnected path relation.

The coefficient value of the path and the value of t on each path will be explained in the results of hypothesis testing. The value of R^2 is used to measure the degree of variation in the endogenous variables described by a number of influencing variables [7]. The higher value of R^2 means the better predicted model of the proposed model.

In this hypothetical model, the path coefficient on the direct correlation of work motivation and policy on waste management performance is 0.346 and 0.427. This is explained by the fact that the contribution to the waste management performance sourced from the waste policy is stronger than the work motivation of the workers.

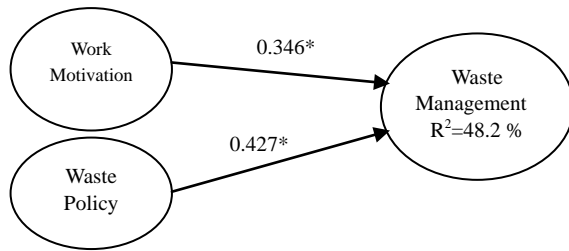


Figure 2. Hypothesis Model

The hypothetical model is calculated using Smart PLS version 3.2.6 to know the significance of path coefficients that exist in the model or significance of hypothetical support [6, 7]. The path coefficient is significant if p is less than 0.05, the inner model result is described in Figure 2 and Table 4. The interpretation of the table and the figure explains the relationship between variables as follows:

Work motivation on waste management performance has a coefficient with the positive direction. The result shows that path coefficient equal to 0.346 with t -statistic 2.968 ($p < 0.05$), it gives a decision that work motivation has significant effect to the waste management performance. Good work motivation will improve waste management performance.

Table 4. The Result of Path Coefficient Testing on the Inner Model

Relation	Path Coefficient	t Statistic	P
Work Motivation with Waste Management Performance	0.346	2.968	0.003
Policy with Waste Management Performance	0.427	2.129	0.033

Solid waste management policies have a positive direction coefficient. The calculation result shows that the path coefficient of 0.427 with t -statistic of 2,129 ($p < 0.05$) gives a decision that waste policy has a significant effect on waste management performance. A good waste policy will improve waste management performance.

The model fit can be judged from the model determination coefficient (R^2). The coefficient of determination model is calculated by using the whole coefficient of determination (R^2) in the model. Since this model contains only one endogenous variable, the direct model match is explained by $R^2 = 48.2\%$. This value indicates that the variation of garbage management performance explained by work motivation and waste policy is 48.2%, while the rest is explained by other variables, such as participation and society behavior. Hair [5] states that in general the coefficient of determination is low if it is 0.20, while in the results of this model the three coefficients are more than 0.20. Thus, based on this result the suitability of the model is quite good.

The results of the analysis in the hypothesis model explain that the high work motivation of waste management officers in Makassar has a significant effect on increasing community participation. In each region, the city government of

Makassar has provided a number of the workforce experts to handle a number of basic duties related to the waste. Worker motivation is measured on a number of indicators such as material / needs, expertise, willingness, skills, income and education. The coefficient on each indicator of the variable is positive which describes that the formation of worker motivation in the field that handles the waste is explained by many things. Among the three main indicators as a description of work motivation are education, materials / needs and willingness. High motivation of workers is explained by the background of education that is not too high but it is enough to understand the duties and obligations as executors in the field. Worker motivation is high if the material / basic needs of the worker's life can be met. The local community generally gives an assessment that garbage collectors have a high work motivation. Then another explanation is the motivation of workers will be high if they have a great willingness in doing the duties of the routine work. Waste collectors activity is an activity that requires good physical strength and teamwork.

At the high or low performance of the manager is explained by the internal indicators of individuals, technical, social and environmental. Among these indicators there are three things that can be regarded as a key indicator of managerial performance; technical, social and environmental. In the description of the managers performance has been explained that most managers have high expectations to have a technical attitude through training, supported by positive social interaction and a good environment that is high. As the definition of performance explains there are three main factors that affect employee performance; the ability of individuals to do the work, the level of business devoted and support organization received. Individual ability can be through training, technical support equipment and organizational support i.e. the needs and expectations of workers, as motivation support [9].

The result of analysis in the hypothetical model explains that high waste management policy on waste management aspect in Makassar has a significant effect on waste management performance. The Government of Makassar has provided policy tools at various stages of waste activities in order to improve the productivity of waste service level, as the objectives achieved as in the municipal government mission related to urban cleanliness.

Solid waste policy is measured on a number of indicators such as waste volume reduction, waste management, waste utilization, transportation scheduling and party cooperation. It is in accordance with the definition and scope of waste policy in Federal Law Number 18 of 2008. Coefficient on each indicator of policy variables is positive which describes the formation of waste performance as a form of reference and direction to waste disposal operations described as policy is a tactic or strategy aimed at achieving goals.

Among the two main indicators as a description of waste policy is the reduction of waste volume, that the reduction of waste volume can be done in each source of waste by sorting the type of waste to be processed according to its type, the

sorting results will be processed at Waste Processing Station (WPS), thus the waste to be transported and disposed are reduced, and can be utilized. Waste can be utilized for a variety of useful materials depending on the technology used. Among others can be made as fertilizer, biogas, alcohol and animal feed ingredients. Several efforts can be made to reduce the volume of waste for waste utilization and the scheduling of waste transport operations [10].

The high waste policy is explained by the increasing number of waste productivity in line with the increase of population growth rate, the increase of waste volume needs to be done breakthrough related with the policy concepts by affirming the provision that the garbage in each source need to be sorted and to be transported to the WPS, it is necessary to have a policy of reducing waste volume through waste reduction strategies based on short, medium and long term stages.

Waste policy is highly implemented if the firmness on the implementation related to volume reduction is implemented consistently and sustainably can be fulfilled. The community through socialization and direction related to the concept of waste volume reduction has a good enough response, for it needs a consistent commitment to actively socialize and do some approaches to the community. Another explanation is that the scheduling of waste transport operations as a form of waste service from the source to the final disposal site will be high if the operator is able to compile the schedule based on daily waste volume to the number of fleets and the readiness of the community to distribute the waste based on the set schedule. Transport activities need to be done with a tight scheduling system and can be implemented either by the operator or the community related to the policy of the transportation activities.

At the high or low performance of the manager is explained by the individual internal indicators, technical, social and environmental. Among these indicators there are three things that can be regarded as a key indicator of managerial performance; technical, social and environmental. Individual Internal Indicators performance factors consist of internal factors and external factors [11]. Internal factors (dispositional) are factors associated with the properties of someone. While, the technical indicators based on the Indonesian Dictionary, the technique is defined as a method or system to do something, how to make or do something related to art. Social indicators according Salim [12], social relationships are relationships between institutions, individuals of a general nature with community-based activities. In the description of the managers performance has been explained that most of the managers have high expectations to have a technical attitude through training, supported by a high positive social interaction and a good environment.

Waste problem is a common problem, so it is related to the management performance that needs to be improved through technical aspect, social interaction and good environment. Technical as part of the performance can improve the performance of the managers or workers, supported by the

social interaction of the community as well as a good environment. If there is one area that has a poor waste management, it will disturb the other areas in the form of bad smells and potentially carrying diseases.

The results of this modeling found that the facts of waste management performance have been active in the management. The high performance is measured by the strong technical aspects, social and environmental relations. Effective and efficient waste management has been accepted as an emergent factor for future social development. The efforts require not only technical innovation, but also the involvement of all stakeholders as well as social, economic, and psychological components [13]. In other words, if in a region found low performance level then one of the explanatory factors that can be used is because the performance of garbage workers in the region is considered low. Therefore, the government of Makassar as the agency of garbage collectors recruiter is expected to conduct a technical training in the field of waste management and create a good interaction relation that is supported by a good environmental condition.

4. Conclusions

4.1. Conclusions

This study is analyzing the role of management policy factors on the performance of waste management. Referring to the results of the analysis in the hypothesis model explains that the waste policy is highly implemented on the waste management in Makassar and the significant effect on improving waste management performance. Since the policy support on waste management has an indicator on the reduction of waste volume in the sources of waste, waste management, waste utilization and scheduling transportation as well as the cooperation of other parties. Stages of the policy were arranged based on the stages of management activities started from the reduction of the volume of waste by processing to make it as useful materials, handling waste from the source to the final disposal place, followed by the utilization of waste, the volume of waste that is transported become smaller. In addition the cooperation and participation between the communities and all parties will bring a successful waste management.

High motivation of workers is supported by the participation of the community in the form of participation and make changes in community behavior through the delivery and implementation of policies that socialized to the community actively, will create maximum work productivity as a manifestation of the performance of managers in carrying out waste services from the source to the place of final disposal. The disclosure and review of how the role of motivation factors in improving services by involving the community as a form of participation, and the behavior change of the citizens by supporting the waste policies in the context of increasing the capacity of waste management as a form of level performance of waste management for the

project of Makassar that is being a city of waste-free and clean city.

4.2. Suggestion

It is recommended for the local government or the town council especially in Kota Makassar that waste management in the future is expected to be a synergy between technical and non-technical aspects that the workers motivation and policy support can be done consistently and continuously to bring Makassar being a city of waste-free.

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