

Community Strategy for Managing Tropical Forest Resources in the Area of Cagar Alam Pulau Sempu (Nature Reserve of Sempu Island)

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Abstract—Management of Cagar Alam Pulau Sempu (The Nature Reserve of Sempu Island) as ecotourism can increase community life in surrounding it. The objects of this study were to 1) knowing community's knowledge about management at the Nature Reserves of Sempu Island as ecotourism, 2) knowing community's participation to supporting management at the Nature Reserves of Sempu Island as ecotourism, and 3) knowing correlation between knowledge and participation in supporting the management of Sempu Island as ecotourism. Data collections were interviews and questionnaires with *Guttman Scale* which made by researchers and had been tested its validity and reliability. All questions in questionnaire is valid and 100% reliable. Samples for this research were 30 local people at Tambakrejo village. Technique of selecting that samples was *accidental sampling*. Most of respondents are male in 21–40 years old and graduating from junior or senior high school which are indigeneous and andong people. Based on normality and homogeneity test, data is homogeneous. It is not distributed normally so hypothesis test using non-parametric correlation of *Spearman*. Significant value $0.000 < 0.05$ so H_0 is rejected. Correlation between knowledge and participation is in strong category with *Spearman's* correlation coefficient (R) = 0.732. The conclusions of this study are the highest score of community's knowledge is 97% and its lowest score is 6,7%, the highest score of community's participation is 97% and its lowest score is 20%, there is correlation between community's knowledge and community's participation in the management at Nature Reserve of Sempu Island as ecotourism.

Keywords—management strategy, tropical forests, Nature Reserves of Sempu Island, ecotourism, knowledge, participation.

INTRODUCTION

Indonesia's forests are the largest tropical forest in the world and occupying the second place in levels of biodiversity. Functions of forest are protecting the climate and atmosphere; powering the good effect providing natural beauty; as laboratories for science, education and tourism; and as national development strategies. It can be in the form of nature reserves, wildlife, hunting parks and theme parks.

Sempu Island is a protected forest because it has status as nature reserves. Nature Reserves of Sempu Island has rich flora ecosystem which is still fairly high. Even some types that exist in the level of "dangerous" and "protected" also found. It is based on the value of the qualification types of flora is 87% which are included in the category of "unique" and "very unique". This condition explains that Nature Reserves of Sempu Island has a level of extinction and a fairly high level of endemism [1].

Community in generally understand that as a nature reserve, Sempu Island absolutely should not be disturbed by any activity other than research. Economic pressure and no other jobs become one of factors to managing the Nature Reserves of Sempu Island as an ecotourism to supporting the community economics. Forest which is used without the proper management of environment will decrease the quality of human dwellings [2].

Interaction between human and their environment will collateral with knowledge about that environment. It means that knowledge just giving guidance to participation in way of positive or negative [3]. Knowledge and participation of community about management strategy are important to evaluate and improving the management of Sempu Island as ecotourism.

Based on that problems, the objects of this research were to 1) knowing community's knowledge about management at the Nature Reserves of Sempu Island as ecotourism, 2) knowing community's participation to supporting management at the Nature Reserves of Sempu Island as ecotourism, and 3) knowing correlation between knowledge and participation in supporting the management of Sempu Island as ecotourism.

METHODS

This research was conducted at Tambakrejo village, Sumbermanjing Wetan, Malang regency at March 18–19 2015. Samples for this research were 30 local people at Tambakrejo village. Technique of selecting that samples was *accidental sampling* [4] because they were selected accidentally when met with researcher.

Instruments for collecting data are the questionnaire of knowledge and the questionnaire of participation which had been tasted to 30 people at March 14 2015. The location and responden for trial were different from location and respondents for collecting data (Fig 1).



Location of testing the questionnaire (red circle) and Location of research questionnaire (yellow circle)

Fig 1. Location of data collection

Location of data collection

This study was an inductive research which focus on observation to taking the conclusion for decided how the conclusion was obtained. This research was kind of quantitative research because data from questionnaire is analyzed with statistics. Variables of this study is showed in Table 1.

The results of validity test for questionnaire of community's participation in Table 3 show that correlation each question with item total is 0.022, 0.017, 0.025, 0.000, 0.002. It has significant value < 0.05 , so 5 questions in the questionnaire of community's participation in managing the Nature Reserve of Sempu Island as ecotourism are valid.

Questionnaire then tested the reliability using *Software SPSS 20*. The results of reliability test for questionnaire of knowledge and questionnaire of participation are showed in Table 4.

The results of reliability test in Table 4 show that all of questions in both of questionnaires are 100% reliable, so there are no questions which are *excluded*. Based on the results of validity test and reliability test, the questionnaires are valid and it can be spreaded.

Table 1. Variables of This Research

Variable	Indicators	Number of Question
Community's Knowledge	Management at the Nature Reserves of Sempu Island as ecotourism	1, 2, 3, 4, and 5
	Supporting factors of management at the Nature Reserves of Sempu Island as ecotourism	6, 7, 8, 9, and 10
Community's Participation	Inhibitor factors of management at the Nature Reserves of Sempu Island as ecotourism	11, 12, 13, 14, 15, 16, 17, 18, 19, and 20
	Concerting management at the Nature Reserves of Sempu Island as ecotourism	2, 3, and 4
	Managing the Nature Reserves of Sempu Island as ecotourism	5
	Repairing and konserving the Nature Reserves of Sempu Island as ecotourism	

Table 2. Results of Correlation Test for Questionnaire of Community's Knowledge

Spearman's rho	No	Correlation Coefficient Sig. (2-tailed) N	Item Total Correlation Coefficient Sig. (2-tailed) N
	No 1	0.433* 0.017 30	0.433* 0.017 30
	No 2	0.437* 0.016 30	0.437* 0.016 30
	No 3	0.416* 0.022 30	0.416* 0.022 30
	No 4	0.637** 0.000 30	0.637** 0.000 30
	No 5	0.463** 0.010 30	0.463** 0.010 30
	No 6	0.449* 0.013 30	0.449* 0.013 30
	No 7	0.437* 0.016 30	0.437* 0.016 30
	No 8	0.540** 0.002 30	0.540** 0.002 30
	No 9	0.417* 0.022 30	0.417* 0.022 30
	No 10	0.405* 0.026 30	0.405* 0.026 30
	No 11	0.380* 0.038 30	0.380* 0.038 30
	No 12	0.458* 0.011 30	0.458* 0.011 30
	No 13	0.405* 0.026 30	0.405* 0.026 30
	No 14	0.552** 0.002 30	0.552** 0.002 30
	No 15	0.408* 0.025 30	0.408* 0.025 30
	No 16	0.416* 0.022 30	0.416* 0.022 30
	No 17	0.441* 0.015 30	0.441* 0.015 30
	No 18	0.410* 0.025 30	0.410* 0.025 30
	No 19	0.481** 0.007 30	0.481** 0.007 30
	No 20	0.526** 0.003 30	0.526** 0.003 30
Item Total	1.000 Sig. (2-tailed) N	1.000 . 30	

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

The results of validity test for questionnaire of community's knowledge in Table 2 show that correlation each question with item total is 0.017, 0.016, 0.022, 0.000, 0.010, 0.013, 0.016, 0.002, 0.022, 0.026, 0.038, 0.011, 0.026, 0.002, 0.025, 0.022, 0.015, 0.025, 0.007, 0.003. It

has significant value < 0.05 , so 20 questions in the questionnaire of community's knowledge about management strategy at the Nature Reserve of Sempu Island as ecotourism are valid.

Table 3. Results Of Correlation Test For Questionnaire Of Community's Participation

Spearman's rho	No	Correlation Coefficient Sig. (2-tailed) N	Item Total Correlation Coefficient Sig. (2-tailed) N
	No 1	0.416* 0.022 30	0.416* 0.022 30
	No 2	0.433* 0.017 30	0.433* 0.017 30
	No 3	0.410* 0.025 30	0.410* 0.025 30
	No 4	0.720** 0.000 30	0.720** 0.000 30
	No 5	0.552** 0.002 30	0.552** 0.002 30
	Item Total	1.000 Sig. (2-tailed) N	1.000 . 30

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Data from survey was given score at each answer of questions then it was analyzed using *Crosstab* and descriptive statistics (test of normality and homogeneity). Normality test using *Saphiro-Wilk* in *Software SPSS 20* because the samples are less than 30. Data is distributed normally if significant value > 0.05 and it is homogenous if significant value > 0.05 . The results of that tests were used for deciding the next analysis.

Table 4. Results Of Reliability Test For Questionnaires

		N	%
Questionnaire of Community's Knowledge	Valid	20	100.0
	Excluded ^a	0	0.0
	Total	20	100.0
Questionnaire of Community's Participation	Valid	5	100.0
	Excluded ^a	0	0.0
	Total	5	100.0

a. Listwise deletion based on all variables in the procedure.

Hypothesis was tested using analysis of correlation. For knowing correlation between variable of knowledge and participation then used correlation test of *Rank Spearman* in *Software SPSS 20*. There are two step of that test. First, signification test is used to knowing correlation between variables. This research taken interval of confidence as big as 95 %. If significant value ≤ 0.05 , H_0 is rejected. In other way, if significant value ≥ 0.05 , H_0 is accepted. Second step, based on the result of correlation coefficient, strenght of correlation between variable is interpreted.

RESULTS AND DISCUSSION

Distribution of Respondents

Distribution of 30 respondents at Tambakrejo village by age is showed in Fig. 2.

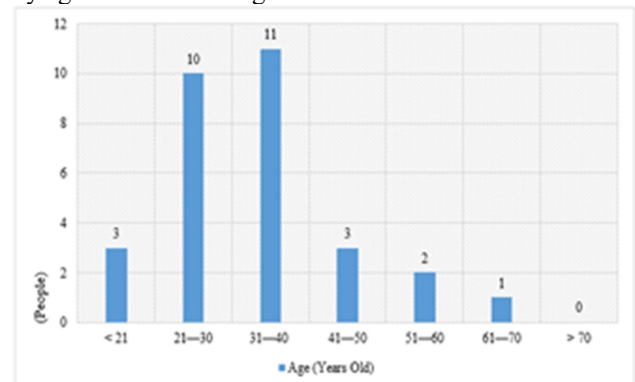


Fig. 2. Distribution of respondents by age

Distribution of 30 respondents at Tambakrejo village based by gender is showed in Fig. 3.

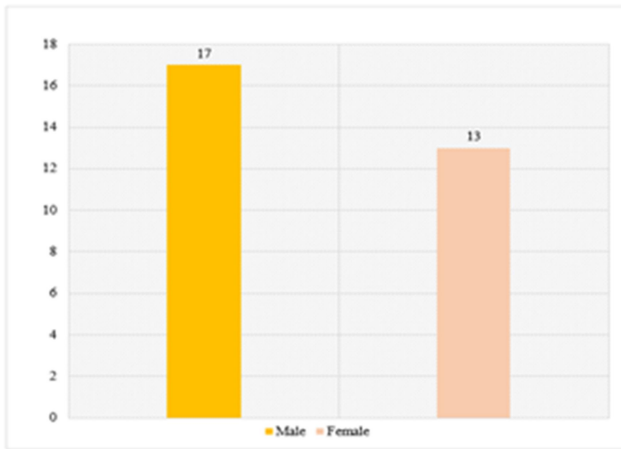


Fig. 3. Distribution of respondents by gender

Distribution of 30 respondents at Tambakrejo village by education level is showed in Fig. 4.

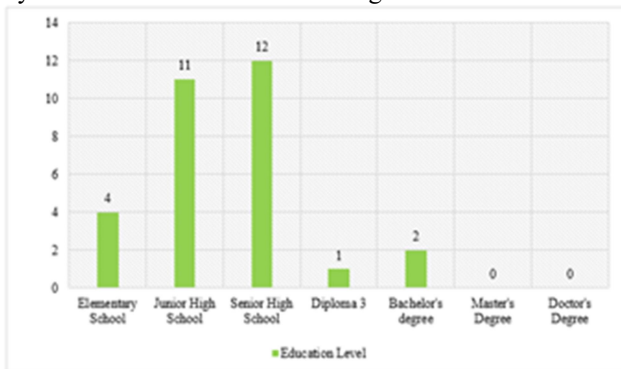


Fig. 4. Distribution of respondents by education level

Distribution of 30 respondents at Tambakrejo village by residence status is showed in Fig. 5.

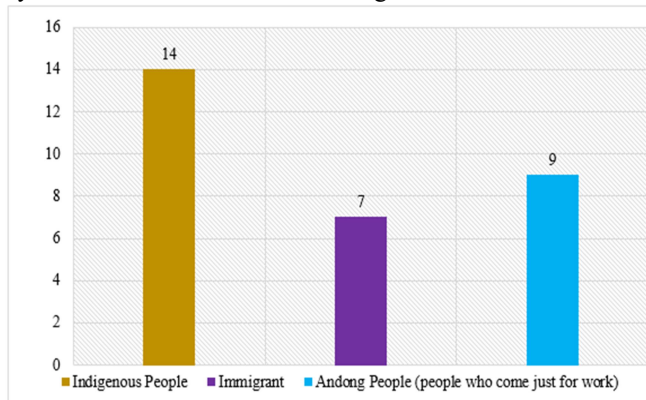


Fig. 5. Distribution of respondents by residence status

Description of Data

The analysis for questionnaire of community's knowledge is showed in Table 5.

Based on the analysis, the highest score of community's knowledge is 97% and its lowest score is 6,7%. 29 people recognize that there is a determination block area management of Sempu Island in the form of ecotourism. 22 people state that management of Sempu Island as ecotourism had been coordinated with BBKSDA of the Nature Reserve of Sempu Island (an institution that focuses on the conservation of natural resources). According to 28 people, that management have involved communities. But, 29 people state that there is still no evaluation related to the function area of the Nature Reserve of Sempu Island.

According to public opinion, supporting factors in magement of Sempu Island as ecotourism are a natural area, strategic position in another tourist object, communities supporting the management, the existing institutions to managing the area, although there is still no document in the planning of the management.

Community recognize that inhibitor factors in magement of Sempu Island as ecotourism are tourist attraction is still incomplete due to the lack of facilities

such as clean water, the source of funds management and development of the area is still limited, the quality and quantity of human resources is still lacking, a lack of support from various parties, violations of the function of the area, the intensity of the number of visitors can cause environmental problems.

Table 5. Results Analysis For Questionnaire Of Community's Knowledge About Management At The Nature Reserve Of Sempu Island As Ecotourism

Number of Question	The Number of Respondents with Score-		Percentage of Score- (%)	
	0	1	0	1
1	1	29	3	97
2	1	29	3	97
3	8	22	27	73
4	2	28	7	93
5	21	9	70	30
6	2	28	7	93
7	3	27	10	90
8	1	29	3	97
9	25	5	83	17
10	9	21	30	70
11	26	4	87	13
12	26	4	87	13
13	26	4	87	13
14	26	4	87	13
15	27	3	90	10
16	28	2	93.3	6.7
17	27	3	90	10
18	19	11	63	37
19	18	12	60	40
20	28	2	93.3	6.7

So, the community generally knows and supporting the management of Sempu Island as ecotourism. They realize the potential of that management though the planning and development is still unclear. Community is also aware of the difficulties in the management mainly related to infrastructure, funding and support from various parties, and also an indication of misuse of Sempu Island.

The analysis for questionnaire of community's participation is showed in Table 6. Based on the analysis, the highest score of community's participation is 97% and its lowest score is 20%.

Table 6. Results Analysis for Questionnaire of Community's Participation in Management at The Nature Reserve of Sempu Island as Ecotourism

Number of Question	The Number of Respondents with Score-		Percentage of Score- (%)	
	0	1	0	1
1	11	19	37	63
2	1	29	3	97
3	1	29	3	97
4	1	29	3	97
5	24	6	80	20

Based on Table 6, 19 people stated that the community were involved in planning of management and development in Sempu Island as ecotourism. Community involvement is not only limited in the planning. They are also directly involved in the management. According to 29 people, the community actively involved to providing services, rental, and trade. But 24 people recognize that the community has not been actively involved in repairing and preventing damage on the Natural Reserve of Sempu Island.

Results of Normality Test and Homogeneity Test

Based on results of normality test, data from questionnaires of knowledge and participation have not been distributed normally. In the *Shapiro-Wilk* column of table can be seen that significant value of data from questions number 1–20 in questionnaire of knowledge is $0,00 < 0,05$ and significant value of data from questions number 1–5 in questionnaire of participation is $0,00 < 0,05$. The significance value < 0.05 indicates that the data is not distributed normally. Results of normality test is showed in Table 7.

Table 7. Results of Normality Test

Data from Questionnaire	Question	Saphiro-Wilk		
		Statistic	Df	Sig.
1. Community's knowledge about management at Nature Reserve of Sempu Island as Ecotourism	No 1	0.180	30	0.000
	No 2	0.180	30	0.000
	No 3	0.554	30	0.000
	No 4	0.275	30	0.000
	No 5	0.577	30	0.000
	No 6	0.275	30	0.000
	No 7	0.275	30	0.000
	No 8	0.347	30	0.000
	No 9	0.180	30	0.000
	No 10	0.452	30	0.000
	No 11	0.404	30	0.000
	No 12	0.404	30	0.000
	No 13	0.404	30	0.000
	No 14	0.404	30	0.000
	No 15	0.347	30	0.000
	No 16	0.275	30	0.000
	No 17	0.347	30	0.000
	No 18	0.612	30	0.000
	No 19	0.624	30	0.000
	No 20	0.275	30	0.000
2. Community's participation in managing the Nature Reserve of Sempu Island as Ecotourism	No 1	0.612	30	0.000
	No 2	0.180	30	0.000
	No 3	0.180	30	0.000
	No 4	0.180	30	0.000
	No 5	0.492	30	0.000

Having tested the normality, then data of questionnaire were tested the homogeneity. Results of homogeneity test is showed in Table 8.

Table 8. The Results Of Homogeneity Of Variances

Data from Questionnaire	Levene Statistic	df1	df2	Sig.
1. Community's knowledge about management at Nature Reserve of Sempu Island as Ecotourism	1.695	5	23	0.176
2. Community's participation in managing the Nature Reserve of Sempu Island as Ecotourism	1.178	2	26	0.324

The results of homogeneity test showed that significant value for the data in the questionnaire of knowledge is $0.176 > 0.05$ and significant value for the data in the questionnaire of participation is $0.324 > 0.05$. So, it can be concluded that the data are homogeneous because significant value > 0.05 .

Correlation between Community's Knowledge and Community's Participation in Management at the Nature Reserve of Sempu Island as Ecotourism

Data on the questionnaire proved to be homogeneous but not distributed normally, so the hypothesis testing is done in the form of non-parametric correlation with *Spearman Rank*. Correlation test is performed to determine whether the research hypothesis is accepted or rejected. The hypothesis proposed in this study are as follows.

H_0 : there is no correlation between community's knowledge and community's participation in the management at Nature Reserve of Sempu Island as ecotourism.

H_1 : there is correlation between community's knowledge and community's participation in the management at Nature Reserve of Sempu Island as ecotourism.

The results of non-parametric correlation showed that significant value between community's knowledge and community's participation is $0.000 < 0.05$. So, H_0 is rejected and H_1 is accepted. It means that there is correlation between community's knowledge and community's participation in the management at Nature Reserve of Sempu Island as ecotourism. Results of non-parametric correlation is showed in Table 9.

Table 9. Non-Parametric Correlation

			Knowledge	Participation
Spearman's rho	Knowledge	Correlation Coefficient	1.000	0.732**
		Sig. (2-tailed)		0.000
		N	30	30
	Participation	Correlation Coefficient	0.732**	1.000
		Sig. (2-tailed)	0.000	
		N	30	30

** Correlation is significant at the 0.01 level (2-tailed).

Spearman's correlation coefficient (R) that is 0.732 then matched with rank of R value to interpreting how strong the correlation between community's knowledge and community's participation. Result of showed that R (0.732) is in the range of 0.60–0.799 which is in the strong category [6 and 7]. So, the correlation between community's knowledge and community's participation at Nature Reserve of Sempu Island as ecotourism is strong.

The factors that affecting forest management are the characteristics of the area and its community [8]. Interaction between human and their environment will collateral with knowledge about that environment. It means that knowledge just giving guidance to participation in way of positive or negative [3]. Community's knowledge about management at the Nature Reserve of Sempu Island as ecotourism is good enough. It correlated with their participation in management at the Nature Reserve of Sempu Island as ecotourism. This strong and positive correlation is based on education level of some people that the average is graduate from senior high school there are also some that diploma 3 and bachelor's degree.

In addition, their participation also supported by age and gender that most of them is male in productive age (21-40 years old). Results of interviews with the head of Tambakrejo village and the head of BKKSDA of the Nature Reserve of Sempu Island (an institution that focuses on the conservation of natural resources) also noted that people who participate in the management of at the Nature Reserve of Sempu Island as ecotourism average were men with ages 20–40 years. People who originally unemployment, involved into a tour guide, as a providing services to Sempu Island with motorboats, sellers around the area of Sendang Biru beach, and also as a parkman.

Community's participation in management at the Nature Reserve of Sempu Island as ecotourism generally is good, but still lacking in participation to repairing and conservation. This strong and negative correlation between community's knowledge and community's participation can be caused by education level of some people that the average is graduate from junior high school and elementary school. Some of community who was joined managing the Nature Reserve of Sempu Island as ecotourism were immigrants and *andong* people (people who came just for working) so they may less at loving environment in Sempu Island.

Obstruction of managing the Nature Reserve of Sempu Island as ecotourism can be caused by the density of visitors which can make worse the damage of tropical forest. It had been anticipated by BKKSDA (an institution that focuses on the conservation of natural resources) through briefing for visitors who want to entering the Nature Reserve of Sempu Island. That short briefing tingkat is conducted for explaining to visitors how important tropical forest is. Destructive action such as throwing trash and oppening new way in the Nature Reserve of Sempu Island will get hard sanction. The immediate conservation of biodiversity in order to protecting forests, especially tropical rain forests are considered to be very important for the life of the world [9].

Managing the Nature Reserve of Sempu Island as ecotourism is conducted by BKKSDA (an institution that focuses on the conservation of natural resources) together

with the communities which based on local potential. Visitors can enjoy the beautiful panorama in way to Segara Anakan (favorite area in at the Nature Reserve of Sempu Island). The management can also improving economy level of local people. Head of BBKSDA (an institution that focuses on the conservation of natural resources) said clearly that ecotourism was only permitted in arrounding of Segara Anakan. That was a strategy to shifting the damage of forest in just one area (Segara Anakan). The areas outside of Segara Anakan were prohibited to entering by visitors expepted for necessity of research and conservation.

Community based managing which is effective can make the local people be prospering [10]. Empowerment of Community Based Forest Program (ECBFP) may be a way for poverty alleviation programs because of the shortage of land livelihoods of the people who live in area of rural and underdeveloped. There has been a lot of ECBFP have focused on improving forest-based livelihoods through commercial utilization of forest resources. Commercial market forest products has been offered a way to overcoming poverty for many poor people in marginal agricultural land and forests [11]. The forest management strategy is not only concerned with economic value that can be taken, but also need to holding the biocentric values or management that ensures sustainable forest remains [12]. This is an effort to protecting old-growth forests and conserving biodiversity are relatively limited [13].

A collaborative approach based on the belief that public support is essential in order to be sustainable conservation efforts by facilitating the difference in interest between the manager and the community through the division of authority and responsibilities among stakeholders [14]. So, the forest management will be optimal and there is no conflict between communities and managers [15].

CONCLUSION

The conclusions of this study as follows.

The highest score of community's knowledge about management at the Nature Reserves of Sempu Island as ecotourism is 97% and its lowest score is 6,7%. The community generally knows and supporting the management of Sempu Island as ecotourism. They realize the potential of that management though the planning and development is still unclear. Community is also aware of the difficulties in the management.

The highest score of community's participation to supporting management at the Nature Reserves of Sempu Island as ecotourism is 97% and its lowest score is 20%. The community generally participates to planing and managing ecotourism in providing services, rental, and trade. But they do not participate in repairing and conservation at the Nature Reserves of Sempu Island.

There is correlation between community's knowledge and community's participation in the management at Nature Reserve of Sempu Island as ecotourism

because significant value $0.000 < 0.05$. That correlation in strong category because *Spearman's* correlation coefficient (R) = 0.732 is in the range of 0.60–0.799.

ACKNOWLEDGMENT

The authors would like to thank Balai Besar Konservasi Sumber Daya Alam (BBKSDA) of Sempu sector, stakeholder and residents in Sumbermanjing village, Malang for their cooperation to carry out this minithesis research work. The views expressed are solely those of the authors. This research have never been publicized previously in elsewhere.

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