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 interdepended 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.

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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, forums, 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.
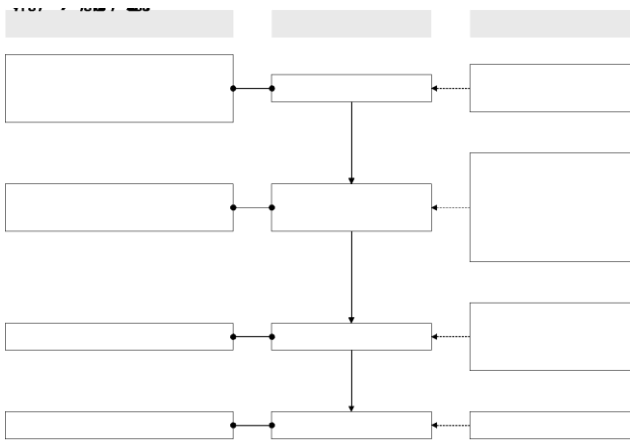

Fig. 1. Research Stages

The last two stages are a model constructing and testing (stage 3 and 4). In constructing model, mathematical and fuzzy logic [10] operated dominantly. Mathematical method benefited to explore quantitative model and fuzzy logic functioned to avoid a bias value for each parameter value involved. Finally, experimental testing used to check the constructed model. All data operated in the experiment coming from questioner randomized participants' perception regarding corruption problem solving in Indonesia. The modeling result is able to suggest a decision to solve the problem. The decision is the most objective decision (via decision priority value), because the model constructed academically (based on academic methods) and parameters involved scientifically verified (based on academic references).

V. RESULT AND DISCUSSION

A. The Constructed Model

All parameters involved in the model are able to be seen via Venn diagram in Fig. 2. Indeed, five types of insight and perception were successfully identified from social-media via deeply analyzing (blue Venn). These insights and perceptions are all comments (both negative and positive) coming from users' comment in five kinds of social-media (i.e. news webs, blogs webs, forums, Twitter, and Youtube). All perceptions were academically verified via reviewing several literatures correlated strongly with corruption issue. However, there is one issue was not discussed in social media. It was coming from academic literatures [11][12][13][14][15].
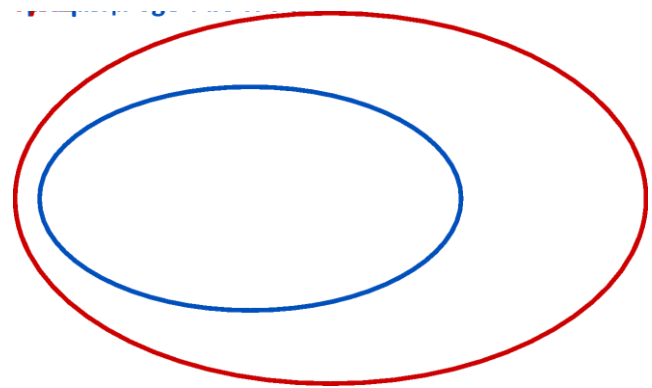

Fig. 2. Identified Parameters with Venn-Diagram

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 symbolizes "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.

Table 1. Parameters of model and their coefficient.

No	Parameter	Reference	Coefficient
1	Independent Institution	[16]	0.25
2	Regulation / law enforcement	[17][18]	0.22
3	System	[11][12][13] [14][15]	0.19

4	Behavior	[19][20][21]	0.15
5	Spirit	[12]	0.13
6	Leadership	[22]	0.06

Code 1. Fuzzy Rule Base

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IF (CP is VL) OR (CP is L) OR (CP is M) THEN
    (DV is IM)
ELSEIF (CP is H) OR (CP is VH) THEN
    (DV is MA)
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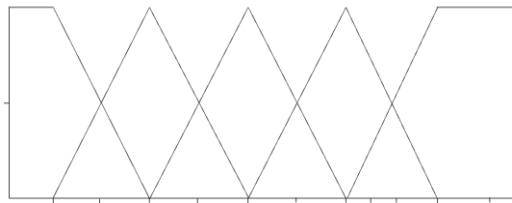

Fig. 3. Triangular Fuzzy Membership Function for Civilian Perception

Based on CO, 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, α represents a perception value of independent institution to handle corruption case in Indonesia, β is a perception value of law enforcement for solve the corruption problem, γ denotes a perception value of system that is able to contribution in solving a corruption problem, δ symbolizes a perception value of societies' behavior represents anti-corruptive behavior, ε signifies a perception value to describe the societies' spirit level in corruption solving, and θ is a value perception of the leadership belong to societies' leader in solving corruption problem in every level of societies' life.

$$Q_{CH} = 0.25\alpha + 0.22\beta + 0.19\gamma + 0.15\delta + 0.13\varepsilon + 0.06\theta \quad (1)$$

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.

$$DPV_i = \frac{min\,(CO_{1..n})}{CO_i} \quad (2)$$

Table 2. Parameters value from civilian perception.

No	Parameter / Decision Alternative	CP	Fuzzy value for CP	CO
1	Independent Institution	74.44	0.78 H / 0.22 VH	75.00
2	Regulation / law enforcement	54.44	0.78 M / 0.22 H	36.00
3	System	52.22	0.89 M / 0.11 H	30.50
4	Behavior	45.56	0.22 L / 0.78 M	25.00
5	Spirit	66.67	0.17 M / 0.83 H	66.50
6	Leadership	53.33	0.83 M / 0.17 H	33.50

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 IndonesianSociety, Comment, Perception, Social MediaUser, 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.
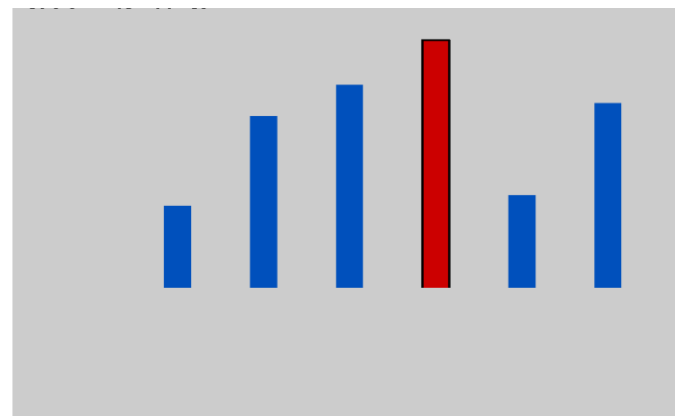

Fig. 4. Decision Priority Value for each Decision Alternative

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 firmed 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.
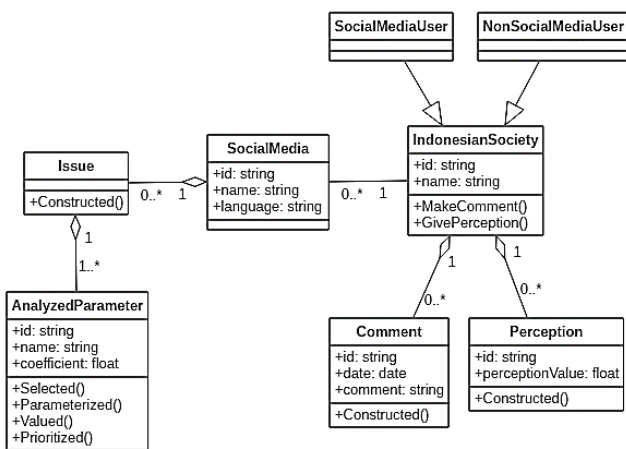

Fig. 5. Identified Parameters with Venn-Diagram

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