

## Tagang System Development: The Impacts and Perception of Local Communities in Terbat Mawang Village, Sarawak, Malaysia

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### Abstract

Growing in popularity of tourism industry in Sarawak creates opportunities for economic development. This industry has been recognized as one of the sectors that contribute to the economic growth in the state. The number of tourists willing to visit the unexplored nature and different cultures has sparked and increased the development for the ecotourism industry. This study focuses on the impacts and perception of local communities on Tagang system development in Terbat Mawang Village, Sarawak. The respondents' feedback was analysed using factor analysis and reliability test. The study showed that three subscales components were identified including economic impact, conservation and protection, and ecotourism benefits in the analysis. In short, the socioeconomic and environmental implications captured an excellent opportunity for economic development in the ecotourism industry.

**Keyword:** Tagang System, Local Community Perception, Socioeconomic And Environmental Impact, Ecotourism And Sustainable Development.

### Introduction

Ecotourism in the fields of tourism, conservation and rural development has become a buzzword nowadays. It is said that the objectives of conservation and development is achieved with the opening of the political and economic resources necessary to tourism as noted by Lindberg, Enriquez, & Sproule (1996). National Ecotourism plan defined ecotourism as "environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features, both past and present), that promotes conservation, has a low visitors impacts, and provides for beneficially active socioeconomic involvement of local populations" as noted by Chin (2010). There are four main elements of ecotourism for sustainable development included preventing damages as far as possible, low impact on the environment and local culture, the benefits for

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people at the area and unavoidable repairing for damages that occur. Since its inception, ecotourism is defined in different ways by different groups of people and with different agendas. The definition of ecotourism is ranging from the general and ambiguous to the specific and prescriptive. The 'ecotourism' term has been debated and discussed again and again in almost all meetings and conferences. The definition of Ecotourism that proposed from by Weaver (2002) is *"Ecotourism is a form of tourism that fosters learning experiences and appreciation of the natural environment, or some component thereof, within its associated cultural context. It is managed in accordance with industry best practice to attain environmentally and socio-cultural sustainable outcomes as well as financial viability."*

Malaysia is abundant with natural and cultural wonders. There is about 75% Malaysia forested land area and 60% are virgin rainforest in Malaysia which paved way for Malaysia to be actively involved in ecotourism (Chin, 2010). Malaysia is no doubt inherently rich with natural and cultural assets that make ecotourism highly beneficial, feasible, sustainable and long-term forms of tourism. Ecotourism can contribute to both conservation and development that involves a positive synergistic relationship between tourism, biodiversity and local people which supported by appropriate management as stated by Ross & Wall (1999). Most importantly, the communities will be affected by the project or decision; thus, naturally, they should have an active role and influence in every level of decision making and planning Bagul (2009). In the light of discussing the nature of ecotourism through the plethora of studies, this study recognised the crucial linkages between tourism and the sustainable environmental or agriculture in a community-based system whereby in this sense, this study focuses on Tagang system (TS) in Sarawak. This study will emphasise the perception of local stakeholder on Tagang system development; and the socioeconomic and environmental impact of Tagang system in Terbat Mawang Village, Sarawak.

### **Tagang System**

Sabah is the first state founder of Tagang system in Malaysia that has adopted a traditional knowledge of indigenous peoples for the management of water and aquatic resources through the implementation of the Tagal system. The application of Tagang System in Sarawak is adopted from Tagal System originated from Sabah. Wong, Etoh, & Sujang (2009) defined "Tagal system" which factually can be described as "fishing in rivers is prohibited by the concerned communities for a certain pre-agreed period" with the purpose to restore the depleting fisheries resources, ensure the rivers free from pollution, and generates income to the communities concerned. By the way, the communities still allowed harvesting fish from the rivers but in a sustainable manner. The implementation of Tagang system in Sarawak was defined Tagang as regulation and conservation according to Iban language. Tagang system implementation is intended to overcome the shortage of freshwater resources, prevent pollution of the river and help generate income for the community. Therefore, the goal of the Tagang system not only focused on the conservation of the physical environment but also contributes to the social environment, especially concerning socioeconomic and environmental development. Tagang system's success depends heavily on cooperation between the community and the government, namely "smart-partnership". Thus, the community response is critical in ensuring the system will be able to go on and continue to step onto the international stage.

Pacos (2008) noted that the implementation of Tagal system in Sabah had been made objectives as following;

- To protect river environment from pollution.

- To conserve and protect the fish resources from extinction.
- To improve fish resource production as the primary source of protein for rural people.
- To control the use of uncontrollable fishing methods like fish bombing, electrocution and poisoning.
- To carry out various activities in Tagang zone that could generate income for rural people, such as eco-tourism (snorkelling, fishing sport, etc.)

The implementation of Tagang system project is initiated in 2006 at Long Tuyo in Lawas, Sarawak with the Gazette under State Fisheries Ordinance 2003 (*Laws of Sarawak: State Fisheries Ordinance, 2003, 2006*). In Sarawak, the concept of Tagang is a smart partnership between local community and government agency which is included Inland Fisheries Division (IFD), Agriculture Department in protection, rehabilitation and management of riverine fisheries resources in Sarawak. Tagang project is applying the demarcation or zoning area for rivers that have been selected for Tagang system. Zoning can be defined as 'regulations that demarcate a specific area for different types of land uses and the development standards to be applied within each land use zoning. This is by using a flexible carrying capacity, the degree of variation and fixed in a protected area was launched a space through zoning regulations Weaver (2002). The boundary or zoning of rivers which has been selected as Tagang projects are controlled under rule and regulations. This rules and regulations are executed from Sarawak Agriculture Department power to declare prohibited fishing zone.

### **Ecotourism case study**

This research was conducted in Terbat Mawang Village, Serian which is located in Sarawak, Malaysia. This village can be accessed by the land road that took approximately one hour from Kota Samarahan district, Sarawak. In particular, the journey took about one hour to travel (distance of 69.1 km) to arrive at the research site. Distance from Kota Samarahan to Serian district is 46.7km, which took 40 minutes and 22.4 km from Serian district town to Terbat Mawang Village which is approximately 20 minutes. The passenger fare is RM 4.00 when travelling by van from Terbat Mawang Village to the main town of Serian. There are 80 households with 560 total populations in Terbat Mawang Village which is led by Mr Singil Anak Han. A majority of the local community in Terbat Mawang Village is from the Bidayuh race. Nonetheless, a number of local residents have migrated to the urban areas to seek higher income jobs and because of marriage. This condition affects the overall population that resides in the village during the period in which this research is conducted.

### **Implementation of Tagang system**

The Tagang system that has been implemented in Terbat Mawang Village becomes one of the ecotourism industry for the selected river in this village known as Kedup River with the contribution of effort from three villages constitutes with Terbat Mawang Village, Terbat Leban and Muara Ahi. First General Meeting was conducted on December 4, 2005, at the hall of Terbat Mawang Village was attended by three villages as stated previously. The first meeting was held on behalf of the Department of Fisheries to implement Tagang Kedup River. If consent is received from all the peoples to accept the implementation of the project, then the specific department will give a talk in details, and a Committee shall be established. The meetings outcomes signified that residents expressed full agreement of all present with the recommendations made by the Department of Fisheries to implement Tagang along Kedup

river. In addition to that is the construction of the organisational chart of Tagang committee for Terbat Mawang Village, Terbat Leban and Muara Ahi.

The implementation of Tagang system officially started on 16 June 2006 after Tagang project dialogue council on 12 December 2005. The entire member of Tagang project is 144 individuals. Tagang system that is implemented in Kedup River, Serian is the longest river whereby there are three Tagang projects was launched on this river comprised of Tagang Mentu Tepu Village on the upstream of the river, Tagang Mentu Muara Mongkos Village in the middle and Tagang Terbat Mawang Village at the downstream of the Kedup river. Previously Tagang system that is executed in Terbat Mawang Village has established 3 zones including red zone, yellow and green. However, after the first harvest of Tagang project, the zoned area was too long which made the committees challenging to control and monitor the area since many illegal fishing occurs enforcing the committee shorten the zoned area from 2.5 km to 337 meters. These modifications ended the zoned area reduce from three zones became two zoned areas — the species of fish in the Tagang project comprised of *semah*, *bantak* or *patau* and other small fish, mollusc and crustacean. Along the river, there are species of trees which is produce fruit, called fig and *kelampuk* that will be eaten by fishes when they fall into the river. The facilities that are provided for Tagang system including cottage for fish fertiliser, rest cottage, bridge, cement stone, and toilet. During the period in which the research is conducted, it is investigated that the facilities provided are insufficient for tourist satisfaction because there is no homestay and cafe or restaurant provided. Currently, there is no fee entrance charged because of the condition of fish that are not fully domesticated and also weather condition. One of Tagang committee was appointed to give a portion of food for fish and attempt to tame the fishes.

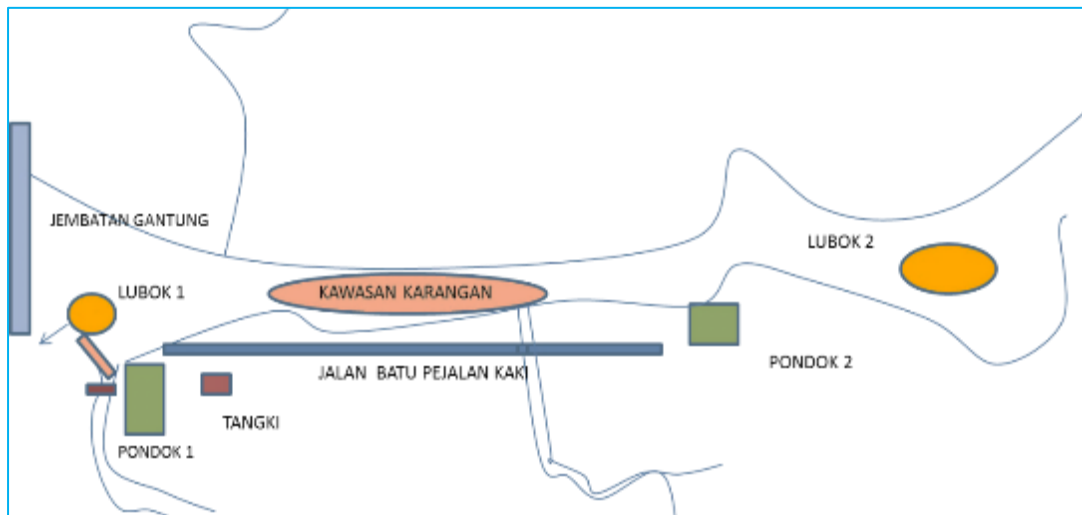
### The location of Tagang project

Based on the (Figure 1.1) Terbat Mawang Village is located as shown in the map marked with the blue arrow. The project location sketches for Tagang system was illustrated in (Figure 1.2) which is a newly zoned area with only two deep hollow or gulf called Lubok 1 and 2. Peoples or tourist can perform fishing activities in Lubok 2.

Figure 1.1: Map of Terbat Mawang Village, Serian.



Figure 1.2: Tagang project location sketches



Sources: Inland Fisheries Division, Agriculture Department.

The implementation of the Tagang system (TS) in Sarawak is adapted from Tagal system at Sabah has becoming increasingly known in the state of Borneo. However, the efforts of TS implementation in Sarawak to be more successful and well known by the community are not effective. Many people have no prior knowledge on the real purpose of the application of TS. In other words, tourist in general or foreign tourist do not know about the existence of TS as there are very few information on TS provided. The implementation of Tagang system essentially provides many benefits to the conservation and preservation of certain species, especially dwindling fish on freshwater, but will give an immense contribution to economic growth in the future if carried out successfully. Indeed, Tagang system is still in the process of developing or in infant stages. Hence, the successful execution of TS perhaps has the potential to move forward from the local visitors and also the foreign tourist with enough knowledge and awareness of the TS site. Therefore, this endeavour will afford encouragement and support to the local community on the progress of implementation TS actively in Borneo. In this study, the authors are interested in studying and analysing the perceptions of internal and external stakeholders on the development of TS in Sarawak. Consequently, the question to be addressed in connection with this study was designed to assess the perception of the local community as stakeholders on Tagang system development and analyse the socioeconomic and environmental impacts of Tagang system in Sarawak. This study was conducted to fill in the gaps of literature on the topic of Tagang system.

### Data & Methodology

This study is employed firstly by identifying the location which implements Tagang system in this case Terbat Mawang Village. 50 questionnaires are distributed randomly to the stakeholder of Tagang system. Various tools were used to analyse information that has been gathered and described different types of data collected include the statistical package for the social sciences (SPSS). Likert scale was used in this study as a scale measurement. The data obtained are appropriately organised and conducted, after encoding as it has been processed by the SPSS version 20 for statistical analysis. Also, the descriptive statistics commonly used for interpretation as stated by Chellan et al. (2005) in previous research. Statistical analysis will cover the factor analysis using Principal component analysis (PCA) was conducted as the variable reduction technique by reducing the original data into the sample

set of variable Dunteman (1989). PCA performed by considering a particular variable that includes into the extraction of components. The factor analyses consist of preliminary analysis, factor rotation and factor extraction which simplified the factor structure. The factor analysis of the preliminary study focused on the Kaiser-Meyer-Olkin (KMO) statistic which is employed to examine the diagonal elements of the anti-image correlation matrix. The factor extraction process is conducted by computing the eigenvalues of the R-matrix to explore the linear component within the eigenvectors. The factor analysis will detect the importance of a particular vector to look the magnitude associated with eigenvalue and determine which factors to retain or discard. The eigenvalues greater than 1 is a benchmark for maintaining factors by using Kaiser's criterion. Then, factor rotation conducted using orthogonal rotation (varimax) to maximise the dispersion of loading within factors to acquire factor structure. Then, the reliability test was constructed to measure the consistency reflect the construction of measuring. Cronbach's alpha,  $\alpha$  indicates the overall reliability of a questionnaire and values around 0.80 are good and 0.70 for ability tests to examine whether the selected model will retain or discard.

### **The Stakeholder Perception**

As stated by Page & Dowling (2002), it is argued that local communities observe ecotourism as an accessible development alternative which can enable them to improve their living standards without having to sell off their natural resources or compromise their culture. Yacob et al. (2007) found that travellers have a different priority to their profile regarding ecotourism resource management and maintenance as well as the results implementation. Therefore, tourist perceptions can yield useful information as a basis for monitoring the ecosystem management, quality and development with high priority to satisfy the needs and experience for effective management and noted that the visitors also believed that there is essential characteristic to preserve the ecotourism resources to guarantee it sustained either short or long-term use. Ojong & Eja (2013) stated that awareness and knowledge of the population are very low concerning the effectiveness of ecotourism has been restricting the number of ecotourism activities. Researchers concluded that the willingness of local communities to participate must be held through direct involvement and prioritise critical issues. Furthermore, public participation and empowerment process is facilitated by proposing ecotourism prototype. According to Mwangi (2005) community has both positive and negative responses to the development of ecotourism, community support for this research. Spanou, Tsegenidi, & Georgiadis (2012) found out that it is essential to define a new policy for prices in combination with a better quality of service. Although, visitors are satisfied and not complaints the ticket prices, however, they show the basic rate should be reconfigured intended to support the need to improve exhibits and infrastructure.

### **Socioeconomic Impact**

Kumar & Kumar (2009) revealed that there are 85% of domestic tourists often visit tourist spots which are Barabar and Nagarjuni hills caves in India. Although foreign tourists are visiting this place, the low number of visitors is due to the various factors such as lack of infrastructure, lack of awareness towards ecotourism among tourist and problem with law and order enforcement. The researcher also discovered that local peoples were very enthusiastic, more low number willingness to participate with government and other stakeholders and harnessing the ecotourism potential of the site which could have far-reaching of socioeconomic impact on the local population. However, ecotourism impact on

the provincial economy has highlighted several ways according to Karmakar (2017). Firstly, revenue generation offer opportunities for redistribution of income and professions that were traditionally left to the mainstream of economic life. Hence, people have the chance to improve their lives through ecotourism. Secondly, the employment opportunities via ecotourism can generates tremendous employment opportunities consequently great incomes to local residents. The prospect has an abundant ability to stimulate economic development. Thirdly, in infrastructure development aspect; tourist groups play an essential role to improve the infrastructure in remote areas. This is due to the foundation for other economic activities such as small-scale industries are relying on infrastructures development. According to Mbaiwa (2005), contrary to the views expressed by Kumar & Kumar (2009) stated that the local communities are actively involved in the field of tourism; and point out that local communities have limited access and control over tourism resources because tourism is entirely controlled by private tour operators and government in the result will not give any advantage towards local people's life. As noted by Weaver (2002), tourism revenues have large positive elasticity concerning entrance fees to protected areas as the primary source of local ecotourism revenue which can be increased without negatively affecting demand. Otherwise, the critical contribution in the ecotourism framework came from Community-based Ecotourism according to Kersten (1997) who defined CBE as a kind of nature tourism wherein the local community maintain full control over the management and profit of the project.

CBE is also mentioned as the grassroots ecotourism which refers to the progenies of sustainable grassroots expansion. This method emphasises local group ownership of ecotourism lodges and noteworthy projects as intervening variables with identifying the importance of economic relations to conservation. Kersten (1997) stated the promoters of community-based ecotourism as "In elementary concept, the community-based ecotourism enterprises managed and owned by the community. The community is taking care of the natural resources they earn through tourism operations and use the income to improve their lives. It involves the preservation, businesses and community development (Lindberg et al., 1996)." According to the proponents, local group ownership is vital to ensure that equal benefits are distributed, and flow to the community rather than only into individual pockets (Kersten, 1997) .

### **Environmental Impact**

Spanou et al. (2012) acknowledge that environmental management and education; and integrated marketing was adopted as essentials for achieving the conservation of the Valley of Butterflies ecotourism. Libanos (2011) revealed that ecotourism has significant influence for environmental defence, preservation and protection for natural and socio-cultural resources. Besides, ecotourism encourages the establishment of the protected area and increase cognisance between local people to worth their natural environment. In contrary, Chellan et al. (2005) indicated that the ecotourism is resulting in adverse impacts which include the accommodation and infrastructure development, noise pollution and animal disturbances. Tonge et al. (2015) found that there is a relationship between the individual dimension of place attachment and pro-environment behaviour. The researchers found that the most essential is place identity which effects on pro-environment behavioural intentions at Ningaloo. Hence, an appropriate manner is needed applied in the protected area to increase the awareness of conserving natural areas for environmental sustainability.

Subsequently, positive and negative environmental impacts resulted from ecotourism has been performed by Bhaskarn & Premavathi (2014) in their studies. Researchers have identified several factors that affect the environment positively on ecotourism including generating revenue, refining the environmental quality, improving infrastructure and helping in the revival of dying arts and crafts to enhanced tourism. In contrast, ecotourism also contributes negative impacts on environmental such as the creation of environmental disturbances, invasion of tourist affect feeding and breeding for wild animals, pollution includes vehicles combustion and garbage disposal. Bhaskarn & Premavathi (2014) suggested the application of environmentally friendly measures for instances reusing, recycling and reducing of resources to make the ecotourism successful. Eshetu (2014) highlighted the ecotourism is a relatively less-pollutant industry which can enrich the conservation and dissemination of natural and cultural heritage. The researchers also emphasised that ecotourism confront pressure on encumbrance for local environments and requirements to build additional infrastructures and facilities for visitor and ecotourism activities.

### Ecotourism and Sustainable Development

Angelkova et al. (2012) stated that tourism activity would give a huge impact on sustainable development. They further state that there is a higher chance for the development of sustainable tourism and the preservation of its competitiveness in the quality of the environment to preserve the natural heritage and fascinating culture and values of other goods and resources. Jayaraman et al. (2010) pointed out that the conservation and preservation of the common areas were maintained and improved to ensure a higher standard of living for the local community. The fundamental strategy to enhance the sustainability of tourism is fully utilised of taxes and subsidies to improve the facilities of economic, environmental and social infrastructure.

Drumm & Moore (2005) highlighted a few key considerations for ecotourism development at the community level. The key considerations also called as a fundamental principle that should be considered in planning for community involvement in ecotourism activities comprised with creating a partnership, avoid putting all eggs in the ecotourism basket and link the ecotourism benefit to conservation. At the same time, society should be considered as value added for their participation leading to ecotourism products and the interests of the involvement for the development of sustainable communities as active community participation in ecotourism is good for business and environmental conservation.

## Findings

### Descriptive Analysis

#### 1. Respondents Demographic

Table 1.1

*Demographic profile of the respondents*

(N = 44)

Items	%	Items	%	Items	%
<b>Gender</b>		<b>Household</b>		<b>Education</b>	
Male	36.4	1 – 3	13.6	No formal education	25.0
Female	63.6	4 – 6	38.6	Primary school	36.4
		7 – 9	31.8	Secondary school	31.8
		10 – 12	9.1	Diploma	4.5
				Other	2.3

Age		Income (RM)		Employment	
16 - 20	9.1	100 – 200	13.6	Private sector employee	2.3
21 - 30	9.1	300 – 400	47.7	Retired	2.3
31 - 40	18.2	500 – 600	11.4	Student	6.8
41 - 50	22.7	700 – 800	2.3	Unemployed	4.5
51 - 60	15.9	900 – 1000	4.5	Running own business	25.0
61+	25.0	2000+	6.8	Other	59.1

Table 1.1 shows the demographic profile of local community respondents included 44 respondents in total for sample size in Terbat Mawang Village. There was slightly more female as 63.6% than male only 36.4%, and most of the respondents were older than 61 years above due to the migration of young community to the urban area to seek a high income for enduring their lifelong. The highest percentage contributed as well as 36.4%, and 31.8% of the local community in the sample set had primary and secondary school education respectively. Furthermore, the percentage indicates that the local community in Terbat Mawang Village is well educated with 75% of the respondents' feedback was completed education with the difference of education level. Subsequently, a majority of the respondents running their own business as their primary employment which has contributes 25% and others job top the employment with the combination of various job which is counted the most significant percentage at 59%. Next, 38.6 of the number of household in a family were found that constitutes a range from four to six members per household. Household monthly income was grouped within six income level. The statistic shows that almost 50 per cent which is 47.7% of the respondent worth RM300 to RM400 in numeric for their monthly income which indicates a very low level of income compared to the average Sarawak income which is RM4,934 (2014).

### Respondent Feedback

The respondent's feedback individually for all range of 5 points Likert scale as illustrated in Figure 2.1. Then, based on figure indicated the respondents' feedback in term of percentages (%) which clustering all the stakeholder perceptions into strongly disagree, disagree, neutral, agree and strongly agree according to the Likert scale that has been designated which shows that the enormous portion of scale held by the 'agree' responds with 36 per cent of the respondent feedback. The 'disagree' replies followed this portion with 20% of the respondent feedback. Also, from the figure, the survey questionnaire was distributed to the stakeholder contributes only 13 per cent in the minority for 'strongly disagree' portion.

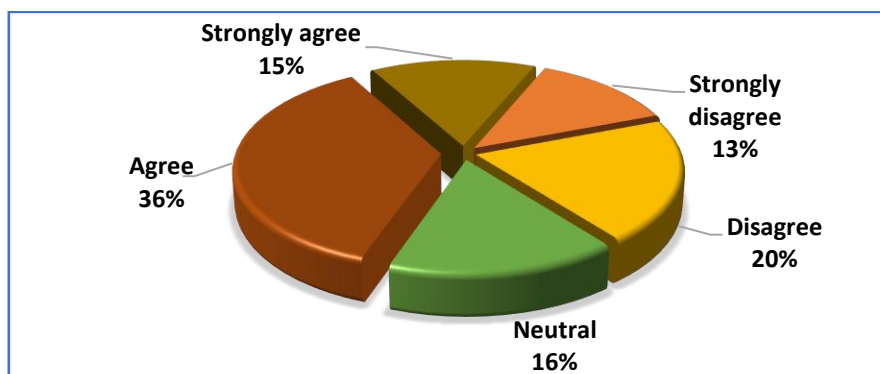


Figure 2.1: The overall respondent's feedback in percentage (%).

Sources: Author's survey output.

### Descriptive Analysis of the Ecotourism

Based on Table 2.2, the results of the descriptive statistical study of stakeholder perceptions were presented the mean scores of the stakeholder perceptions ranged from 1.86 to 6.16. The lowest score is item Q20 which indicates that the tourist not created the unfavourable effects towards the local community but in a contrary way. While the highest score is item Q14 which means ecotourism generates more benefits in environmental perspectives.

Table 2.2

*Descriptive Statistics of Ecotourism on local community (LC)*

Ecotourism attributes	Mean	S.D.
Q1 Improves the well-being of the LC.	4.77	1.750
Q2 Generates greater employment opportunities.	4.30	1.936
Q3 TS increases the development of the tourism sector in Sarawak.	5.48	1.422
Q4 Enhances the public utility development.	5.34	1.554
Q5 Increase the number of tourists.	5.09	1.552
Q6 Increase the income of LC.	3.75	1.713
Q7 Overall, provide more advantages than disadvantages in the economics' view.	5.66	1.446
Q8 Increases the protection of the riverine system and its ecology.	5.64	1.464
Q9 Cause the river and its fishes to be more manageable.	5.95	1.033
Q10 Cause the river quality to be polluted.	2.80	2.053
Q11 Cause disruption in fish breeding.	2.52	1.898
Q12 Cause disruptions in Tagang zones.	1.93	1.021
Q13 Increase the variety of fish species.	5.68	1.459
Q14 Overall, provide more advantages than disadvantages in the environmental perspective.	6.16	.834
Q15 Increase the standard of living of the LC.	4.84	1.539
Q16 Increase crime rate and security issues.	2.95	2.011
Q17 Lead to illegal fishing.	2.80	1.924
Q18 It is burdensome for LC to communicate with international tourists.	3.64	2.263
Q19 Tourists attracted to the culture and heritage of the LC.	5.07	1.934

Q20 Tourist can create undesirable effects towards the LC.	1.86	1.651
Q21 Overall, provide more advantages than disadvantages to the social perspective	5.82	1.544

### Findings

The respondent feedback on the socioeconomic and environmental impact on ecotourism development focused on Tagang system was analysed by using factor analysis and reliability test. Firstly, a Principal component analysis (PCA) was conducted on 15 items extracted from SPSS output of total variance. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis (KMO statistic) is .731 which is good after passing through three stage removal of variables by removing six variables, the factor analysis is appropriate consistent with all the variables value are above the bare minimum of .50. Bartlett's test of Sphericity  $X^2 (105) = 268.286$ ,  $p < .000$  indicated the correlation between items were adequately large for PCA analysis according to Field (2009).

Table 2.3

#### KMO-statistic and Bartlett's Analysis

Items	Stage removal of variables			
	Initial	First	Second	Third
KMO stat.	.461	.593	.662	<b>.731</b>
<i>Approx. <math>X^2</math></i>	514.395	358.418	306.586	<b>268.286</b>
Sig.	.000	.000	.000	<b>.000</b>
Items excluded	Q12, Q13, Q20, and Q21	Q14	Q18	-

### Factor extraction

Based on the SPSS output the eigenvalues associated with each linear component before extraction, after extraction and rotation. Before the extraction of initial eigenvalues, SPSS has identified 15 linear components within the data set. In this study, the first factor explains 32.103% of the total variance. The SPSS output showed five components with the eigenvalues greater than one in this study. The results before rotation indicate component 1 accounted for considerably more variance than the remaining four components which is 32.103% compared to 16.443, 8.696, 7.606 and 6.875%. After the extraction, component 1 account for only 18.058% of variance to 17.816, 13.846, 12.056 and 9.947% respectively.

The rotated component matrix shows there are 5 factors of variables load very highly into only one factor except for question 19. The suppression of loading was less than 0.50 and ordering the variables by loading size. The suggestion components of clusters are tabulated as following into 5 components. Then, the reliability test was conducted individually on the extraction of components from the rotated component matrix. The component will be retained when the Cronbach's Alpha above .70 while will be discarded on the contrary. There are 5 components extracted as follows;

Component	Item	Cronbach's Alpha, $\alpha$	Retain/ Discard
1 (Economic impact)	2, 15, 6, 1	.805	Retain
2 (Conservation & protection)	9, 8, 16	-1.059 <sup>a</sup> (.725 <sup>b</sup> )	Retain (After deletion item 16)

3 (Ecotourism Benefit)	5, 3, 4	.705	Retain
4 (Negative impact)	10, 17	.509	Discard
5 (Disruption and attraction)	11, 19	-1.420 <sup>a</sup> (.587) <sup>b</sup>	Discard (After the reversed scoring items)

<sup>a</sup> Before adjustment, <sup>b</sup> After adjustment.

### Summary of Factor Analysis

Table 2.4: Summary of factor analysis for the Ecotourism questionnaire on local community (LC) in Terbat Mawang Village, Sarawak. ( $n=44$ )

Ecotourism Items	Rotated Factor Loadings				
	1	2	3	4	5
Generates greater employment opportunities.	<b>.802</b>	-.138	.310	.111	-.174
Can increase the standard of living of the LC.	<b>.783</b>	.095	-.068	-.139	.412
Activities increase the income of LC.	<b>.722</b>	.156	.284	-.168	.223
Improves the economic well-being of the LC.	<b>.619</b>	.476	.268	-.128	-.034
Activities cause the river and its fishes to be more manageable.	-.051	<b>.902</b>	.019	-.067	.091
Increase the protection of the riverine system and its ecology.	.146	<b>.749</b>	-.155	-.298	.001
Increase crime rate and security issues.	-.172	<b>-.583</b>	-.179	.479	-.069
Activities increase the number of tourists.	.097	-.036	<b>.861</b>	-.007	-.075
TS increases the development of the tourism sector in Sarawak.	.263	-.037	<b>.786</b>	-.054	.225
Enhances the public utility development.	.175	.445	<b>.519</b>	.133	.296
Activities cause the river quality to be polluted.	-.103	-.016	-.118	<b>.874</b>	-.072
Can lead to illegal fishing.	.070	-.314	.103	<b>.598</b>	-.192
Overall, provide more advantages than disadvantages in the economics views.	.376	.329	-.294	-.478	.005
Activities cause disruption in fish breeding.	-.077	-.034	-.165	.191	<b>-.865</b>
Tourists are attracted to the culture and heritage of the LC.	.472	.520	-.022	-.061	<b>.542</b>
Eigenvalue	4.815	2.466	1.304	1.141	1.031
% of variance	32.103	16.443	8.696	7.606	6.875
Cronbach's $\alpha$	.805	.725	.705	.509	.587
***	<b>R</b>	<b>R</b>	<b>R</b>	<b>D</b>	<b>D</b>

Note: Factor loading over .50 appears in bold.

\*\*\***R** represents retain the component, **D** represent discard the component.

Then, all the individual items were above .50 is acceptable according to Field (2009) after the adjustment and removal of six items. The factor loading after rotation listed five components which are identified as positive and negative impacts of ecotourism. Furthermore, only three sub-scales which are clustered as economic impact, conservation and protection, and ecotourism benefits were retained as an essential factor. The result of this study was retaining 3 model had been supported from the previous research by Tonge et al. (2015) and Rhead, Elliot, & Upham (2011). According to the analyses, the economic impact is reliable for generating greater employment opportunity, increasing the standard of living, increase income and improving economic well-being. Secondly, items that reliable was cluster as conservation and protection by increasing the protection of riverine system and its ecology, and cause the river to be more manageable. Next, third components of ecotourism benefiting the local communities was identified would enhance public utility development, increase the number of tourist and development of the tourism sector. So, it can be concluded that only 3 component constitutes with component 1, 2, and 3 will be retained in this study whereby other 2 components will be discarded since the Cronbach's alpha was not liberated from the range of .70.

### **Interview Outcomes**

Mr Francis Ak. John Mutu as a Chairman of Tagang system in Terbat Mawang Village has been interviewed by the author considering three aspects comprising socioeconomic impact and environmental impact. From the economic viewpoint, the Chairman said that ecotourism is less satisfactory because it is not profitable even though has numerous members. However, he stressed again this system would improve the economic well-being of local communities and increasing employment in the future. He suggests that ecotourism is aiding the growth of tourism sector particular in Sarawak and improve public facilities with successful implementation. At this point, the numbers of tourists visiting the protected area are not encouraging as there are many weaknesses and shortcomings within the execution and management of a project.

Regarding security, tourism activity does not trigger criminal activity and severe security problems from the social impact side because the Tagang committee has enacted the laws and regulation which is fully applied. Thus, individuals who are proven guilty will be given fine for RM500. The environmental impact, he agreed that eco-system could improve the protection of the river and its ecology which also make the river and the fish become more manageable with TS. He denied that ecotourism is causing the quality of the river became contaminated and caused reproductive disorders in fish and Tagang zone. Instead, he asserts that these activities help to increase the variety of fish species.

Next, he believed that the participation of the overall local community in TS is inadequate. Fishes in the Tagang area also yet to be tamed caused difficulties for the committee to impose the appropriate entrance fee. He suggested that the Department of Agriculture and Tagang Committee should work together to improve ecotourism for Tagang system development. He also added that by visiting the nearby villages and knowledge sharing will help to raise awareness about Tagang system. Moreover, knowledge of the population about the importance of exercise on Tagang system can be implemented through the awareness program. Overall, he concluded that ecotourism conveys more advantage than disadvantage from an environmental standpoint.

**SWOT Analysis**

<b>Strength</b> - Types of fish preserved were demanded - Culture and heritage attraction - Community enthusiasm to cooperate - Good and strategic place of the river	<b>Weaknesses</b> - Financial constraint - Lack of participation from the community - Insufficient advertising - Weather condition
<b>Opportunity</b> - Increase local community income - Job creation for the local community - Enhances the ecotourism development - Development of public utilities	<b>Threat</b> - Illegal fishing - Natural disaster (Flooding, drought) - Reluctant of local community awareness - Difficulties on divulgation for tourist

**Discussion**

Consistent with the objective of the study, this research was emphasised on the perception of the local community, and the impact on ecotourism development in Sarawak. Currently, the implementation of Tagang system in Terbat Mawang Village was lack of performance because the committee vis-à-vis many impediments and problem to become successful in Tagang system. The local community perception concentrated on socioeconomic and environmental impact measured by the Likert scale.

Overall for economic impact, 80% of the respondent consent the implementation of Tagang system will increase the number of tourist and development of tourism sector enhances the public utility development consistent with the previous study from (Eshetu, 2014). Nevertheless, the execution of Tagang system in Terbat Mawang Village is at the infant stage. The amenities for Tagang project requires improvement for tourist convenience and satisfaction when stopover at the zoned area. The number of tourists visiting the protected area is generally low in numbers mainly because of the low advertisement coverage. This study revealed that low participation of local communities and only focused on a few individuals. This condition caused Tagang system member had not satisfied with the revenue generated from Tagang projects. Bagul (2009) emphasised that ecotourism required local community's participation to achieve success. Thus, lack of overall involvement of the communities slows down the process to be successful because the workforce is insufficient which hinder the committee to gain their goals and expand outcomes from Tagang system. Thus, the Tagang committee should improve and rearrange their ecotourism management involving the community (Moswete, 2009). The willingness to participate of the local community and their collaboration is necessary because locals are the primary driver and fundamental elements to be active participation for successful development (Bagul, 2009) and (Eshetu, 2014). Barkin (1996) highly accentuated the essential involvement of the local community in ecotourism development as; *"...unless ecotourism actively incorporates the local society in to service planning and provision, and includes programs to meet the fundamental needs for income and employment for all people in the locality, the special quality of the site and its flora and fauna may be irreparably damaged"*.

For environmental impact, 91 per cent of respondents computed agreed that Tagang system will increase the protection of riverine system and its ecology, increase the variety of fish species, and cause the river and its fishes to be more manageable. When considering the effect of protection and management on environmental concern, the previous studies from Spanou et al. (2012) supported the opinion that higher protection and management will be good for the positive impact from environmental aspect. Contrary to the previous research

from Bhaskarn & Premavathi (2014), this study identified that the ecotourism activities does not affect the river quality to be polluted, disruptions in fish breeding and also in Tagang zoned. As it is previously mentioned, Tagang system is at its infant stages and consequently, negative impacts were not affected the Tagang projects due to the low number of tourist and the well-management from the Tagang community. However, the situation may change in the future with the rising number of visitors.

Furthermore, Tagang system increased the variety of fish species based on the respondent feedback in this study. This circumstance positively influences to eradicate the extinction of fishes in the future. The conservation of riverine system benefited especially for local communities to perceive the significant protection and preservation on the riverine system to preserve the quality water and habitat in the river.

As might be expected, the social impact gathered overall 70% assent that tourist was attracted to the culture and heritage of the local community. Based on respondent feedback, they disagree that ecotourism can lead to illegal fishing. There are a few individuals do not concern will be given penalty or fine by doing illegal fishing. In addition, a majority of the research participant agree that tourists are attracted to the culture and heritage of the local community. Significant cultural attraction is exotic, especially for foreign tourist (Penney, 2014). The uniqueness of culture and heritage of local communities will attract tourist to experience both ecotourism and culture in the village as supported by Desai (2010) and Liou (2013). The culture and heritage in Terbat Mawang Village comprised with traditional foods, dance, arts and crafts; and Gawai Festival.

Subsequently, the implementation of Tagang system assented able to increase the standard living of local community through properly manage and control; with the collaboration of overall participation added by the awareness of significant and benefit of ecotourism (Libanos, 2011). The finding indicates no improvement regarding the standard living of communities because the popularity of Tagang system still not exposed to outside tourist. Hence, the number of tourists is deficient with no fee entrance imposed will caused ecotourism activities to encounter difficulties to gain profit from this project. As a conclusion, a majority of the respondents indicated that the existence of ecotourism activities has been benefiting them in socioeconomic and environmental aspects based on feedback from respondents. The limitation includes limited studies causing this research to have inadequate references particularly on Tagang system. Nevertheless, this study was conducted generally as one of the point of reference of Tagal or Tagang system for the ecotourism industry development in Malaysia particularly in Borneo.

## **Conclusions**

This study attempts to identify the core variables of the application of Tagang system framework in Terbat Mawang Village, Sarawak, Malaysia. The factor analysis produced four factors which are Economic Impact, Conservation and Protection and Ecotourism Benefit with each factor having an acceptable level of reliability (Cronbach's Alpha). Tagang system is still considered at its infant stage even though it was established more than 10 years to date. The implementation of Tagang system in Terbat Mawang Village, Serian confront many impediments and challenges to become successful. Several policies or mechanisms are recommended to improve the Tagang system implementation including developing and sustaining stronger ecotourism based policies, encouraging community-based ecotourism, optimising protection, conservation and awareness towards the Tagang ecosystem; and upgrading infrastructure and amenities from time to time. Furthermore, the cooperation

between multi-stakeholders are important so that the synchronization would ensure long-run sustainability of the system towards the ecosystem as well as generating revenue and employment prospects to the local communities.

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