

Social capital role in the utilization of mangrove ecosystem service for ecotourism on Kutai National Park, East Kalimantan, Indonesia

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Abstract. *Sulistiyorini IS, Poedjirahjoe E, Faida LRW, Purwanto RH. 2018. Social capital role in the utilization of mangrove ecosystem service for ecotourism on Kutai National Park, East Kalimantan, Indonesia. Bonorowo Wetlands 8: 63-70.* Social capital has an important role in mangrove ecosystem preservation. Changes to mangrove ecosystem services can affect elements of social capital. Ecotourism is one of the alternatives that can be developed in the mangrove area in the National Park. The purpose of the study was to give an overview of the correlation between several elements of social capital in supporting ecotourism in mangrove areas. This study was conducted in five villages in East Kutai Regency, East Kalimantan, namely Singa Geweh, Sangkima, Teluk Singkama, Teluk Pandan and Kandolo. There were 530 respondents from the five villages involved as informants or resource persons. The data were analyzed using the Sequal Equation Modeling Partial Least Square (SEM-PLS) method with SmartPLS. Based on the initial assessment by the scoring method, five social capitals, i.e., trust, networking, community involvement, social norm, and concern to mangrove, had low criteria to support ecotourism in Kutai National Park (KNP) mangrove area. According to SEM-PLS analysis of the social capital variables, community involvement, social norms, and trust negatively affected ecotourism. Trust and community involvement were relatively low in the four villages (Singa Geweh, Sangkima, Teluk Singkama, and Kandolo). They were associated with social norms. On the other hand, concern for mangroves, education and income levels, and networking had positive effects and power to support ecosystem service of mangroves for ecotourism.

Keywords: Community, ecotourism, East Kalimantan, mangrove preservation

INTRODUCTION

The mangrove forest area in Indonesia is about 3.1 million hectares, or approximately 22.6% of the world's mangrove forest area (Giri et al., 2011). In East Kalimantan, the size of mangrove forest is about 367 thousand hectares (Noor et al. 2006). The mangrove forest of Kutai National Park (KNP), located in East Kutai District, East Kalimantan Province, Indonesia, along the coast facing the Makassar Strait, has an area of approximately 5,271.4 hectares or 2.7% of the total KNP areas of 192,709.6 hectares (Gunawan and Sayektiningsih 2014). The latest information by the KNP management unit in 2017, the mangrove area is about 4,766.3 ha or decreased by about 9.6% from the previous area. Bismark and Iskandar (2002) stated that the mangrove forest of KNP continues to experience pressure due to the increase in human activities for settlement, agriculture, and other activities. Budiarsa and Rizal (2013) explained that mangrove conversion in KNP for various activities has continued over the past two decades. The development of a new regency, especially the East Kutai Regency, is suspected to reduce KNP forests' sustainability on the coast significantly.

The mangrove ecosystem is one of several high-productivity ecosystems (Budihastuti et al., 2012). The

primary productivity of mangroves ranges from 350 to 500 grams C/m²/yr in coastal waters, and abroad proportion is founded on the coastline in the tropics (Mann 1982). Mangrove forests also provide valuable ecosystem services for coastal communities, tourist attractions, nature conservation, education, and research (Eddy et al., 2016). The mangrove forest ecosystem of KNP has a high productivity ecosystem role as a source of feed, spawning and conservation areas for aquatic organisms living in the surrounding areas such as fish, crustaceans, mollusks, and others (Budiarsa and Rizal 2014). In addition to the aquatic biota, the KNP mangrove forest is also a habitat for Proboscis Monkey (*Nasalis larvatus* Wurmb, 1781). It was found in the Sangatta River, French Cape, Sangkima River, and Kanduung River (Suwanto et al. 2016). Based on this, the KNP mangrove has the potential and opportunities for conservation-based eco-tourism development. Ecotourism is also expected to be used to campaign for the protection and integrity of conservation areas.

Maintaining the existence of mangrove forests in KNP needs a sustainable development of forest utilization based on the ecotourism concept (Daryono 2014). The utilization and management of sustainable mangrove forests require a multi-dimensional and fundamental concept that can affect all categories of ecosystem services (Barnes-Mauthe et al.,

2015), known as social capital. Research on the topic of social capital has gained much attention from researchers around the world, especially in the perspective of collective action (Asmin et al., 2017). The development and changing of socio-cultural conditions of society have provided new challenges in the management of the National Park. This study aimed to provide information for the conservation policy of mangrove forests by exploring the diversity of ecosystem services value for ecotourism based on the importance of social capital, which can be further used as a guideline in the development and utilization of the mangrove forests.

MATERIALS AND METHODS

Study site description

Since 2001 the area of KNP has been 198,269 hectares, then in 2014, the area becomes 192,709.6 hectares or decreased about 5,560 hectares. Reduction of the area due to the enclave for settlement community areas such as Teluk Pandan, Kandolo, Teluk Singkama, Sangkima, South Sangatta, and Singa Geweh Village. This study was conducted in five villages located in the coastal regions of KNP. The three villages (Singa Geweh, Sangkima, Teluk Singkama) located in Sangatta Selatan sub-district and two villages (Teluk Pandan and Kandolo) located in Teluk Pandan sub-district on East Kutai Regency, East

Kalimantan (Figure 1). The study period starts from September 2017 to December 2017.

Sampling and data collection

A direct interview carried out the social capital data of the community in a structured way to the respondents (guidelines with a questionnaire). Respondents were determined proportionally from the number of household heads in the five villages. The total number of respondents from the five villages was 530 households, which was two folds higher than the minimum number of samples/respondents based on the Luck and Rubin formula (Luck and Rubin 1987; Jakpar and Goh, 2012), increasing the validity of the data. Social capital has been conceptualized into three levels, i.e., micro, meso, and macro. The measurement at the micro-level was conducted at the household or individual level (Grootaert et al., 2003). The micro-level measurement (measuring household living standards) became the survey’s focus in this study. Data collected included respondents’ characteristics: formal education level and income level (X1). Social capital data includes trust (X2), networking (X3), social norm (X4), community involvement (X5), concern to the environment (X6), attitude or perception to the utilization of mangrove for ecotourism (Y1). The seven latent variables and the 35 indicators are described in Table 1.

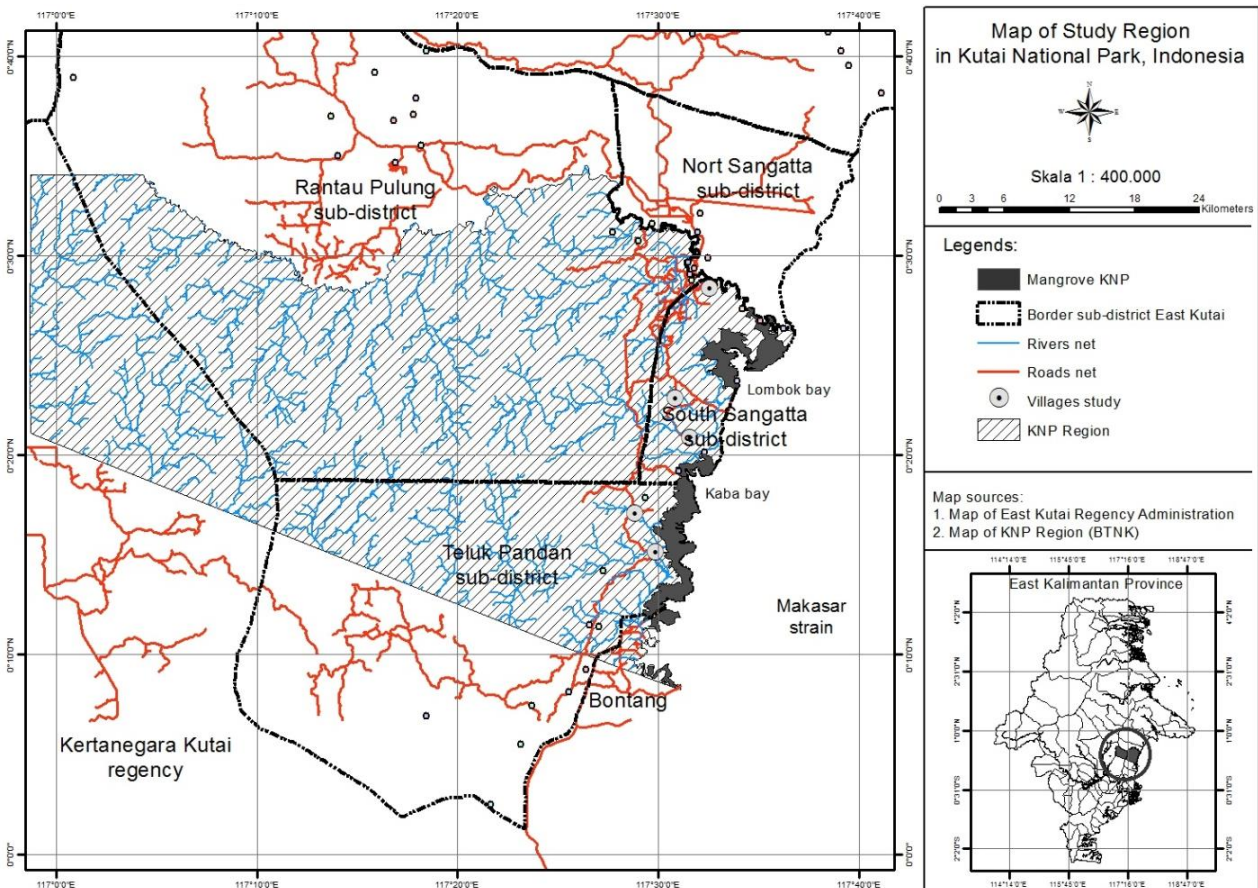


Figure 1. Location of study sites in the mangrove forest of Kutai National Park (KNP), East Kutai District, East Kalimantan, Indonesia

Table 1. Latent variables and indicators description

Latent variables	Indicator description	
Education and income level (X1)	Education level	X11
	Income level	X12
Trust (X2)	KNP management unit	X21
	Local government	X22
	Social norms/rule traditions	X23
	Public figure in local society	X24
	Fellow locals in society	X25
	Outsiders (NGO/Academics/Researcher)	X26
Networking and organization (X3)	Cooperation with KNP management	X31
	Cooperation with local government	X32
	Cooperation with Corporate	X33
	Interested with organizations in the local society	X34
	Cooperation fellow local people	X35
	Leisure to interaction with fellow local	X36
Social norms (X4)	Knowledge of social norms	X41
	Compliance with social norms	X42
	Obedience and implementing social norms	X43
	Implementation of agreed rules at the community organization	X44
	Know and obey the KNP rules	X45
	Know and follow the local government rules	X46
Community involvement (X5)	Follow the meetings initiated by KNP management	X51
	Participation in community service	X52
	liveliness in organizations/meetings in the local community	X53
	liveliness in criticizing to KNP and local government in mangrove management	X54
	Contribution of ideas to KNP and local government in mangrove management	X55
Concern to mangrove ecosystem (X6)	Knowledge that mangrove forests need to be preserved	X61
	Participation in mangrove conservation activities held by KNP management	X62
	Independently ever do mangrove conservation activities	X63
	Invite fellow local people to preserve mangroves	X64
	The closeness of fellow citizens in mangrove conservation	X65
Response to the utilization of mangrove ecosystem for ecotourism (Y1)	Knowledge of ecotourism in mangrove forests	Y11
	KNP mangrove potential can be used as a tourist attraction	Y12
	Knowing that the mangrove will be a tourist destination by KNP management	Y13
	Involvement in ecotourism activities in mangrove forests	Y14
	Interest in ecotourism in mangroves KNP	Y15

Data analysis

This research was conducted through qualitative and quantitative descriptive approaches. Data analysis of the questionnaire results refers to the Social Capital Assessment Tool (SCAT) (Krishna and Shrader 1999) with minor modifications. Social capital was categorized into five levels: very low (45-81), low (82-118), moderate (119-155), high (156-192), and very high (193-225). The interval value of each level was calculated based on the maximum (225) and minimum value (45) of all social capitals. The correlation among the community's social capital elements was assessed to identify the mangrove ecosystem services for ecotourism. The elements of social capital observed in this research were trust, social norms, social networks, involvement, and concern of the community. The correlations among the variables of the social capital element were analyzed by PLS-SEM (*Partial Least Square-Structural Equation Modeling*) using the SmartPLS 3 to determine the social capital factors triggering the mangrove ecotourism. This model performs beta values of path coefficient that describe the greater the value, the more influential. T-test for interpreting the

relationship between variables is if the value of T count > T-table with (α) 0.05 (T-table = 1,96), it comes as a real effect or a significant variable to another variable.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The majority of household respondents that participated in this survey were male. They accounted for 67% of the total respondents. Most of the respondents (58%) were within 40 years and below. The educational background of the respondents was graduated from elementary school (45%), junior high school (25%), and senior high school (19%). Most of the monthly income of the respondents was IDR 1,000,000.00 and below (49%). About 40% (199 households) of the total respondents reported the extraction of mangrove resources as their full-time occupation. The summary of the socio-economic characteristics of the respondents in the five villages is presented in Table 2.

Table 2. Summary of the socio-economic background of the survey respondents

Variable	Number of respondents (n)					Average (%)
	Singa Geweh (n = 180)	Kandolo (n = 60)	Teluk Pandan (n = 120)	Sangkima (n = 90)	Teluk Singkama (n = 80)	
Gender (%)						
Men	71	72	62	66	66	67
Women	29	28	38	34	34	33
Age group (%)						
40 years and below	67	55	69	44	54	58
41 years and above	33	45	31	56	46	42
Education (%)						
Nonformal education	7	5	3	16	15	9
Elementary school	39	40	43	53	50	45
Junior high school	33	30	33	16	14	25
Senior high school	20	23	19	14	18	19
College/university degree	1	2	3	1	4	2
Household income (IDR/Month) (%)						
IDR 1,000,000.00 and below	33	47	58	60	59	51
IDR 1,000,000.00-1,500,000.00	26	27	30	31	25	28
IDR 1,500,000.00-2,000,000.00	23	15	8	8	10	13
IDR 2,000,000.00-4,000,000.00	13	7	3	1	6	6
IDR 5.000.000 and above	4	5	1	0	0	2
Occupation (Extraction of mangrove resources) (%)	42	25	46	46	40	40

The socio-economics of the community in the five villages were relatively low, especially seen from the level of productive age, income, and education. These three things can affect social capital related to community awareness to support mangrove conservation. The people who settle down in these five villages have lived in KNP for decades. They are mostly migrants from outside Kalimantan. This condition influenced the cultural values and local wisdom, which can impact low norms and trust in social capital. Vayda and Sahur (2005) classified settlers in KNP by 3 regions, namely (i) Teluk Pandan; it was mentioned that Bugis settlers from Bone, South Sulawesi, first came in the mid-1960s, (ii) Selimpus/Kandolo area, first settled in 1974 and developed in 1977 by Bugis tribe and (iii) Sangkima area, first settled in 1924 by Bugis tribe. At that time, Sangkima was also a shifting cultivator for indigenous people, and both tribes were assimilated and settlers more and more in 1954 and 1960. According to BTNK (2005), the three villages are developed. The Governor of East Kalimantan Province has recognized them by defining them as the definitive village (Teluk Pandan, Sangkima, and Sangatta Selatan) through Decree number 06 of 1997 dated 30 April 1997. In its development, Desa Sangatta Selatan is divided into two villages, Desa Sangatta Selatan and Singa Geweh with the Decision of East Kalimantan Governor number 410.44/K.452/1999.

The local government and KNP management unit must think about how to improve the socio-economic life of the community in the conservation area. There are around 199 respondents directly related to KNP mangroves; this is a high potential in community empowerment, especially for mangrove ecotourism programs. Ecotourism certainly cannot stand alone and must be supported by other sectors such as the creative economy that can be developed and

collaborated with stakeholders such as companies, local governments, academics, and non-government organizations. Hakim et al. (2017) stated mangroves are important resources, and nature-based tourism became a strategy for mangrove conservation. The success of mangrove tourism in the studied area could be due to a combination of factors, including mangrove site accessibility, local community involvement, the quality of mangrove ecosystems, and the availability of mangrove tourism programs.

Social capital valuation

Assessment by the scoring method to social capital in five villages showed that some elements of the social capital have low value, such as trust, social networking, and social norm, with an average value above 19. Generally, the five villages have not supported the strength of the social capital, including the responses of respondents to mangrove services to ecotourism scored 17.8. The strength of the social capital in this study was in a low category, with an average value of 110.5 (ranging from 82 to 118) (Table 3). The elements of trust social norm in Teluk Singkama and Kandolo had higher scores than the other three villages. The networking elements in Teluk Pandan and Kandolo villages were higher than the other three villages. Elements of community involvement concerning mangrove and mangrove services to ecotourism in Kandolo and Sangkima were higher than in the other three villages. Respondents from the village of Sangkima had a deep concern for mangroves because they are the closest village to mangrove forests and tourism location on the coast of Teluk Lombok KNP. The Kandolo village also had a deep concern for mangroves for ecotourism services because they have access to the mangroves in Teluk Kaba KNP.

Table 3. Minimal, maximal, and mean scores of the social capital variables

Social capital variables	Mean score		Mean
	Min.	Max.	
Education level	2.3	2.8	2.6
Income level	1.5	2.3	1.8
Trust	16.9	22.4	20.5
Social Networking	16.6	20.8	19.3
Social norm	16.5	22.0	20.1
Community involvement	12.5	14.9	13.9
Concern to mangrove	12.8	17.8	14.5
Mangrove services to ecotourism	17.0	18.6	17.8
Mean	96.0	121.6	110.5

The PLS-SEM (*Partial Least Square-Structural Equation Modeling*) analysis was carried out to examine the relation of indicator influence on each variable of the social capital element. The PLS-SEM has been widely used in the social sciences and was recently introduced into ecological studies (Pepler-Lisbach et al., 2015; Miguel et al., 2017). PLS is related to Principal Components Analysis (PCA), but additionally, it allows us to capture information on the relationship between predictive and target variables (Bryce et al., 2016). Based on this analysis, the Average Variance Extracted (AVE) for this study was higher than the value of 0.50 (Table 4), and the internal consistency reliability is higher than the recommended value (Hair et al. 2014; Ghazali 2014; Sözbilir 2018).

Evaluation of the initial measurement model found that the variable indicator could not reflect the construct of the latent variables. The variable had a loading factor value less than 0.5, which needs re-specification by issuing an indicator variable that did not meet the eligibility criteria to improve the validity and reliability of the model. Out of 35 total indicators, several should be deleted for each village, fourteen indicators in Teluk Singkama, ten indicators in Singa Geweh, five in Kandolo, and Teluk Pandan, and four indicators in Sangkima. After the model was re-specified, the PLS algorithm process eventually gave the results that matched the criteria of convergence validity test on the measurement model. The AVE (>0.5) showed that all variables at various significant levels had positive correlations. Composite Reliability analysis (>0.7) can state that the research model was valid and reliable (Table 4).

Social capital owned by individuals or communities is an important resource in an ecosystem that can improve the quality of ecosystem services. The stronger the social capital, the stronger the community's support for sustainable ecosystem services. The social capital tested in this study is represented by six variables, as presented in Table 5. The test had a significance level above the t-table (α 0.05; t-table 1.96). Several hypotheses do not support mangrove forests for ecotourism. The community or respondents in five villages were concerned about mangrove or mangrove services to ecotourism. Then, variable social norms supporting mangrove ecotourism were found in the two villages, i.e., Teluk Pandan and Teluk Singkama villages.

Many variables were not significant based on the analysis of respondents in each village (Table 5). Furthermore, analysis for the entirety (530 respondents) was carried out to clearly know the significant influence of the six latent variables for ecotourism mangrove services. The results were analyzed with the PLS program to re-specify the matched criteria to the convergence validity test on the measurement model (Figure 2). The evaluation of the measurement model through the load factor analysis, average variance extracted analysis value, cross-loading analysis, and composite reliability analysis can state that the research model is generalized to all objects; the research model is valid and reliable. The community involvement, social norm, and trust variables had no positive effect or were not significant to the utilization of mangrove services for ecotourism (Table 6). The overall analysis of the respondents gave slightly different results than the respondents' analysis of each village. One variable was a concern to mangroves, which positively influenced the four villages. While the networking variable had a positive impact in one village, the education and income levels variable had no positive influence in all villages.

The previous research also discovered the low social capital strength (Oktadiyani et al., 2013). The study explains the value of social capital for Kabo Jaya in Swarga Bara village is 173 (enough) and Dusun G III in Singa Gembara village is 159 (not enough). The weak social capital will dim the spirit of mutual cooperation, exacerbate poverty, increase unemployment and crime, and hinder efforts to improve human well-being (Nababan et al., 2016).

Table 4. Assessment of the measurement model (means, AVE, Composite Reliability=CR)

Variables	Singa Geweh			Kandolo			Teluk Pandan			Sangkima			Teluk Singkama		
	Mean	AVE	CR	Mean	AVE	CR	Mean	AVE	CR	Mean	AVE	CR	Mean	AVE	CR
(X1)	2.49	0.65	0.79	2.35	0.79	0.86	2.18	0.70	0.82	1.91	0.75	0.86	2.04	0.67	0.80
(X2)	2.81	0.62	0.87	3.74	0.52	0.84	3.51	0.54	0.88	3.5	0.75	0.90	3.54	0.60	0.75
(X3)	2.76	0.87	0.95	3.46	0.55	0.86	3.35	0.64	0.89	3.30	0.51	0.86	3.32	0.57	0.80
(X4)	2.75	0.67	0.89	3.67	0.52	0.84	3.43	0.52	0.84	3.42	0.51	0.85	3.45	0.60	0.75
(X5)	2.49	0.62	0.83	2.99	0.74	0.92	2.83	0.65	0.88	3.04	0.68	0.89	2.59	0.58	0.81
(X6)	2.68	0.57	0.80	3.02	0.52	0.80	2.68	0.60	0.82	3.56	0.52	0.83	2.56	0.51	0.81
(Y1)	3.40	0.70	0.92	3.71	0.62	0.89	3.37	0.68	0.91	3.72	0.66	0.91	3.59	0.60	0.88

Note: *) according to rule of thumb (AVE > 0.5; CR > 0.7)

Table 5. Significance test model after re-specification in the five villages

Latent variables hypotheses	Singa Geweh (180 respondent)		
	Path coefficients	t-Value	Supported?
Community involvement-> Mangrove services to ecotourism	0.147	1.854	No
Concern to mangrove-> Mangrove services to ecotourism	0.254	3.541	Yes
Education and income levels-> Mangrove services to ecotourism	0.086	1.394	No
Networking-> Mangrove services to ecotourism	0.132	1.728	No
Social norms-> Mangrove services to ecotourism	0.172	1.934	No
Trust-> Mangrove services to ecotourism	0.045	0.490	No
Kandolo (60 respondents)			
Community involvement-> Mangrove services to ecotourism	-0.111	0.532	No
Concern to mangrove-> Mangrove services to ecotourism	0.417	2.436	Yes
Education and income levels-> Mangrove services to ecotourism	0.197	1.446	No
Networking-> Mangrove services to ecotourism	0.025	0.135	No
Social norms-> Mangrove services to ecotourism	-0.114	0.632	No
Trust-> Mangrove services to ecotourism	0.220	0.930	No
Teluk Pandan (120 respondent)			
Community involvement-> Mangrove services to ecotourism	0.165	2.006	Yes
Concern to mangrove-> Mangrove services to ecotourism	0.383	3.779	Yes
Education and income levels-> Mangrove services to ecotourism	0.078	1.029	No
Networking-> Mangrove services to ecotourism	0.101	1.013	No
Social norms-> Mangrove services to ecotourism	0.185	2.085	Yes
Trust-> Mangrove services to ecotourism	-0.078	0.877	No
Sangkima (90 respondents)			
Community involvement-> Mangrove services to ecotourism	0.166	1.366	No
Concern to mangrove-> Mangrove services to ecotourism	0.005	0.036	No
Education and income levels-> Mangrove services to ecotourism	0.126	1.179	No
Networking-> Mangrove services to ecotourism	0.315	2.155	Yes
Social norms-> Mangrove services to ecotourism	-0.099	0.686	No
Trust-> Mangrove services to ecotourism	0.278	2.289	Yes
Teluk Singkama (80 respondent)			
Community involvement-> Mangrove services to ecotourism	0.037	0.215	No
Concern to mangrove-> Mangrove services to ecotourism	0.395	3.142	Yes
Education and income levels-> Mangrove services to ecotourism	0.067	0.681	No
Networking-> Mangrove services to ecotourism	0.152	1.553	No
Social norms-> Mangrove services to ecotourism	0.318	2.626	Yes
Trust-> Mangrove services to ecotourism	-0.030	0.238	No

Table 6. The significance test model after re-specification to 530 respondents

Latent variables hypotheses	Result (530 respondents)		
	Path coefficients	t-Value	Supported?
Community involvement-> Mangrove services to ecotourism	0.052	1.129	No
Concern to mangrove-> Mangrove services to ecotourism	0.263	5.756	Yes
Education and income levels-> Mangrove services to ecotourism	0.110	3.012	Yes
Networking-> Mangrove services to ecotourism	0.193	3.563	Yes
Social norm-> Mangrove services to ecotourism	0.080	1.412	No
Trust-> Mangrove services to ecotourism	0.085	1.463	No

Ecosystems results from complex interactions between ecological and social processes. People affect ecosystems' capacity to deliver services that contribute to the well-being of humans and their resilience (Fedele et al., 2017). The values of mangrove ecosystem services are highly variable across study sites due to other factors, the biophysical characteristics of the site, and the socio-economic characteristics of the beneficiaries of ecosystem services (Brander et al., 2012). Involving local communities in

mangrove management is an effective way of maintaining and enhancing the protection function of the mangrove forest while providing livelihood for local people (Schmitt and Norman 2015). Future governance models must involve partnerships between local custodians of mangroves and beneficiaries of the services (Lee et al., 2014). Community participation is needed to develop and preserve mangrove forests in the conservation areas. (Suprakto et al. 2014).

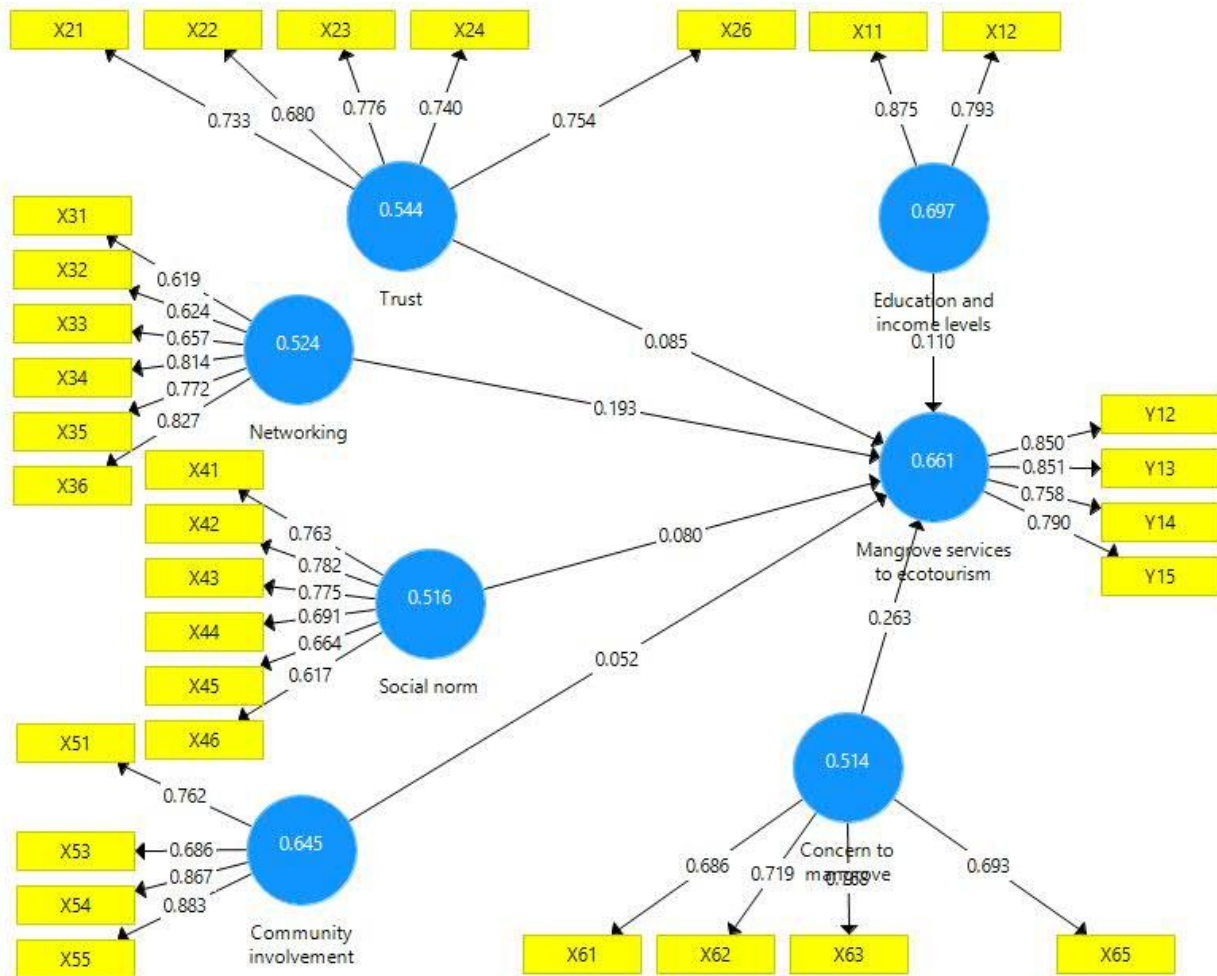


Figure 2. The convergent validity of each construct factor loadings after the re-specification

The main challenges to restoring and managing the mangrove forests are socio-economic conditions and land conflict between society, KNP, and local government (Gunawan and Sayektiningsih 2012). Community-based mangrove management will reduce conflicts. In Thailand, stand structure was superior in mangrove forests managed by communities rather than in mangrove forests are claimed for state management (Sudtongkong and Webb 2008). Mangrove tourism programs could support a conservation program. It is also crucial to involve and strengthen the participation of local communities surrounding mangrove areas. In Indonesia, national parks are the pioneer for mangrove-based recreation. In East Java, efforts to involve mangrove ecosystems in tourism packages were promoted in Alas Purwo National Park, Meru Betiri National Park, and Baluran National Park (Hakim et al., 2017). KNP in the future should be able to develop like the national park in Java. Although the social capital was still weak in supporting mangrove ecotourism, such as community involvement and trust, it can still be improved by multi-stakeholder cooperation.

In conclusion, natural tourism is one of the possible activities to be promoted in mangrove areas of national parks to increase local communities' role and preserve

mangrove forests. Efforts to involve communities in mangrove conservation and tourism development were relatively poor in KNP. The low level of community involvement can be caused by weak information, socialization, and financing for activities related to mangroves in KNP. Low trust level was also associated with low community involvement and social norms support. Low social norms can occur because the values of local wisdom and local culture in the community are not well maintained. Support from the local government, KNP management units, NGOs, and surrounding companies should be improved to strengthen the community's social capital that can positively affect the conservation of mangroves and ultimately increase human well-being. Community involvement was also affected by the trust level and community knowledge related to social norms and other regulations related to national park management. Preservation and development of mangrove tourism efforts in the national park would need a particular approach for the community around the mangrove forest. The socio-ecology approach that offers a comprehensive theoretical base needs to be well developed for strategy defines the utilization of the mangrove ecosystem service for ecotourism in the national park. An interdisciplinary

approach with mixed methods to determine ecological perspectives can be a useful research strategy to improve the social function of an ecosystem system.

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