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Modelling the Measurement of Engagement Index of the Regional Governments' Social Media in Indonesia

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ABSTRACT

Several types of engagement index and its variables can predict the engagement index of social media. However, no research has yet to use Structural Equation Modelling to model the engagement index of the variables from the prior researchers. This study was conducted to test the metrics of social media including like, comment, share and reply towards the online engagement variables that are measured by its affective engagement, cognitive engagement and behavioural engagement. The results indicate that the reply from the admin variable is the most significant factor in creating engagement on the social media of the Local Governments in Indonesia. This will then be used to increase the engagement index of the local governments in Indonesia.

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1. INTRODUCTION

Social media has become a means of communication that offer speedy coverage and public involvement. However, the advantages that this technology is offering has not always received the warmest welcome by some social elements, such as the government's institutions [1], especially the regional government. It is supported by the fact that out of 530 regional governments in Indonesia, less 50% has their social media. The central government has commanded the regional governments to alter the way they broadcast information and the way they communicate by using website 2.0 (social media) instead of website 1.0 [2]. The policy issued by the central government has not yet been successful in practice. Thus, the result of its implementation is not yet significant. Therefore, an evaluation of the social media run by the regional governments is needed to shed lights on the quality of the public's engagement based on comprehensive measurement. The metric of the measurement can be obtained by using the social media engagement index's parameter; a metric related to what extent the social media accounts run by the regional governments attract public's attention and develop interactive correspondence by using features such as click, like, comment and share provided within the social media (Wallace, 2014 in [3]).

Several studies on engagement index have been conducted in which the parameters were adjusted. Gruzd et al. [4] used likes and reply on every post of the Facebook page, while Faber et al. [5] used the number of reply on Twitter and in [6] authors conducted a direct survey related to the content of the posts posted on Facebook and Twitter. Meanwhile, Bonsón and Ratkai [7] and Bonsón et al. [8] designed and referred to an expert for validation of the metric of engagement index which parameters used were the number of followers, likes, the total number of post, and share; these were then classified into three variables namely popularity, commitment and virality.

Engagement itself is a latent variable; a variable which cannot be measured directly. This is the reason why other indicators/dimensions are required to measure the engagement. Based on the pointers of the variables which have been frequently used to carry out prior researches on engagement index, metric variables will be retested by using Structural Equation Modelling (SEM) on the social media run by the regional governments in Indonesia. No research has yet to retest the variables of online engagement on social media since the majority

support the findings of research that used measured variables such as like, comment, and share [7]. There are limited numbers of quantitative studies on the retesting of engagement index variables since the focus of most researches is to the engagement variable and try to predict the other variable [9]. However, there is a possibility that what has been achieved in the previous researchers cannot be proven model-wise due to the lack of tests that suit particular states of the objects.

In this paper, we propose an objective engagement index metric based on significance variable only. SEM model will create a structural model and significant variable towards the engagement index on the social media run by the regional governments. Then, the results will be used as the metric of the engagement index of social media. This research is to gain an objective engagement index that can help with the assessment and evaluation of the performance of the social media accounts managed by the regional governments in Indonesia.

2. METHOD

2.1. Data Resource

This research used two primary data. The first one was obtained by distributing questionnaires that used purposive sampling. This was conducted both in-person and on the internet. The data were collected for five months from June 13th, 2019 to November 10th, 2019. Out of 247 respondents, only 115 respondents met the requirements of the questionnaires while the other 132 respondents did not pass the filtered question (it must be active local government social media followers now less than one month). The other primary data for simulation were gathered from three social media platforms – Twitter, Instagram and YouTube. The data were obtained from the social media of the regional governments by researching them through 530 official websites of the autonomous regional institutions, including 34 provinces, 415 regencies and 93 cities.

2.2. Research Variable

The exogenous variable of this research is represented by popularity, commitment, virality and response; according to [5] [7] [8] [10] [11] [12]. An endogenous variable is represented by affective engagement, cognitive engagement and behavioural engagement [13].

Table 1. Research Variables

Indicators	*Signs*	Notes
Popularity	M_1	Represented by *Likes*
Commitment	M_2	Represented by *comment*
Virality	M_3	Represented by *share*
Response	M_4	Represented by *reply admin*
Affective Engagement	E_1	The assessment of the behaviour and engagement value
Cognitive Engagement	E_2	The assessment of the engagement related to the intellectual potential
Behavioural Engagement	E_3	The assessment on the engagement related to sharing, learning and supporting

2.3. Stage of the Research

In general, the stages of the research are as follows:

- Collecting samples from the respondents using Likert scale of 1-5 (Strongly Disagree, Disagree, Somewhat Agree, Agree, Strongly Agree)
- Structural Equation Modelling (SEM) was carried out using the following stages
  a. Carrying out a validity test on the questionnaires
  b. Checking for outliers
  c. Checking for missing data
  d. Carrying out normality test on the data
  e. Carrying out the multicollinearity test of the correlation between endogenous and exogenous variables
  f. Conceptualizing the structural model
  g. Carrying out confirmatory factory analysis and pooled confirmatory factor analysis in order to do validity and reliability test of the latent variable
  h. Modifying or respecifying the model if the GoF value is not fit

- Crawling the data of the social media from the variables that have been proven significant towards the engagement of the social media of the regional governments
- To rank the engagement index of the social media of the regional governments; it is divided into two scenarios that are the ranking based on the social media, and the other one is based on the engagement

index from three social media (Twitter, Instagram and YouTube) combined.

- Drawing conclusion

2.3. Analysis Technique

AMOS Version 24.0 and SPSS Version 26.0 were used to develop the structural model within Structural Equation Modelling (SEM). Meanwhile, data collection technique to gather the data from social media – such as the likes, comments, and shares – were carried out using API (YouTube and Twitter) and Phyton Scraper Library (BeautifulSoup and Selenium). It was then converted to .csv file.

3. RESULTS AND DISCUSSION

3.1. Descriptive Analysis

Based on the respondents' answers, as shown in Figure 1, 82% of the respondents follow the Instagram of the regional governments. In comparison, 8% follow their Facebook, 9% follow them on Twitter, and only 1% follow them on YouTube. The results, as shown in Picture 1, is relevant to the fact that 51% of 530 regional governments have Instagram accounts; compared to the other social media platforms like Facebook, Twitter and YouTube. Although Facebook revealed on the second rank from the Figure.1, Facebook was not included in this study due to Facebook's API access restrictions after the Cambridge Analytica case in 2018. It makes Facebook data mining extremely hard and illegal.

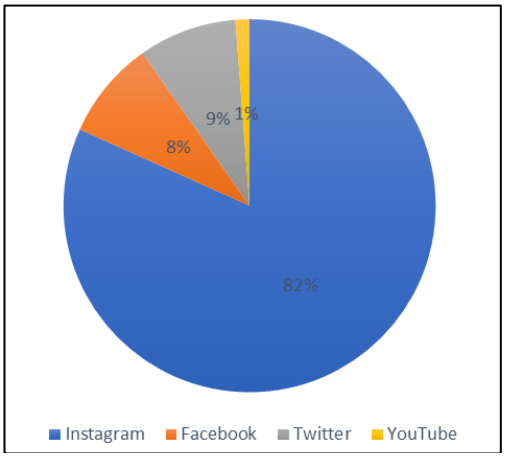

Figure 1. The distribution of the kinds of Social Media followed by the respondents

3.2. Initial Data Evaluation

Prior to estimating the structural model, data were examined to rule out outliers and data normality test were carried out. There was no outlier found based on the Z-score on each variable. There was also no missing data found during the missing data evaluation. In addition to that, there were no variables that were out of the range of abnormal data during the normality test using skewness and kurtosis values. Therefore, the data were modelled using the structural model and the estimated engagement model of the social media of the regional government was drawn.

3.3. Model Estimation

Model estimation was created in several stages; confirmatory factor analysis first order and pooled confirmatory factor analysis. The results from CFA first order show that all indicators of the exogenous variable (Social Media Behaviour covering the popularity, commitment and virality) are valid. However, the endogenous variable of cognitive engagement is deemed invalid because its CR value is less than 0.7. The indicators that can describe the variables are M1.1, M1.3, M2.2, M.2.3, M3.1, M3.2, M3.3, M4.1, M4.2, M4.3, E1.1, E1.4,E2.1,E2.2, E3.3, E3.4, E3.5, E3.6, E3.7 dan E3.8. Then, all these indicators were made as conceptual models that the final result of the conceptual model could be obtained and shown in Figure 2.

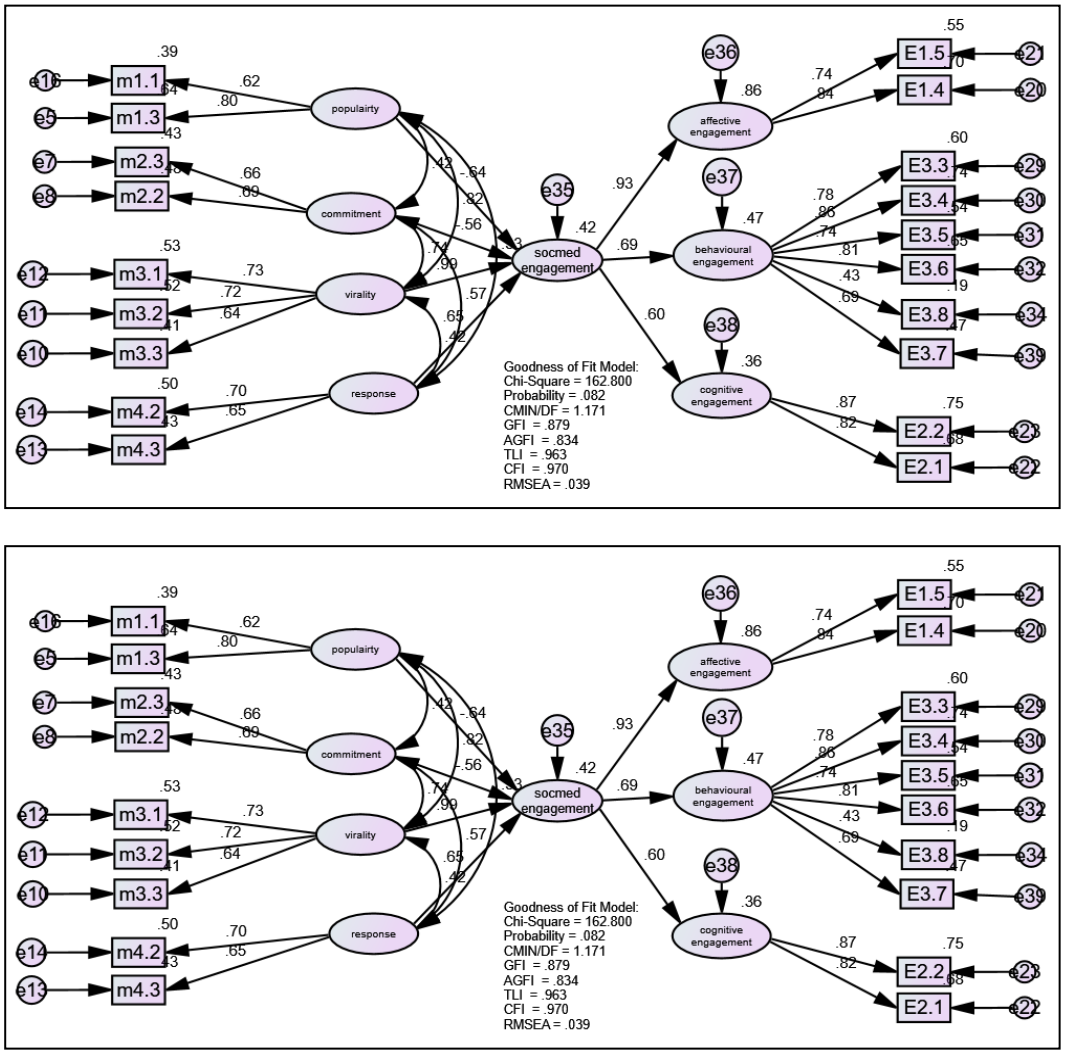

Figure 2. *Structural Equation Modeling* (SEM) Final Model with The Best *Goodness of Fit*

Table 2. The Results of Significance Test of the Variables

Causality Relation	*Estimate*	*S.E.*	*C.R.*	*p-value*
Popularity → *Social Media Engagement*	-0.602	0.696	-0.865	0.387
Commitment → *Social Media Engagement*	-0.479	0.596	-0.804	0.422
Virality → *Social Media Engagement*	0.911	0.994	0.916	0.360
Response → *Social Media Engagement*	0.780	0.374	2.086	.037

Based on Table 2, the result of a hypothesis test of the formed models shows that there is a significant relationship which is indicated by the CR value (more than 1.96) and the p-value (less than 0.05). It can be concluded that only *response* variable that gave out significant positive effect towards social media engagement. It means that the higher the *response* of the social media administrator of the regional governments, the higher the public social media engagement on the internet. Meanwhile, it can be concluded that the other variables such as popularity, commitment and virality do not have causality related to the variable of social media engagement. Thus, *the response* is the only variable used in ranking the engagement index of social media of the regional governments.

This finding is relevant to the theory of dialogue creation strategy on the internet as suggested by Axyan [14] [15]; there is hope that the dialog between the government and society will be developed directly that both can actively contribute online in order to support the governments in the regions. The word 'dialog' means two-ways communication between society and the owner of social media. It means that the engagement of the society to a social media is formed by the *comment* element provided by the public and is replied using

reply by the social media administrator. In other words, the public highly appreciates the responses provided by the administrators on the comments of the posts.

This research shows that public is significantly more interested or engaged to the comments on the social media of the regional governments that were directly replied by the administrator; the replies indicate that the messages, complaints and suggestions are heard and responded. Furthermore, in [16] authors suggested that the reply to a comment can retain followers or stakeholders, and it will help them gain more new followers or stakeholders. It clarifies why respondents consider *reply from the administrator* is important, especially for the social media accounts owned by the regional governments.

3.3. Ranking Engagement Index

Following is the result of the Engagement Index ranking of the social media owned by the regional governments based on the numbers of reply from the administrators. Figures 3, 4 and 5 are the visualizations of engagement index values based on social media (i.e. Twitter, YouTube and Instagram). Special Capital Region of Jakarta has the best engagement index on Twitter, while Kediri Regency and West Java Province have the best engagement index for YouTube and Instagram, respectively.

Figure 3. The Rank of Engagement Index of Regional Governments' Twitters

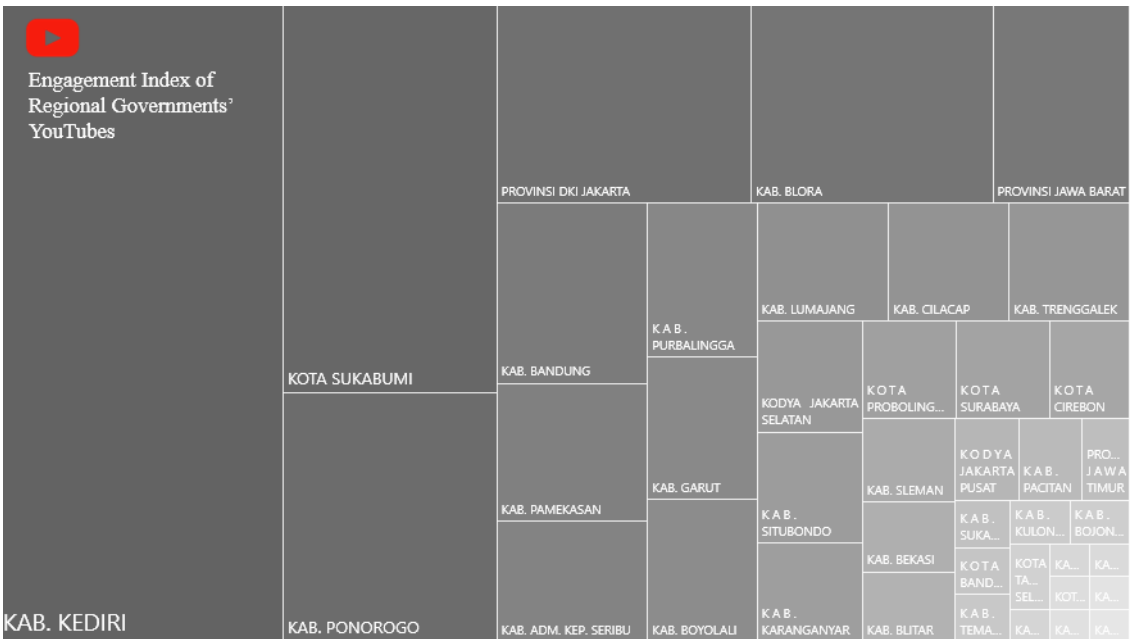

Figure 4. The Rank of Engagement Index of Regional Governments' YouTubes

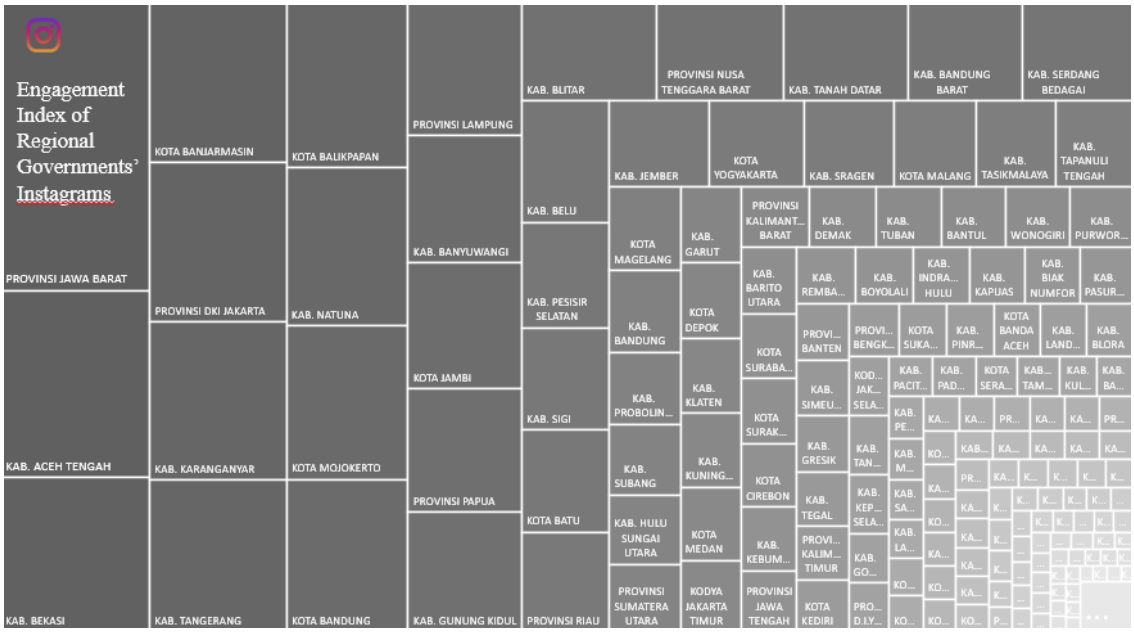

Figure 5. The Rank of Engagement Index of Regional Governments' Instagrams

In order to carry out the simultaneous measurement for these three social media using the number of replies, data normalization was implemented by using Z-score within this formula

$$N(EI) = \frac{E_{lama} - \text{Mean}}{stdev} \quad (1)$$

An example of the calculation:
The engagement index of West Java Province for Twitter is 125, so if it is normalized, the calculation will be as follow:

$$N(EI)_{Twitter\ Jawa\ Barat} = \frac{125 - 39.89}{181.93} = 0.468 \quad (2)$$

Hence, the result in Figure 3 shows that the Special Capital Region of Jakarta, Kediri Regency and West Java Province are the regional governments that put serious effort in developing communication with their citizens.

Table 3. Engagement Index (Twitter, Instagram dan YouTube) Rank for Twenty Local Governments in Indonesia

Local Governments	$EI_{Twitter}$	$EI_{Instagram}$	$EI_{Youtube}$	$N(EI_{Twitter})$	$N(EI_{Instagram})$	$N(EI_{Youtube})$	EI
Provinsi DKI Jakarta	2826	619	39	15.31	5.00	5.01	8.442
Kab. Kediri	35	30	140	-0.03	-0.07	18.34	6.079
Provinsi Jawa Barat	125	1230	21	0.47	10.27	2.63	4.456
Kota Sukabumi	638	72	64	3.29	3.29	0.29	8.31
Kab. Sleman	1682	0	6	9.03	-0.33	0.65	3.116
Kab. Karanganyar	502	614	8	2.54	4.96	0.92	2.806
Kab. Bekasi	106	656	5	0.36	5.32	0.52	2.069
Kab. Aceh Tengah	0	790	0	-0.22	6.48	-0.14	2.040
Kab. Gunung Kidul	541	386	0	2.75	3.00	-0.14	1.871
Kota Depok	880	130	0	4.62	0.79	-0.14	1.757
Kota Yogyakarta	712	232	0	3.69	1.67	-0.14	1.742
Kota Bandung	173	528	2	0.73	4.22	0.13	1.692
Kab. Tangerang	105	593	0	0.36	4.78	-0.14	1.666
Kab. Ponorogo	11	3	41	-0.16	-0.31	5.27	1.603
Kab. Blora	0	69	37	-0.22	0.26	4.47	1.596
Kota Banjarmasin	0	632	0	-0.22	5.12	-0.14	1.586
Kota Tangerang	929	0	0	4.89	-0.33	-0.14	1.473

Local Governments	$EI_{Twitter}$	$EI_{Instagram}$	$EI_{Youtube}$	$N(EI_{Twitter})$	$N(EI_{Instagram})$	$N(EI_{Youtube})$	EI
Kota Balikpapan	0	579	0	-0.22	4.66	-0.14	1.434
Kota Surabaya	576	103	7	2.95	0.56	0.79	1.430
Kab. Sragen	547	218	0	2.79	1.55	-0.14	1.399

4. CONCLUSION

Based on all the research stages, the process of data collection, data analysis and data processing to model the engagement index of social media owned by regional governments in Indonesia can be summed up as follows:

- Based on Structural Equation Modelling (SEM), responses that consist of reply is the only variable that has a significant effect on the engagement index of social media owned by regional governments in Indonesia.
- The metric of engagement index of social media owned by regional governments in Indonesia is divided into two scenarios: the first one is the measurement based on particular social media (i.e. Twitter, Instagram and YouTube) and the second one is combining the measurements of the three social media based on response value (it was used as the measurement of normalization engagement index). Based on these, it can be said that every regional government has different performance across these three socials media. Every regional government has its preference and priority in optimizing the performances of their social media. For instance, West Java's Instagram is well-performed, but that is not the case for its other social media.
- The most measured social media to measure the metric of an engagement index is Twitter since the flexibility of data collection from Twitter can be done well. However, for Instagram and YouTube, this could be challenging due to some restrictions. From the challenges in conducting this research, these following suggestions are to be considered in conducting further research:
- This research can only be used to measure the rank of the engagement index of social media owned by the regional governments in Indonesia because of the limitation of respondents that were only from followers of social media owned the regional governments in Indonesia. For further research, a case study on social media, in general, can be proceeded.
- The research can be further developed into qualitative research towards the findings of the structural model; thus, it can further validate the findings.
- Variation of the sample can be added into the structural model by taking the samples from across regions in Indonesia or, if possible, to get the active followers on the social media of the regional governments to part take.
- Because of some restrictions on retrieving the data, it is suggested that further research can attempt to get them all data and elements needed from Instagram or YouTube.

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