Social-Media based DSM for Strategic Decision Making: Corruption Case

Ditdit Nugeraha Utama

Abstract: Social-media is a communication media based on internet technology. It is a big virtual place where data and information could be practically mined. Furthermore, the data and information are able to be operated in research purposes. One of them, they could be mined to generate decision parameters. This study operated social media to dig all clues in topic corruption. They then generated to become decision parameters that are ready to be involved in to the model. Decision support model (DSM) was constructed scientifically based on two main methods; fuzzy logic and mathematical model. They were functioned respectively to eliminate a bias characteristic of parameters value and calculate the quality of corruption handling and propose the most objective strategic decision to solve the problem, particularly in Indonesia. The model was able to simulate the decision alternative measurement and propose the best decision of several strategic decision alternatives.

Keywords: DSM, corruption, social media, fuzzy logic, strategic decision, Indonesia.

I. INTRODUCTION

Indonesia faces a great problem. It is a corruption case. For several years, government, also other institutions in each government department and Indonesian people, have been trying to find the right formula to answer this problem. However, it is still like a disease that has no medicine to treat. Komisi Pemberantasan Korupsi / KPK, a commission for erasing the corruption in Indonesia, is one independent institution that has main responsibility to solve the problem, also has not been able to answer the problem effectively yet. Whereas, the corruption could be interrelated negatively to other sectors, including economic development [1][2].

On the other hand, social-media plays an imperative role, particularly to disseminate data and information. Several researchers have operated this media for their research purposes. [3] conducted a study to explore social-media influencing an employee performance. The qualitative study determined that social-media is able to create synergies to enhance an employee performance in working. [4] investigated the impact of social-media on perception of food-related content. The study result said that the Facebook is a popular social-media used for finding recipes. Social-media also could be a factor in what people eat. [5] operated a social-media in decision support model (DSM) construction for making a strategic decision particularly in solving a problem of waste management in Indonesia. Also [6] performed a study by operating a social-media Twitter to crape a users’ tweets to see commerce behavior and predict the tax-income for Indonesia. The model was constructed based on Python programing.

This study conducted to develop a DSM that is able to decide a strategic decision to solve the corruption problem based on social perception extracted from social-media. It is similar to what [5] did, however there are several parts strengthened, particularly in analysis aspect and model verification. Also, in this study, the corruption case in Indonesia is a problem taken to solve academically.

II. LITERATURE REVIEW

Corruption was defined in many fashions. Simply, it is able to be well-defined as “an abuse of public power for private benefit”. It is not original sensation to any further extent. It has been appealing a lot of notice around the world now [7]. Furthermore, the corruption could be interdependently destructively to other economic development segments [1][2] practically and it is possibly able to destroy one nation’s existence.

III. RELATED WORKS

In the similar research domain, DSM, there are numerous researchers have conducted a study. They functioned a social-media as a research object to deeply study. As revealed before, [5] expended a social-media in academically creating a DSM that is able to suggest an objective decision for solving waste management problem in Indonesia. The mathematical and fuzzy logic are two main methods exploited here. Correspondingly, [6] constructed a text-mining model to extract Twitter users’ tweet that is able to be used to envisage the online commerce behavior and tax-income.

Furthermore, [8] constructed a decision making model for improving sustainable supply chain capabilities particularly in textile industry. In this research, social-media operated to extract and measure qualitative and quantitative data in building a hierarchical structure as new capabilities of sustainable supply chain; such as outbound logistics flexibility, market-oriented perception, partner development, etc. Then, [9] proposed a decision making model based on data retrieved via social-media. The interval majority aggregation operator used to construct the model. The model has been implemented in real case where it was according to the market.

IV. RESEARCH METHODS

Four simple steps were followed to perform the study. They are represented in Fig. 1. The first stage is a literature studying. Here, the method of systematic literature review was functioned methodically. The online scientific literature database used here was sciendirect.com. Several scientific manuscripts that related to the research topic were successfully collected and deeply reviewed.
The objective of the first stage is to obtain the comprehensive understanding of research domain we were studying. The second stage is parameter determining based on hot issue. By using social-media quantitative analysis tool (i.e. talkwalker.com), the candidates of parameter were able to be found based on hot issue keyword. At this point, the hot issue keyword benefitted in seven days searching (from 11 September 2019 until 18 September 2019) was "korupsi" ("corruption" in English). Five types of media were involved (i.e. news, blogs, forum, Twitter, and Youtube). Also, the specific country Indonesia and language Bahasa were conclusive categories functioned to explore the parameter candidates.

Then parameters were fruitfully determined. At this time, the relative mathematical measurement was conducted. To verify them, the systematic literature review was method operated again. Venn diagram used to find the final parameters based on social-media perception and academic literatures, here the social-media users’ perceptions and academic references functioned to create the parameter coefficients. Thus, the parameters determined finally became academic-proven parameters and ready to be benefited in constructing the model.

Thus, six parameters would be involved into model listed in Table 1. Where the coefficient is value coming from priority-value merged between user perception in social-media and number of literature successfully defined (from sciencedirect.com literature database). Then, the parameters determined were used as decision alternatives. The civilian perception (CP), coming from little sample data collected via online survey, is processed via fuzzy logic; where CP functioned to become crisp input (CI) value. By using conception of fuzzy logic and also operating fuzzy rule base Code 1, the crisp output (CO) produced. The fuzzy membership function for decision value / DV operated like in [5], where IM means “improved” (0, 25, 75), and MA means “maintained” (25, 75, 100). CO value is performed to become input of decision mathematical-model. The fuzzy membership function used for fuzzy logic process here is balanced triangular; with membership function types are very low / VL (0, 10, 30), low / L (10, 30, 50), medium / M (30, 50, 70), high / H (50, 70, 90), and very high / VH (70, 90, 100). The fuzzy triangular membership function for CP is configured in Fig. 3.
Based on $CO_i$, the quality of corruption problem handling in Indonesia is 46.99 (with value range in between 0.00 until 100.00). It is taken from equation (1) with data in Table 2; where $Q_{CH}$ is a quality value for corruption handling in Indonesia, $\alpha$ represents a perception value of independent institution to handle corruption case in Indonesia, $\beta$ is a perception value of law enforcement for solve the corruption problem, $\gamma$ denotes a perception value of system that is able to contribute in solving a corruption problem, $\delta$ symbolizes a perception value of societies’ behavior represents anti-corruptive behavior, $\epsilon$ signifies a perception value to describe the societies’ spirit level in corruption solving, and $\theta$ is a value perception of the leadership belong to societies’ leader in solving corruption problem in every level of societies’ life.

$$Q_{CH} = 0.25 \alpha + 0.22 \beta + 0.19 \gamma + 0.15 \delta + 0.13 \epsilon + 0.06 \theta$$

(1)

The highest priority to be treated in erasing a corruption problem in Indonesia is “corruptive behavior” (please see Fig. 4 regarding decision priority value / $DPV$). The all level of society and also education institution have the highest responsibilities to it. The $DPV$ itself is coming from calculation by using formula of relative-minimum calculation in equation (2); where $DPV_i$ is a decision priority value for $ith$ decision alternative and $CO_i$ signifies a value of crisp output for $ith$ decision alternative.

$$DPV_i = \frac{\min (\theta CO_i \alpha \epsilon \gamma \beta \delta \alpha)}{CO_i}$$

(2)

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter / Decision Alternative</th>
<th>CP</th>
<th>Fuzzy value for CP</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Independent Institution</td>
<td>74.44</td>
<td>0.78 H</td>
<td>75.00</td>
</tr>
<tr>
<td>2</td>
<td>Regulation / law enforcement</td>
<td>54.44</td>
<td>0.78 M</td>
<td>36.00</td>
</tr>
<tr>
<td>3</td>
<td>System</td>
<td>52.22</td>
<td>0.89 M</td>
<td>30.50</td>
</tr>
<tr>
<td>4</td>
<td>Behavior</td>
<td>45.56</td>
<td>0.22 L</td>
<td>25.00</td>
</tr>
</tbody>
</table>

Table 2. Parameters value from civilian perception.

The entity relationship of the constructed model is delivered via class diagram (Fig. 5). The diagram describes the high level of the constructed model configuration. Eight classes are main entities of the model. They are Indonesian Society, Comment, Perception, Social Media User, Non Social Media User, Social Media, Issue, and Analyzed Parameter. The model is able to retrieve value of parameter coefficient and perception value to be generated as priority value. Parameters play as decision alternative evaluated via attribute perception Value in class Perception.

B. Model Limitations

Parameters use as decision alternatives looks poor, although it is possible-scientific to do. It is going to be better, if one activity to find the decision alternatives from the selected parameter done. Then, the alternatives are going to be tested as a proposed objective decision. For example, based on the selected aspect “behavior”, several decision alternatives are able to be generated; e.g. curriculum implementation, punishment execution for rule breakers / scofflaw; etc. where, the expert-judgment is able to be engaged to do so. Then, the other sub-model could test them to propose the most objective decision.

VI. CONCLUSION AND FURTHER WORKS

DSM based on social-media focusing to solve a problem of corruption in Indonesia was positively developed. Six parameters that entirely analyzed via operating keyword “korupsi” to search and scientifically determined via academic references were converted to become decision alternatives. Fuzzy logic was main method for parameterizing; the fuzzy rule base was functioned to evaluate the decision alternatives to find the most objective decision to take. In this model, the most objective decision is a decision that has the highest decision priority value. Here, behavior is an aspect to be improved for resolving the corruption problem in Indonesia.
The limitation of the model is regarding decision alternatives as parameters. One step more should be done to discover the decision alternatives to be tested based on selected parameter. Commonly, the decision is different to parameter that involved in the model.

Defining the further decision alternatives is challenging. This issue is possible to do for next study. Moreover, the mathematical-interconnection among parameters should be explored more. It is going to be fruitful to depict the firmly mathematical model, where it will give more accurate measurement’s result. Also, the boarder date-range and other computational-intelligence technique use for extracting data from social media is possible to do in the further research.

Fig. 5. Identified Parameters with Venn-Diagram

REFERENCES

AUTHORS PROFILE
Didit Nugeraha Utama is a faculty member of Computer Science Department, BINUS Graduate Program – Master of Computer Science, Bina Nusantara University, Jakarta, Indonesia. He graduated from Mathematics and Informatics department of Doctoral Program in Göttingen University, Germany; where his doctoral-research conducted in environmental-informatics field specifically. His research interest is regarding decision support model for solving several cases of decision making problem.