ASSIGNMENT MODEL-BASED AND INTEGRATED PROCESS IMPROVEMENT (MIPI) TO INTEGRATE WASTE MANAGEMENT SYSTEM IN TPST BANTARGEBANG-BEKASI, WEST JAVA-INDONESIA

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Abstract. The waste management in Bantargebang has been planned for 15 years and should be improved in order to meet the needs of the stakeholders. The study is done to find the right method to be used for integrating the waste management in Bantargebang site. The method is a review of previous studies related to improvement in waste management and business processes. The result suggests that the mapping of the process needs to be done on the waste management system and using the Model-Based Integrated Process Improvement (MIPI) which developed by Adesola et al. (2006) to improve the process.

Keywords*:* waste management, business process mapping, process, Model-Based and Integrated Process Improvement (MIPI)

INTRODUCTION

Urban waste management is often an issue of interest in assessing the performance of local governments. Garbage generated from social and economic activities of society that always increases whereas the quantity of waste-handling from upstream to downstream is not optimal. This leads to reduced capacity of the land the city landfill/waste disposal (TPS).

Waste management in DKI Jakarta became one of the many policies focus involves various parties are the provincial government, the central government as well as private to public. The results of the census statistics Indonesia (BPS) DKI Jakarta (http://jakarta.bps.go.id//) shows that the total population of Jakarta amounted to 9,604,329 inhabitants and the volume of waste in Jakarta reached 29,676.24 m^3 or 6,594.72 tons/day (Nasir, 2010). The composition of trash is 65% organic waste and 35% non-organic waste. Based on composition, source of the waste of DKI Jakarta comes from: industry (8.97%), offices (27.35%), school (5.32%), market (4%), housing (52.97%), others (1.4%). (Nasir, 2010).

Waste management is the function of the public service. These activities apply the principle of 3 R (reduce, reuse and recycle) as an option on public participation criteria. It can help local governments reduce the cost of transport to waste disposal (TPS). The magnitude of the burden of waste cannot be separated from the lack of waste management from a source. The waste that can be recycled or composted only 10%, around 60% dumped without processing to integrate waste treatment facility (TPST) and 30% were left in temporary shelters (TPS) including illegal TPS. (Budisantoso, 2011). In addition there is approximately 15.3% of the waste dumped carelessly in Jakarta (BPLHD, 2009).

The waste management of TPST Bantargebang involving various parties. The main parties that have an interest in public service, namely Dinas Kebersihan

Pemprov DKI, and the waste manager who has a contract with the city government work, namely PT. Godang Tua Jaya (PT. GTJ). PT. GTJ have responsibilities in cooperation in the form "Bangun Guna Serah (BGS)" to serve and accommodate waste obtained from the rest of the economic activity in Jakarta. PT. GTJ make efforts to optimize the availability of land to be able to accommodate a supply dump site garbage from Jakarta through the sewage treatment process by means of exploring biogas (methane and carbon dioxide), leachate (leachate) and fertilizer (composite) and recycled plastic. The effort is expected to reduce waste generation which has the potential overload. PT. GTJ able to look at the economic value of the use of waste which is then combined with the efficiency aspect capacity of garbage in TPST Bantargebang. Waste volume tends to increase by 6,500 tons per day exceeds the capacity of garbage in Bantargebang which only amounted to 2,000 tons per day. This is of course resulted in the emergence of potential excess capacity even though the manager has sought to reduce the burden of piles of waste through its utilization in the form of composites, recycling and powerhouse (Power Plant Waste, namely PLTSa).

Some researches on waste management has been carried out in major cities in Indonesia and abroad provide inspiration to know how to improve the effectiveness of waste management present and future in the city. The previous studies discuss the various aspects related to waste management are: Ardiagarini et al (2013) discuss the compressed natural gas from landfill gas as an alternative energy, Riansyah and Wesen (2014) discuss the use of waste as fertilizer liquid leachate, Nyyssönen (2015) discusses the potential of waste sludge in industrial and environmental sustainability, Kubin (2012) discusses the characteristics of gas emissions on landfilling in some tropical areas of the world, and Koesrimardiyati (2011) discusses the sustainability of community-based waste management. The studies on TPST Bantargebang management specifically has been done by: Dasuki (2008) discusses the implementation of asset management in the management of landfills, Ardiagarini et al (2013) discuss the financial aspects of compressed natural gas (CNG) as an alternative energy made from landfill gas, and Widyaputri (2014) discusses the economic aspects of solar power and bebefits of carbon emission reduction.

This study will focuses on the selection of methods can be used to improve the waste management system in TPST Bantargebang involving various parties in it.

METHODOLOGY

This study used a qualitative paradigm is the paradigm that aims to understand a phenomenon in the process (Creswell, 1994), as a research approach. This approach is used because the research focused on the study process and waste management activities in TPST Bantargebang. Data collection techniques performed through literature study to previous studies that discuss the process of waste management and the improvement of business processes. References to previous studies obtained from scientific journals that have published both nationally and internationally.

RESULT AND DISCUSSION

Waste Management. Waste is the rest of the daily activities of human and/or natural processes in the solid form and source of waste is the origin of waste. (Direktorat Pengembangan Penyehatan Lingkungan Permukiman, 2006; Undang-Undang No.18 Tahun 2008). Trash can consist of organic matter (plants/herbs that can be decomposed by bacteria, or Biodegradable) and non-organic materials (materials that are difficult decomposed by soil, or Nonbiodegradable) is scrap and waste/no longer needed resulting from the activities of humans, animals and plants (Tchobanoglous, 1993). According to the Law on waste management activities defined as a systematic, comprehensive, and continuous covering waste reduction and handling.

In general, waste management is control activities to the accumulation of garbage that include reduction and sustainable handling. This is done through activities: collection, transfer and transportation, processing and final processing/disposal of garbage, which considers the factors of environmental health, economics, technology, conservation, aesthetics, and other factors are closely related to public response.

The previous studies related to urban waste management are: Yogiesti et al. (2010), Handoko (2010), Sulistyawati and Nugraha (2010), Surjandari et al. (2013), and Aladjadjiyan et al. (2014) discuss the effectiveness of treatment of urban waste that can be done by composting and recycling. Another effort is to process waste into a variety of renewable energy (Aladjadjiyan et al., 2014) which can be done through the process of landfilling and LFGTE projects (landfill gas to energy) (Alex, 2009), changing the solid waste with MBP method (mechanical-biological pretreatment) become a secondary fuel (Ritzkowski et al., 2006), convert plastic waste into liquid fuels (Kadir, 2012), and the processing of sewage sludge (Nyyssönen, 2015). In addition, the effectiveness of urban sewage treatment is determined by the accuracy of selecting the land (Usman et al., 2013) and the determination of land area (Handoko, 2010).

Process Business Improvement. Business processes are defined in accordance with the main concern (Tinnila, 1995). The main concern which is the main aspect in the analysis of business process definition is operational approach, strategic and organizational. These three main aspects can be used as a starting point in the engineering process.

This study takes the definition of business processes from Davenport and Short (1990). They define business processes as an organization consisting of human, material, energy, equipment, and procedures in a draft work activities to produce an end result that is unspecified.

A business process improvement project can be measured levels of priority, whether the project is in fact included on process improvement, process redesign, or process reengineering (Adesola et al., 2006). Furthermore, Kettinger et al., (1997) distinguishes process improvement, process redesign and process reengineeing through 11 (eleven) characteristics that are centering strategy, visibility of information technology, the scope of the process, the commitment of senior management, performance measurement criteria, the function of the process, the availability of resources power projects, structural flexibility, the

culture capacity to change, the amount of management hopes to influence people, and the target value chains.

Studies that raised the issue of business process improvement (BPI) and business process reengineering (BPR) has been carried out by: Kettinger (1997) developed a method in which a flexible framework MTTs in process engineering business in the future, Prasad (1999) develops strategies hybrid re-engineering for process improvement, Talluri (2000) examines the relevance bencmarking as the methods used in BPI and continuous process improvement (CPI), Gunasekaran and Kobu (2002) identify modeling techniques that can be done in BPR, Saven (2004) discusses election modeling techniques based on the purpose of the process, Adesola and Baines (2005) determine the critical success factors in the activity of the BPI methodology and Integrated Model-Based Process Improvement (MIPI), Adesola et al. (2006) developed a method that integrates BPI modeling techniques and teamwork environment, Radnor (2010) defines public service process improvement methodologies, Bask (2010) analyzes the service strategies and business models associated with the service, and Banaeianjahromi et al. (2014) discuss the Identify and Improve Model (IMI) methodology in providing solutions for the identification, modeling and business process improvement.

Management of TPST Bantargebang. TPST Bantargebang is one example of landfills (TPA), which introduced a system of open dumping sanitary landfill, although initially this dump site was not designed with open dumping method. The capacity of TPST Bantargebang is not proportional to the amount of supply of waste from markets and households in the capital city. Management of TPST Bantargebang strived to overcome the problems of capacity as well as other waste issues by trying to exploit and change the value of waste into more economically useful.

TPST Bantargebang started operating since 1989, is located in east Jakarta in Bekasi West Java Province. TPST Bantargebang has an area of 108 hectares and is divided into five zones. Until now, managing TPST consists of a simple system of "Gather Transport Throw" involving some 6,000 scavengers. The accumulation of garbage in the year 2010-2016 is 41,343,550 tons, and the volume of waste sent to the dump site in the same year is estimated to 93,075 million tons. The capacity of the waste in the year 2016-2023 reached at least 2000 tons/day (BPLHD, 2015).

The various methods and approaches related to waste management and improvement of business processes conducted by previous researchers have provided an overview of the alternative methods that can be used to improve the waste management system in TPST Bantargebang involving many parties in it. Thus, the method chosen for this study is a methodology developed by Adesola et al. (2006), namely MIPI

Adesola et al (2006) explain that MIPI is an integrated methodology that incorporates the concepts and approaches of process improvement and modelling. It provides a simple improvement guideline in which only seven steps are involved. The purpose of the methodology is to achieve better product or service through an effective improvement mechanism. The principal goal of the methodology is to guide a project in the improvement of a business process. The

methodology has been developed bearing in mind that it should provide a structured approach for users on what to do and how to do process improvement in the least complex manner. MIPI methodology is a seven-step BPI methodology. It serves as a road map to move a process from its current state along a guided path to better performance.

The overall purpose of the Seven-Step Methodology is to facilitate process improvement. The MIPI method consists of seven stages (according to the model developed by Adesola et al. (2006)) as follows: Step One: Assess Readiness. *Techniques:* Search Conference; Process Prioritisation; Readiness Assessment Questionnaires. Step Two: Outline Process under Review *Techniques:* Process Deployment Matrix; Voice of the Customer table and IS/IS Not table. Step Three: Detailed Data Collection**.** *Techniques:* Interviews; brainstorming; focus group; workshop; enhanced IDEF0 process analysis tool; Person centred process chart. Step Four: Form Model of Current Process. *Techniques:* IDEF0 (activity modelling); Flow diagram; role activity diagram (for mapping role and interaction to the activities); swimlanes; rich pictures and computer modelling tool, such as Enterprise Modeller. Step Five: Assess and Redesign Process**.** *Techniques:* Cause and Effect Diagram; Value Added Analysis; Process Performance table; Scenario modelling, Simulation, What, Where, Why, Who and How (5 Ws 1H). Step Six: Implement the improved process. *Technique*: Action Plan, Customer Audit; Improvement Learning Audit. Step Seven: Review Process. *Techniques:* The Opportunity Cycle; Deming's Plan, Do, Check and Act cycle; Failure Mode and Effects Analysis and Self- Assessment.

CONCLUSION

This study aims to find a method that is more precise and easier to use in performing system integration to overcome the problems of the growing waste piles and potentially beyond capacity. The review of previous studies provide results that need to be done modeling or mapping process on the waste management system in Bantargebang. The aim is to facilitate finding solutions to the integration process that allows to solve the problem while meeting the needs of stakeholders in Bantargebang. Furthermore, the model-based integration techniques need to be done to improve the process in the waste management system and the selected method is Model-Based and Integrated Process Improvement (MIPI) which was introduced by Adesola et al. (2006).

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