

PROCEEDINGS



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Engineering and Technology

**“Sustainable Development in Developing
Country for Facing Industrial Revolution 4.0”**

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FOREWORD

In the name of Allah, Most Gracious, Most Merciful
Assalamu'alaikum Wr. Wb.,

Welcome to the Second International Conference on Science Engineering and Technology (ICoSET 2019). The advancement of today's computing technology, science, engineering and industrial revolution 4.0 play a big role in the sustainable development of social, economic, education, and humanity in developing countries. Institute of higher education is one of many parties that need to be involved in the process. Academicians and researchers should promote the concept of sustainable development. The Second International Conference on Science, Engineering and Technology (ICoSET 2019) is organized to gather researchers to disseminate their relevant work on science, engineering and technology. The conference is co-located with The Second International Conference on Social, Economy, Education, and Humanity (ICoSEEH 2019) at SKA Co-EX Pekanbaru Riau.

I would like to express my hearty gratitude to all participants for coming, sharing, and presenting your research at this joint conference. There is a total of 84 manuscripts submitted to ICoSET 2019. However only high-quality selected papers are accepted to be presented in this event, with the acceptance rates of ICoSET 2019 is 70%. We are very grateful to all steering committees and both international and local reviewers for their valuable work. I would like to give a compliment to all co-organizers, publisher, and sponsors for their incredible supports.

Organizing such prestigious conferences was very challenging and it would be impossible to be held without the hard work of the program committee and organizing committee members. I would like to express my sincere gratitude to all committees and volunteers from Singapore Management University, Kyoto University, Kyushu University, University of Tsukuba, Khon Kaen University, Ho Chi Minh City University of Technology, University of Suffolk, Universiti Teknologi Malaysia, Infrastructure University Kuala Lumpur, Universiti Malaya, Universiti Kebangsaan Malaysia, Universiti Utara Malaysia, Universiti Teknologi Mara, and Universiti Pendidikan Indonesia for providing us with so much support, advice, and assistance on all aspects of the conference. We do hope that this event will encourage collaboration among us now and in the future.

We wish you all find the opportunity to get rewarding technical programs, intellectual inspiration, and extended networking.

Pekanbaru, 27th August 2019
Dr. Arbi Haza Nasution, M.IT
Chair of ICoSET 2019

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PAPERS

FULL PAPERS

Design of Community-based Ecotourism at Cengkehan and Giriloyo, Wukirsari Village, Imogiri District, Bantul Regency, Special Region of Yogyakarta

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Keywords: Design, Community-Based, Ecotourism, Correlation and Cengkehan-Giriloyo.

Abstract: Ecotourism at study area is a tourism concept that presents unspoiled tourism and preserves to improving its sustainability. This ecotourism was defined by the local people contribution to the conservation of the land by mass movements potential in study area. People live in Cengkehan and Giriloyo are very concerned to the environmental preservation around them. The aim of this paper is to obtain the conservation in developing Community-Based Ecotourism (CBE) enterprises, supported by the partnerships of communities with the government, non-government and the private sectors. This study attempts to evaluate those partners most able to support various initiatives. The Giriloyo-Cengkehan CBE purposes to create a local ecotourism and its influence to the CBE marketing development. The study exposed that the nature of Cengkehan-Giriloyo's CBE has positive correlations between the community capacity carrying and the role of the developing CBS, includes its management and sustainability. The high expectation for the Giriloyo-Cengkehan CBE can perceive much more positive impacts than the negative impacts into the environmental, economic, and socio-cultural as a result of the ecotourism. They can manage all of activities and attraction they offer, and provide logistic, ccomodation and amenities supported by the government policy as well as accessibilities and other facilities within the destination area.

1 INTRODUCTION

Ecotourism has grown in the last decade in Indonesia; in hamlets to inland and former mining areas. During this period, discussions in ecotourism to the geoconservation and environmental sustainability contribution, have been deeply wide-reaching. Indonesian Guides Association (HPI: Himpunan Pramuwisata Indonesia) has considered and used ecotourism principles in developing itineraries, training guides, and marketing products. In the last five years, the guidelines have been formulated by legal organizations of HPI. Many ecotourism business owners and travel agents were also already practicing these standards to obtain consumers not only locally but also worldwide organizations (Sproule, 1996; Aczel et al., 2006; Arce et al., 2014). This has been an important step in setting standards within the field of ecotourism.

An ancient volcano supported by field of ecotourism in the form of traditional market,

cruising river and batik craft were identified at Giriloyo and Cengkehan, Wukirsari Village, Imogiri District, Bantul Regency (Figure 1). Geoparks, as an advance protection of natural and geological heritages, governing the important role in developing geotourism (Bray and Rodriguez-Marek, 2004; Budayana, 2017; Edwards, 1997). Together with ecotourism and geotourism, the establishment of geoparks can generate new job opportunities, new economic activities and additional sources of income, especially in rural regions. Study area is covered by Gunung Sewu Geopark in the Southern Mountain area, it encourages in constructing the local products and local handicrafts involved within the geo-and eco-tourism and other geo- and eco-products.

Previous study identified Tertiary superimposed volcanism, depositing basaltic volcanic rocks of Kebo-Butak Formation and andesitic volcanic rocks of Nglanggeran Formation (Mulyaningsih and Suhartono,) Inflation and deflation intensively controlled the study area; normal and shear faults as

products of the volcanism are potentially resulting landslide and other mass movements. The aim of study is to obtain the conservation in developing community-based ecotourism, geotourism and geoconservation supported by the partnerships of communities with government, non-government and private sectors. This study attempts to evaluate those partners most able to support various initiatives.

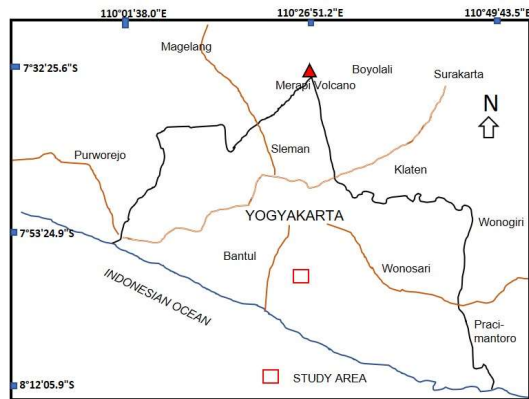


Figure 1: Situation map of study area.

2 METHOD

The study was constricted to design, develop, and analyze parameters, variables, tools and methods that used to be applied in managing the compliance of eco- and geo-tourism guidelines. Questionnaires were designed with the respondents as a manner coming from the consumers and the tourists that visited to Giriloyo-Cengkehan. Those were completed within approximately five-ten minutes. It consisted of the following six sections with the relevant numbers of the questions per section listed as follow:

- the accessibility facilities to Cengkehan (the end the tour)
- activity offered, visitor information and its education provided during the trip
- the available local accomodation (guest house, hotel, homestay and restaurants)
- the guide tours and the management (tour operator contributions to conservation and local development programs)
- the amenity (ATM, Parking area, shop, market, et. al.)
- socio-demographic information about ecotourists (Hermawan and Brahmanto, 2017).

The questionnaire was designed that at list six or seven of the ten guide-lines proffered by the management could be evaluated by the consumer.

Questionnaires were also provided to the local ecotourism; i.e for the manager, guide tours and the community who manages this ecotourism. These questionnaires aim to evaluate the success of the running management. Those consist of the perceptions of environmental, economic and socio-cultural impacts between residents of a traditional tourism area and a recently created ecotourism area.

All data resulted during the research were analyzed using statistic method; including correlation test and linear regresion.

3 THEORY

Ecotourism Society defines it as responsible travel to natural areas which conserves the environment and sustains the well-being of local people. In the basic concept, ecotourism enterprises that owned and managed by the community is called as Community-Based Ecotourism (CBE). In this case, CBE responsables to conserve, enterprise, and develop the community. (Wang et al., 2002) defined two kinds of community, i.e. direct and indirect communities with direct and indirect beneficiaries. Direct community included members of the managing committee and workers. Indirect community included the broader community who selected the management committee, namely interconnection service providers, travel agents, lodging and restaurant entrepreneurs, market traders and others. Direct beneficiaries included employees, craft producers, guides, and committee members, while indirect beneficiaries included the wider community as recipients of community development projects funded by tourism revenues.

People or groups of people can be defined as ecotourism community, by the role of the groups. There are local communities and broadband communities. The most successful CBE projects have started in the success of the information system; by the dissemination of information, that was chain from one community to another. Industry 4.0 involves that chain. Most activity, such as marketing ecotourism, are required to develop the needs of internet. For this reason, Kozinets (1999) proposed 'virtual communities' that able to push the growth of quantity, interests, and influence transforming traditional tourism into ecotourism. First of all, "virtual community" is considering to the unique

characteristics of community in cyberspace, it's an abstraction and empirical application virtual community as place, as symbol, and as virtual. This community is groups of people who interact with specific purposes, under the governance of certain policies, and with the certain facilitation (Figure 2).

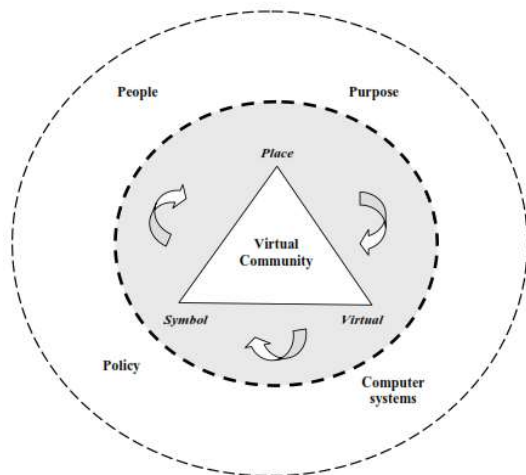


Figure 2: A conceptual model for the definition of virtual community (Wang et al., 2002).

4 RESULTS

4.1 Secondary Data

Assessment of the Giriloyo ancient volcano analyzed gently to undulated topography sloping to 5-10° at distance areas, undulated to steeply hills at Cengkehan to Nogosari sloping to 10-30°, roughly elevated hills near Watulumbung that sloping around 30-60° and very steeply scarpments with 60-70° on upper cliffs (Figure 3). Creeps are recognized along Watulumbung and the cliff of Mount Makbul. Those were influenced by the ancient superimposed volcanism happened during Early to Middle Miocene (Mulyaningsih and Suhartono,).

Landslides and others mass movements at study areas can result in enormous casualties and huge economic losses, such as happened on 17 March 2019 (Mulyaningsih and Suhartono,). So that it necessary to mitigate. Mulyaningsih et al. (2019a in this volume) proposed that design to the geoconservation of the potential mass movements can be package to be eco- and geo-tourism destination. The geotourism application is supported by the presence of volcanic

rocks exposed along Cengkehan River. It can be defined as central facies volcano.

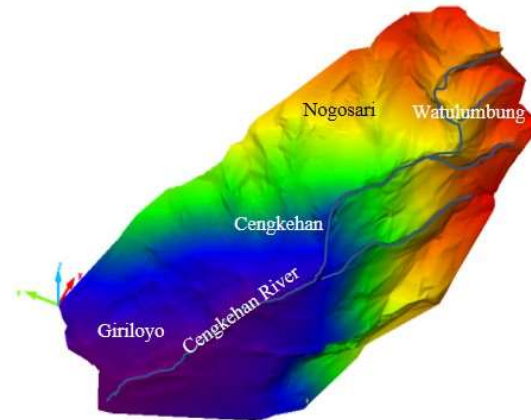


Figure 3: Digital Elevation Model (DEM) at study area.

(Mulyaningsih and Suhartono,) mapped and described volcanic sequences of Kebo-Butak and Nglanggeran Formations. Kebo-Butak Formation was exposed at Giriloyo, consists of black tuff intersects with brecciated and compacted basalt lava, then covered by less calcareous sedimentary rocks having an age of N5-6 (Early Miocene) (Eliezer et al., 2019; Farsani et al., 2011; Hadian et al., 2016). Lower Nglanggeran Formation exposed at Cengkehan, it lie on the Kebo-Butak Formation, consist of creammy color of coarse tuff and lapillistone that coarsening upward and replaced with interstings of thick layers of breccia, lava and lapillistone in pyroxene-rich basalt composition. Those were covered by Younger Nglanggeran Formation, that consists of agglomerate, andesitic lava and dike, in unconformably relationship. The Younger Nglanggeran was exposed at Watulumbung. The outcrops of the volcanic rocks are illustrated in Figure 4.

(Mulyaningsih and Suhartono,) argued that those volcanic rocks strongly supported the geological conditions, but the inflation and deflation during the volcanism in it had already deformed them. Those resulted south-west-northeast normal faults (N290-320°E), north-south shear faults (0-15°E), and oblique normal faults (northwest-southeast). that all of them have potential landslides. According to (Mulyaningsih and Suhartono,), the potential landslides and other mass movements could be minimized using terracing technics collaborate with bamboo park.

4.2 Field Data Record

Tools used to comprehensive sustainability assessments consist of correlation test to the current ecotourism destinations (i.e. Breccia Cliff-Prambanan, Nglanggeran Ancient Volcano Geotourism, Mangunan Ecotourism, and Dlingo Ecotourism), covering sociocultural, economic and environmental issues. It considers to their strengths, weaknesses, threats and opportunities of the site-specific applicability. Those intended to facilitate Giriloyo-Cengkehan's ecotourism that covered sustainability indicators, environmental impact assessment, life cycle assessment, environmental audits, ecological footprints, multi-criteria analysis and adaptive environmental assessment (Schianetz et al., 2007).

The implementation of sustainability at Giriloyo ecotourism destination is particularly significant for its viable target; the important of sustainability issues are scope and responsibility of its organisation and management. Hotels at study area are in minimized;

4.2.1 Correlation Analyses

In CBE, relationship between managers, owners, local community and consumers characteristics with their effort in the community capacity for tourism development is very important. It was identified by completing questionnaire, as a primary data by 149 respondents. Table 1 shows details of descriptive statistics for 149 people arriving Giriloyo-Cengkehan Ecotourism, consist of workers, manager, tour guides, local community and consumers. They were at Traditional Market Tour Community, Cengkehan Cruising River Community, and Batik Craft. Out of the 149 people community, 40% were female and 60% were male, with an average age of 29 years. The youngest participant was 16 years and the eldest one was 67 years. Table 1 is frequency distribution of the responden coming from the comitee community.

Table 1: Frequency distributions of Respondents' Demographic Profiles (N=149)

No	Education	Σ	%	Age (years)	Σ	%
1	Student/S1	25	16.78	<20	25	16.78
2	S1	38	25.5	21-25	26	17.45
3	S2	27	18.12	26-35	22	14.77
4	Others	22	14.77	35-50	27	18.12
5	High School	37	24.83	>50	49	32.89

This content information written in the questionarry provides to introduce the future ecotourism development activities. To identify the relationships between tourism variables under studied

used Pearson coefficient correlation and Spearman rho coefficient correlation. The utilization of Pearson moment coefficient is attended to the variables correlated that expressed as interval data.

Table 2: Frequency distributions of infrastructure developments (N=149)

No	Variable	Category	Freq.	%
1.	Respondent	Students/S1	45	30.2
		S1	58	38.93
		S2	47	31.54
		Others	42	28.19
2.		<20	45	30.2
		21-25	46	30.87
		26-35	42	28.19
		35 - 50	47	31.54
		>50	69	46.31
3.	Internet	Agree	65	43.62
		Disagree	24	16.11
	Wifi	Agree	53	35.57
		Disagree	36	24.16
	Large Bandwidth	Agree	65	43.62
		Disagree	24	16.11
4.	Activity	Outing track	40	26.85
		Education	35	23.49
		Exhibition	29	19.46
		Crafting	25	16.78
5.	Attraction	Outbond	50	33.56
		Culture	24	16.11
		Museum	28	18.79
		Batik Craft	27	18.12
6.	Lodging	Hotel	30	20.13
		Guesthouse	40	26.85
		Inn	30	20.13
		Caffee / Bar	22	14.77
		Saloon	22	14.77
7.	Ammenity	Restaurant	65	43.62
		Parking Area	64	42.95
		ATM	61	40.94
		Supermarket	27	18.12
		Traditional market	57	38.26
8.	Accessibility	Shop	25	16.78
		Require roadwork	43	28.86
		Lane setting	46	30.87
9.	Management	Improving ecotourism	59	39.6
		Traditional tourism	30	20.13
10.	Sustainability	CBE	57	38.26
		Outside Investment	32	21.48

As depicted in Table 2 and 3 there were significant positive correlation between age and background education and the sustainability of the Giriloyo-Cengkehan's ecotourism development ($r = 0.416$, $N = 149$, $p = 0.000$, two-tailed). Positive correlation also occurred between age the community capacity carrying (improving CBE and sustainability; $r = 0.402$, $N = 149$, $p = 0.001$, two-tailed); positive correlation between the community capacity carrying and the improvements of CBE ($r = 0.462$, $N = 149$, $p = 0.000$, two-tailed); and positive correlation between the further involving CBE and the sustainability ($r = 0.601$, $N = 149$, $p = 0.000$, two-tailed).

The Spearman rho was applied during the analyses, expressed as a rank to determine the



Figure 4: The volcanic rocks exposed at study area; a. Agglomerate; b. Dike; c. Altered rocks with sulphid minerals, d. Volcanic neck; and e. Lava with collumnar joints. Those are used to deposited very close to the crater or within the crater.

Table 3: Pearsonn Correlation between respondent's demographic profile and intending infrastructure developments (N= 149)

	1	2	3	4	5
1 Age	1				
2 Background Education	**0.416	1			
3 Improving CBE	**0.727	**0.803	1		
4 Management	0.281**	0.109	0.177	1	
5 Sustainability	0.416**	0.402**	0.462**	0.601**	1

**p<0.05

relationship between education, tourism activity, improving management and sustainability in term of carrying community capacity. Because the variables were on a rank scale, Spearman rank correlation coefficients were computed between the variables (Aczel et al., 2006). The relationship of each variable was statistically significant, there were some positive correlations between age, education, activity offered in CBT management, sustainability and the infrastructure developments ($r_s = 0.401, N = 149, p < 0.000$, two-tailed). There was also significant correlation between offering tourism activity and community capacity carrying ($r_s = 0.644, N = 149, p < 0.000$, two-tailed). Table 3 also illustrates that there was a negative correlation between background

education and its management ($r_s = -0.214, N = 149, p < 0.004$, two-tailed), a tourism sustainability ($r_s = 0.546, N = 2, p < 0.000$, two-tailed). Table 4 shows the result of Spearman correlation.

Table 4: Spearman Correlation between background of education and community capacity carrying(N= 149)

		r	p
1	Background Education	0.401**	0.000
2	Tourisme offered	0.644**	0.000
3	Management	-0.214**	-.000
4	Infrastructure	0.546**	0.000
5	Sustainability	.0.356**	0.000

**p<.05

The result of the r_s showed that there were correlations between the educational background of the respondent, tourism activity offered, desired management system, infrastructure development, and the expected sustainability within the carrying community capacity. Although, community resources were identified as ineffective elements in building capacity for tourism development, the findings of this study in fact illustrate that community characteristics can contribute to the community capacity building for tourism development.

5 DISCUSSION

This study has stated that the tourism community, which plays a role in the Giriloyo-Cengkehan ecotourism development has significant effects on the local economic development, especially on the community development effort. Two points of the key, coming from the respondents were educational background and age. People who have higher education have more activate in the (eco-) tourism development; it shows that educational background and age have positive relationship to the community capacity carrying. People with 26-35 years old have more involved and responsible in ecotourism development.

A critical element in carrying community capacity and CBE development is defined as a group of community who able to influence policy, opinion, and action in building BCE by their official role, title, and age (seniority) in the local community. Community management was an important element, role and vital to successful CBE. Hence, understanding relationship between the community characteristics and their attempt on building CBE is important for further planning and marketing Giriloyo-Cengkehan's ecotourism.

6 CONCLUSIONS

CBE is able to develop at Giriloyo-Cengkehan, by its community characteristic; as a central of batik craft, educational geotourism, cruising river outbond and their traditional market. By CBE, from individual management that is not or less effective to be more effective in one CBE management. It also applicable to the virtual and real marketing management, by both real and virtual community-based ecotourism.

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