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A lean based analysis on the Indonesian citizens' participation in environmental impact assessment (EIA): a potential improvement through web based system and SMS-gateway

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Abstract

In this paper, a lean based analysis was conducted to explore the potential improvement of citizens' participation in environmental impact assessment (EIA). Three lean tools, namely *muda*, value stream mapping and *gemba* were used as a tool to analyze the EIA public participation process flow in Indonesia. Two information and communication technologies, which are web-based system and SMS-gateway, were proposed to improve the current steps and reduce the "non-value" added process. This paper and the associated result can be used by EIA-policy makers as well as project owner in the implementation of citizens' participation to reduce the waste in the public involvement process.

Keywords : Lean; Environmental impact assessment; SMS-gateway; web based system.

1. Introduction

The evolution of information and communication technologies (ICT) has been taken positively by many Indonesian people in the last decade as the assistive tool to perform various activities. Not only utilized by individual, but the advantages of ICT are also used by big institution including Indonesian government. Particularly, to get the best achievement in providing the best service to the citizens, many of the service activities are now operated by digital based services [1]. In this research study, we discuss the use of ICT on Indonesian government's program, namely environmental impact assessment (EIA). Specifically, the parts that will be assessed are related to public participation. In order to reach the

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sustainable improvement in the public participation process, this research is highly needed as a bridge to transform the current situation to the future situation with the mediation of lean approach. While lean government analysis has been implemented massively and mainly in the American continent [2], this research serves as the first attempt to provide a new point of view by analyzing the Indonesian government's EIA through lean based analysis. Three lean tools such as *muda*, value stream mapping and *gemba* are used to measure the potential improvement EIA implementation with web and SMS technologies. Both web-based and SMS-based technologies are highlighted due to the citizens are familiar with these technologies in government related services [1, 3]. The target of this research is to provide the potential improvement through the lean analysis for citizens' EIA participation with the mentioned ICT. Specifically, the parts that will be solved are regarding the reduction of time and steps in citizens' EIA involvement process.

2. Literature review

2.1. Environmental impact assessment (EIA) in Indonesia

The focus of EIA approach is to assess and to identify potential impacts on any proposed project that will be performed to mind the pro-environmental concerns in every planning and decision making [4, 5]. EIA program was firstly regulated in Indonesia in the year 1999 by the Government of Indonesia [6]. The regulation of how the citizens can participate was endorsed by the head of Indonesia's environmental management agency in the year 2000 and was also amended in the recent year 2012 [6-8]. In the current regulation, particularly for electronic media explanation, Ministry of Environment of Indonesia explicitly mentions the range of additional technologies that can be used by the project owner to announce the proposed project such as website, SMS, social network, and any usable media in the additions of previous regulations that are television and radio [7]. In the suggestions, opinions and feedbacks (SOF) sections, although the regulation does not obviously say the detail of the technology options, it allows the citizens to use the ICT media that is written or recorded. Similarly, in the public consultation sections, both project owner and citizens can use any bidirectional ICT communication channel. Generally, the regulation explicitly and implicitly allows both citizens and the project owner to use the written and or recorded technologies to accommodate both one directional and bidirectional communication.

2.2. Lean based analysis component

The term of lean was firstly discussed in an article entitled "Triumph of the Lean Production System" [9] based on the philosophy of Toyota Production System (TPS). The idea of lean is to improve the efficiency by reducing or erasing the "non-value added" activities. Waste, or known as *Muda* in Japanese term, is the term used by lean to describe the human activity that creates no value. In the book of Lean Thinking, Womack and Jones [10] describe how Taiichi Ohno as the executive of Toyota identified the seven types of *Muda* such as defects, overproduction, over processing, excess motion, complexity steps, waiting, and inventory. It is believed when the potential waste in the business process can be anticipated, then the performance of business process will improve significantly. The concept of lean is also adopted by United States Environmental Protection Agency (US EPA) since 2003 to improve the protection of human health and the environment and it is described in the book of Lean in Government Starter Kit [2]. In this book, a numerous examples show on how the US EPA able to reduce the waste significantly up to 94 percent reduction (e.g: US Vermont agency of natural resources able to reduce wastewater permit process time from 542 to 34days) as well as 95 percent improvement (e.g: Quality of process in Michigan department of environmental quality rising to 95 percent). It was also recorded in 2011 that 29 states environmental agencies of US have conducted lean events. The interesting information in this book can

be seen on how the value stream mapping is frequently used and discussed as the tool for improvement. A value stream mapping (VSM) is an activity of developing a visual representation for each step, from the start to finish. VSM capture both value added and non-value added time at every step. The objective of VSM is to depict the current state map (CSM) and propose the future state map (FSM) with some improvements and waste reduction. For the next lean tool, namely *Gemba*, is a tool derived from the Japanese term Gemba or "the real place". This tool asks every stakeholder to spend time in the field where the real action occurs. Many of the business processes were improved by using lean tools and some of them utilize ICT as the improvement ways [11, 12]. In this research, we will analyze the lean government process in the case of Indonesian citizens' EIA participation with ICT by the mentioned lean tools.

2.3. A glance of web based system and SMS-gateway

World Wide Web, or known as web, is an information system technology that interlinked a hypertext format communication through the internet. Commonly, the user will use the web browser application in the computer operating system to connect to the internet. Currently, there are two kinds of web based system that are Web 1.0 and Web 2.0. From user point of view, instead of the advanced technology, Web 2.0 allows many users to participate in the content creator [13]. Both technologies are now being used by large organization including the government for displaying the information and or collaborating with citizens [14, 15]. For the next technology, SMS-gateway, is a tool or facility that uses SMS-message format to deliver the information from other media, both one and bidirectional, with or without the use of mobile phone [3]. In previous research conducted by Persada, et al. [3], SMS-gateway technology was analyzed in the use of facilitating the information flow between project owner, citizens and government in EIA participation. The result shows how SMS has a better performance and preference than a physical paper based media.

3. Methodology

We conducted a combination of qualitative and quantitative research method. The instrument development consists of both questionnaire survey and an interview to 3 EIA practitioners. The collection of data was performed on April 2013 in a parallel research regarding SMS-gateway study [3]. A total of 103 questionnaires was gathered from online and offline from the respondents who are Indonesian citizens. The design of the questionnaire is much likely discussed the performance comparison between paper based and electronic based such as processing time and the perceived to using it in 7-Likert scale, ranging from 1 "I completely disagree" to 7 "I completely agree" [3]. For the EIA practitioners, all of them are well understood about the EIA procedure and were involved in many EIA projects. One of the interview respondents is an EIA expert and this respondent has been teaching EIA for more than 10 years. Both questionnaire and interview are one of the ways to implement the *gemba* philosophy and to identify the *muda* in citizens' EIA participation process. The current and improvement process, based on data collection, is depicted in VSM.

4. Analysis result

4.1. The current state map(CSM)

The steps of the EIA and the role of each participant have been guided by the government for the last two years through EIA regulations [6-8]. Hence, by adopting *gemba* philosophy and discussing each of the regulation with the EIA practitioners, the CSM was created and shown in Fig. 1(a). Since our research

focuses on the citizens' participation, the other activities which do not involve the citizens are assumed as the necessary value added activities. The average of the shortest and longest time is used in the timeline segment for value added calculation. Based on the following Fig.1 (a)., The first involvement of citizens begins when the project owner announces their company's proposed project to public. Project owner, besides able to use an ICT medium, have to announce the information through newspaper and physical notice board. Based on the experience, the shortest times to publish the information through newspaper and notice board mediums are a half day (720 minutes) and two days for the longest time needed (2880 minutes). The citizens could express their SOF within 10 days (14400 minutes) after the announced time. The second involvement of citizens can be captured in the public consultation/socialization. The EIA practitioners, based on the past situations, mention on 5 hours (300 minutes) for the longest time of this event and 2 hours (120 minutes) for the shortest time needed. A representative of the citizens is commonly selected in this phase. The third participation appears in EIA document review phase. However, only a representative of the citizen involve in the document review process. Briefly, it takes 5 hours (300 minutes) for the longest time and 2 hours (120 minutes) for the shortest one. The fourth and fifth involvements of citizens are in the SOF of environmental permit application announcement and in the environmental permit issuance announcement. Both phases have a maximum duration of 5 days (7200 minutes) and the citizens could deliver their SOF in 10 days (14400 minutes).

4.2. The future state map(FSM)

After observing the present state map and identifying the citizens' participation phases, the first reaction was to identify the *muda* in these processes. We used *gemba* philosophy to look upon the field situation. Based on the experience in the floor, many of the communication in projects were able to be channeled by ICT. Hence, transforming the physical based medium to electronic based medium will not be difficult. Since the frequent technologies used are web based and SMS based media, these technologies are suitable to facilitate the potential improvements as shown in Fig. 1(b). We identify 5 out of 6 phases to have a potential improvement. Specifically, only the participation of citizens' representative could not be replaced with ICT process. This is happening due to the review process has a complicated assessment and need a face to face discussion.

For the initial phase of citizens' participation, a combination of Web 1.0 with SMS-gateway or Web 2.0 with SMS-gateway can be used to announce the proposed project. In Persada, et al. [3] analysis, SMS based usage able to reduce the processing time for more than 87.5 percent of newspaper time and 60 percent of notice board process time. SMS based usage also had a dominant preference [3], by the 103 respondents with more than 63 percent. Hence, the reduction time is also captured in the FSM by reducing the announcement time into 76 minutes [3]. Although there is no evidence that mentions about the reduction time of web based system in the EIA process, this technology is able to reduce the steps needed by citizens, project owner and EIA-related agencies. At the citizens' point of view, they can simply post a private message of SOF in Web 2.0 system instead of manually writing a letter of SOF and post it through the mail. In the project owner perspective, the use of web based system able to help him/her to reduce the posting and collecting data efforts. The mentioned posting efforts, such as going to the newspaper agency and make a deal with the announcement, can be overcome by publishing the announcement through Web 1.0/Web 2.0. Moreover, web-based system not only can facilitate the announcement of the project owner, but also the announcement of permit application and permit issuance by the EIA-related agencies. For the data record of SOF, project owner and EIA-related agencies surely able to organize and save the data better with Web 2.0 as well as SMS-gateway than when they organize and save a physical letter. In the public socialization, a Web 2.0 based system able to reduce the effort of preparing the physical place/room and equipment for presenting the material. Furthermore, this

technology can save the cost of using physical paper as well as reducing the paper consumption in the form of physical copy of documents that will be distributed during a socialization and consultation.

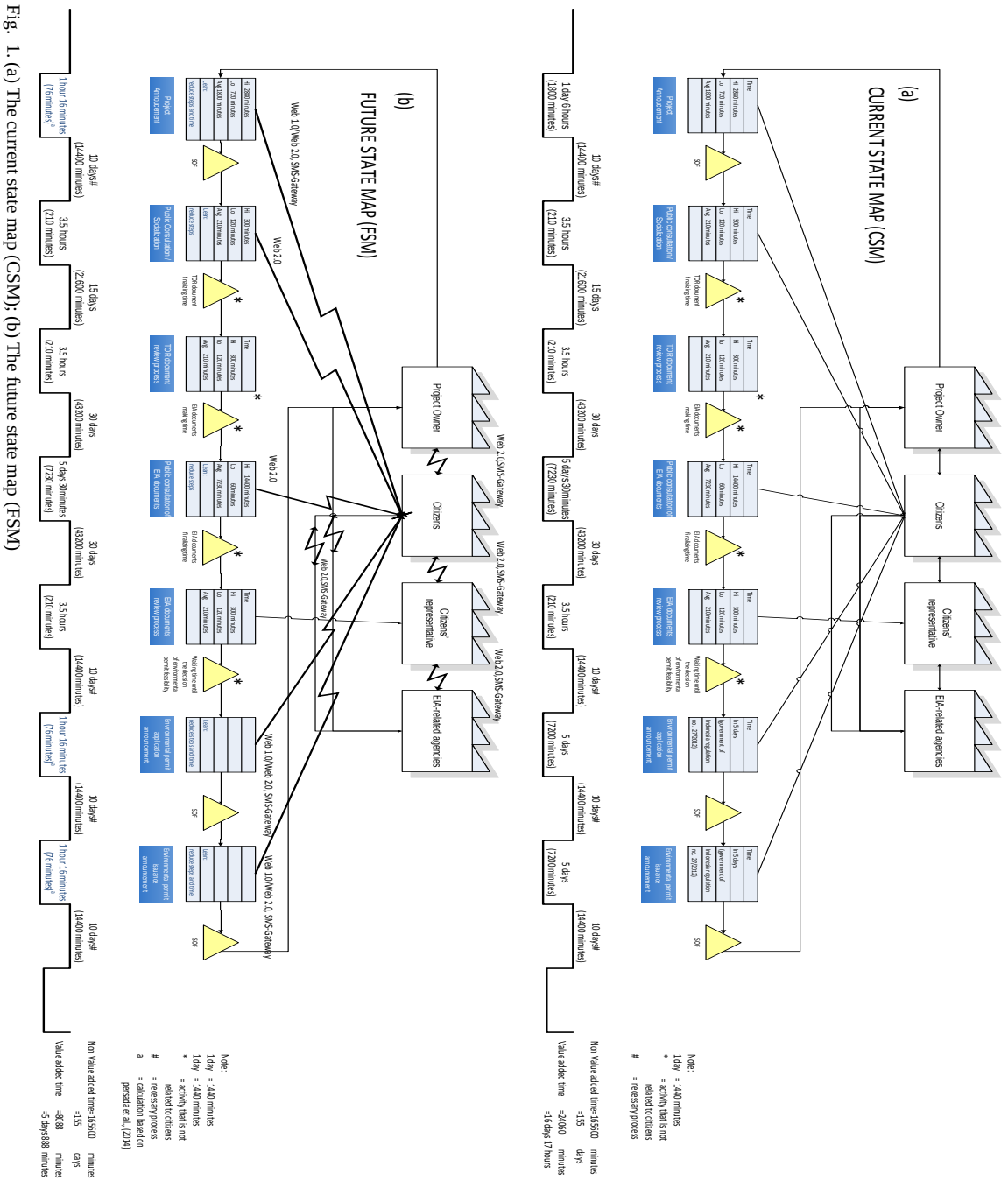

Fig. 1. (a) The current state map (CSM); (b) The future state map (FSM)

5. Conclusion

Public participation is important in the EIA to collect a precise and accurate data from the society that will be used as data analysis for EIA recommendation. In order to improve the participation process, a lean based analysis is performed. A CSM has been made to depict the EIA process based from the regulation. This research has identified several *muda* through *gemba* analysis, which are time and steps. A potential improvement, through a web-based system and the SMS-gateway, has been pictured in the FSM. From 6 phases of public involvement, 5 phases have lean improvement. The result of the FSM reveals how the Web 1.0 able to facilitate the announcement process as well as Web 2.0 able to facilitate the socialization and consultation. Moreover, Web 2.0 and SMS-gateway able to organize the SOF data better than when the process uses a physical paper. SMS-gateway is also captured to provide the improvement process through time reduction in the announcement process. Finally, this research provides the sustainable improvement with ICT in EIA process.

This research has a few limitations, where this situation only applies when the related city has e-government as a depiction on how the citizens familiar with ICT, especially web-based system and SMS-gateway. The second limitation is regarding the overall process besides the public participation process. Since this research only focuses on citizens' participation, the potential and undiscovered improvement in other steps is not captured. This limitation can be used as a main consideration to assess the overall EIA process with lean analysis. Adding some lean tools as the analysis is also suggested to expand the potential improvement of overall EIA process.

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