Giving Increased value to Invertebrates through Ecotourism

Ak. Mohd Rafiq Ak. Matusin[1], Norazah Mohd Suki[2], Mahadimenakbar Mohamed Dawood[3] and Fiffy Hanisdah Saikim[4]

***Abstract*—**Invertebrates form an estimated 73.5 % of life on earth and are often considered to be most significant component of biodiversity in terms of their diversity and role in ecosystem functioning. Conservation measures for invertebrates are largely inadequate. Conservation efforts can be improved in the context of ecotourism. This paper seeks to determine and examine the overview of response of tourist to the concept of inclusion of invertebrate's information in ecotourism activities, to obtain an overview of the current levels of the inclusion of information on invertebrates in certain types of ecotourism activities and to provide recommendations on how to address the lack of invertebrates information in ecotourism.

***Keywords*—**biodiversity, ecotourism, invertebrates, conservation

I. Introduction

THE majority of organisms in the Kingdom of Animalia, in terms of both abundance and species, are invertebrates. Invertebrates form about 73.5 % of organism on earth (Hammond, 1995) and are often considered to be the most significant component of biodiversity in terms of their diversity role in ecosystem functioning (Horwitz *et al.*, 1999). Scientists have calculated that approximately 30 000 species of plants and animals are lost every year due to human activities, and most of these losses are invertebrates (Eldredge, 1998).

Negative perceptions of invertebrates contribute to the inadequacy of their conservation. Many people in developed first world countries view invertebrates, especially insects, with disgust, focusing them to be dangerous, poisonous or carriers of disease (Horwitz *et al.*, 1999)

Globally, the inclusion of invertebrates in ecotourism activities is rare. Where invertebrate-focused tours do take place it is inevitably to view a spectacular phenomenon created by a large collection of one type of insect. This suggests that there is potential for the inclusion of a focus on invertebrates in ecotourism activities. The benefits include increased awareness of invertebrates which will result in support for their conservation, and improved products and services offered by ecotourism operators, especially those in areas which do not have the Big Five.

This study aimed to investigate the potential for including information on invertebrates in certain ecotourism activities. The objectives of the research were to determine the response of tourists to the concept of including such information in current and planned ecotourism activities, to examine the opinions and attitudes of selected people working in the ecotourism field to the concept of including more information on invertebrates in ecotourism activities, to obtain an overview of the current levels of the inclusion of information on invertebrates in certain types of ecotourism activities and to provide recommendations on how to address the lack of invertebrates information in ecotourism.

II. Procedure

To achieve the objectives, three main methods were used, namely structured and standardized questionnaire that will be design according to the research objectives, observations based on tour guides interpretation during tourist's activities (guide tour) and interviews sessions with tourists and tour guides. The three methods were chosen to ensure that the following information were that crucial for the research can be obtained. The information includes:

A. Attitudes of tourist to the inclusion of invertebrates in ecotourism activities

A structured, standardized questionnaire were used to assess the response of tourists to: (i) the integration of invertebrate-focused tourism into current tourism activities; (ii) ecotourism activities focusing almost entirely on invertebrates and (iii) inclusion of indigenous knowledge on invertebrates

B. Assessment of extent of invertebrate inclusion in existing activities

Data were collected by participating in: a guided night drive, a guided walk and guided wilderness trail at the Tabin Wildlife Reserve. Observations were made regarding the type of information guides gave to tourists, noting in any particular any information on invertebrates.

Ak. Mohd Rafiq Ak. Matusin[1] Institute for Tropical Biology and Conservation , Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah (corresponding author's phone: 0135556221 ; e-mail: akmohdrafiq@gmail.com).

Fiffy Hanisdah Saikim[2], Institute for Tropical Biology and Conservation , Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah (e-mail: hanisdah.fiffy@gmail.com).

C.Development of recommendations for invertebrates for inclusion in existing ecotourism activities

A record was made of any invertebrates easily observed during the course of guided walk and drive in Tabin Wildlife Reserve. This was done in order to contribute toward assessing the feasibility of including a focus on invertebrates in ecotourism activities and to identify examples of invertebrates that could be included in ecotourism.

III. Results And Discussion

For demographic data, statistical analyses showed that there were 170 respondents in total in which male has the highest number of group gender, 60.6% and female only has 39.4%, and 80.6% of the respondents were tourists. Malaysia showed the highest number of respondent 19.4%, followed by Netherland, 17.6%, China 16.5%, German and Italy, 9.4%, Denmark 7.1%, Canada 5.3%, U.S.A and France 4.7 %, Japan 3.5% and Singapore 2.4%. The age's range, 25.9 % of respondents were aged within 43 and above, 23.5% aged within 33-37, 18.2% aged within 38-42, 13.5% aged within 28-32, 12.9% aged within 23-27 and the lowest age within 18-22, 5.9%. Respondent's education background majority were Bachelor Degree holder (52.9%) followed by Diploma holder (18.8%), High school/Matriculation (12.9%), Master Degree holder (11.2%) and the lowest was Vocational (4.1%).

Structural Equation Modeling

Structural Equation Modeling (SEM) technique utilizing Analysis of Moment Structure (AMOS) computer programme version 21 was carried out with the aims to examine the strength of the relationships between latent variables and observed variable as posited in the research hypotheses and the conceptual framework for simultaneous test that chains multiple regressions with confirmatory factor analysis to estimate simultaneously a series interrelated dependence relationships. The SEM analysis is performed through two phases: measurement model and structural model. Measurement model comprises 2 components: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Details as described as follows.

Measurement Model – Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is executed via Statistical Package for Social Sciences (SPSS) computer programme version 20 with the aims for data reduction of items that is below the recommended value of 0.50 to well represent its expected factor for further analysis. Results as presented in Table 1 details the items loadings, beside the Cronbach's Alpha values for all factor, i.e. Awareness, Interest, Willingness, Activities, Supports, and Ecotourism. It is noted that the loading items greater than 0.50, and Cronbach's Alpha value exceed 0.70 to consider the items load heavily to its respective factor and reliable for subsequent level of analysis (Hair *et al.*, 2010). All factor investigated in this study were designed in five question items. During the EFA, all items are reliable to measure its respective factor as it fulfilled the requirements of having loadings above 0.50 with no cross-loadings. However two factors, Awareness and Interest were required to eliminate 1 item each for having loadings below 0.50. Indeed, all constructs have Cronbach's Alpha values beyond 0.70 i.e. Support (0.873), followed by Ecotourism (0.860), Interest (0.845), Willingness (0.845), and Activities (0.815), respectively. Awareness was the lowest value of Cronbach's Alpha (0.783). Thus, all factors had high internal consistency

Table 1: Items Loadings

Construct	Items	Standardised Loading	Cronbach's Alpha
Awareness	A2	0.806	0.783
	A3	0.734	
	A4	0.759	
	A5	0.790	
Interest	B1	0.760	0.845
	B2	0.805	
	B3	0.830	
	B5	0.613	
Willingness	C1	0.811	0.845
	C2	0.772	
	C3	0.830	
	C4	0.764	
	C5	0.785	
Activities	D1	0.798	0.815
	D2	0.813	
	D3	0.819	
	D4	0.781	
	D5	0.645	
Supports	Es1	0.864	0.873
	Es2	0.794	
	Es3	0.905	
	Es4	0.777	
	Es5	0.724	
Ecotourism	F1	0.794	0.860
	F2	0.855	
	F3	0.788	
	F4	0.845	
	F5	0.748	

Measurement Model – Confirmatory Factor Analysis

After each items load heavily to its respective factor in the EFA stage, Confirmatory Factor Analysis (CFA) utilizing Structural Equation Modelling (SEM technique via Analysis of Moment Structure (AMOS) computer programme version 21 was performed to test the measurement model whether has a satisfactory level of validity and reliability before testing for a significant relationship in the structural model. It was performed with the aims to test the validity and reliability of each construct before testing for a significant relationship in structural model, including Standardised Item Loadings, Construct Reliability, and Average Variance Extracted (AVE). It is a requirement that any item that does not fit the measurement model due low Standardised Item Loadings (i.e. loadings <0.70) need to be removed from further analysis (Fornell & Larcker, 1981; Ifinedo, 2006). Furthermore, the Composite Reliability value for each factor must exceed 0.70, and Average Variance Extracted (AVE) must surpass 0.50 to have acceptable results (Hair *et al.*, 2010). Table 2 depicts the reliabilities and validities for each factor, including Standardised Loadings for each item, Construct Reliability

and Average Variance Extracted (AVE).

Table 2 details that the Standardised Loadings for each item, Construct Reliability and Average Variance Extracted (AVE), fulfilled the minimum requirements stated above. Before that, there is an item is discarded for Willingness factor and Support factor, while 2 items each are eliminated for Interest factor and Activities factor to improve the model fit. Next, the Cronbach's Alpha value for this model shows that Support has the highest Cronbach's Alpha value (0.870), followed by Ecotourism (0.860), Willingness (0.814), Activities (0.807), Awareness (0.783), and Interest (0.769), respectively.

Table 2: Items Reliabilities and Validities

Construct	Items	Standardised Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Awareness	A2	0.681	0.783	0.806	0.510
	A3	0.747			
	A4	0.650			
	A5	0.772			
Interest	B1	0.698	0.769	0.754	0.506
	B2	0.726			
	B3	0.709			
Willingness	C1	0.761	0.814	0.855	0.596
	C2	0.730			
	C3	0.825			
	C4	0.769			
Activities	D1	0.584	0.807	0.871	0.701
	D2	0.915			
	D3	0.926			
Supports	Es1	0.875	0.870	0.873	0.636
	Es2	0.692			
	Es3	0.919			
	Es4	0.674			
Ecotourism	F1	0.749	0.860	0.849	0.534
	F2	0.763			
	F3	0.779			
	F4	0.799			
	F5	0.529			

For Composite Reliability (CR), Support had the highest value (0.873), followed by Activities (0.871), Willingness (0.855), Ecotourism (0.849), Awareness (0.806) and Interest (0.754). Next, the Average Variance Extracted (AVE) revealed that Activities came the highest (0.701), followed by Support (0.636), Willingness (0.596), Ecotourism (0.534), Awareness (0.510) and Interest (0.506). All variables showed high value than the threshold, this indicating good convergent validity.

Correlation Analysis

Discriminant Validity examines the extent to which a construct is truly distinct from other constructs tested (Hair *et al*., 2010), by comparing the value of Average Variance Extracted (AVE) value with correlation squared (Fornell & Larcker, 1981). Table 3 specifies the correlation matrix for constructs where there is a significant positive correlation between all variables at 0.01 level. For instance, Support highly correlated with Ecotourism (r=0.574, p<0.01), followed by Willingness (r=0.514, p<0.01), and Activities (r=0.432, p<0.01). Indeed, Awareness (r=0.385, p<0.01) and Interest (r=0.284, p<0.01) also significantly correlated with Ecotourism. Hence, there is no multicollinearity problem in this research. For the skewness, it ranges between -0.870 to -0.204, which is below ±2.0, while Kurtosis ranges between -0.745 to 1.090, lower than ± 10. Both results lead the model to be in a normal distribution or Bell-shaped curve. Next, means for all factor range between 3.950 to 4.324 on a scale of 1=strongly disagree to 5=strongly agree, inferring respondents mostly had positive attitude toward ecotourism.

Table 3: Correlation Analysis

	Awareness	Interest	Willingness	Activities	Support	Ecotourism
Awareness	0.714					
Interest	0.763 **	0.711				
Willingness	0.718**	0.625**	0.772			
Activities	0.567**	0.524**	0.615**	0.837		
Support	0.427**	0.352**	0.609**	0.402**	0.797	
Ecotourism	0.385**	0.284**	0.514**	0.432**	0.574**	0.731
Mean	4.216	4.324	4.196	4.121	3.950	4.262
Std Deviation	0.619	0.566	0.598	0.621	0.730	0.583
Skewness	-0.664	-.0870	-0.267	-0.204	-0.345	-.0861
Kurtosis	-.077	0.723	-0.413	-0.734	-0.745	1.090

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

Structural Model

The structural model in SEM was evaluated by examining several fit indices, besides examined the strength of the relationships between independent variables and dependent variables simultaneously. Table 4 presents the results of the overall Goodness-of-fit Indices for the structural model. To have best fit value, fit indices value for CFI, GFI and NFI must above 0.90 and RMSEA below 0.80 (Bentler, 1990; Byrne, 2001). Results specified that the $\chi 2$ of the model was 218.909 with 105 degrees of freedom. The fit indices value of $\chi 2$/df=2.085 and RMSEA of 0.080. Values of PNFI and PCFI were 0.613 and 0.645 respectively, which were exceeded 0.50. In addition, the fit indices value for CFI = 0.940 (>0.90), and GFI = 0.885 (>0.80), specifying that all indices surpassed the respective common acceptance levels that was suggested by previous research (Bentler, 1990; Byrne, 2001). Hence, the structural model has a satisfactory model fit.

Table 4: Goodness-of-fit Indices for Structural Model

	X^2	df	X^2/df	CFI	GFI	NFI	RMSEA	PNFI	PCFI
Recommended Value	N/A	N/A	< 3.0	> 0.9	> 0.9	> 0.9	< 0.08	> 0.5	> 0.5
Model Values	218.909	105	2.085	0.940	0.885	0.894	0.080	0.613	0.645

Figure 1 displays the structural model which examines the relationships between independent variables (i.e. Awareness, Interest, Willingness, Activities, and Supports) on the dependent variable (i.e. Ecotourism). Specifically, the SEM analysis revealed that 51% variance of ecotourism is well explained by all the five independent variables (i.e. awareness, interest, willingness, activities, and supports). H1 posited that awareness has significant positive relationship with ecotourism. Table 5 exemplifies that H1 is insignificant ($\beta 1 = 0.081$, $p>0.05$), implying the hypothesis1 is not supported. Correspondingly, the next factor, interest also not able to affect ecotourism as $p>0.50$ ($\beta 2 = -0.164$, $p=0.538$). Thus, H2 is not maintained.

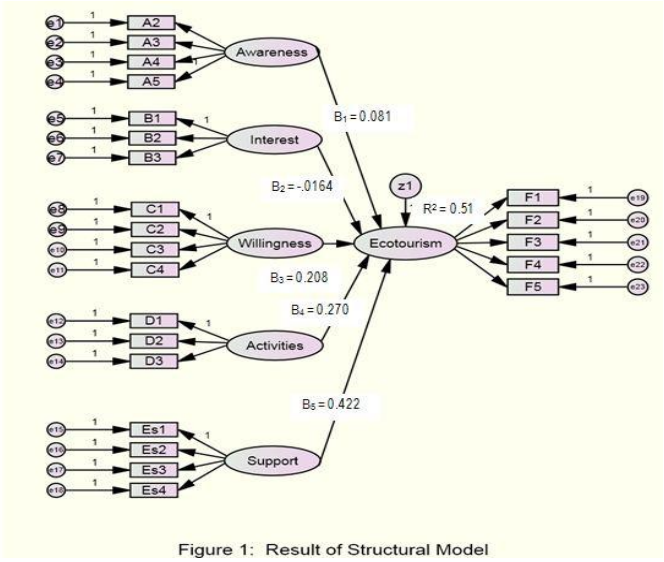

Figure 1: Result of Structural Model

The ensuing hypothesis, H3 proposed that activities have significant positive relationship with ecotourism. Results as presented in Table 5 indicates that H3 is maintained as activities significantly and positively affect ecotourism ($\beta 3=0.270$, $p<0.05$). Likewise, ecotourism is also influenced by support factor ($\beta 4=0.422$, $p<0.05$). SEM confirmed that this factor had highest standardized beta coefficients, implying it is the most imperative factor influencing ecotourism. Hence, H4 is sustained. However, the opposite findings is found in the final hypothesis, H5, where the relationship between willingness and ecotourism is insignificant ($\beta 5=0.208$, $p>0.05$), inferring H5 is rejected.

Table 5: Relationships on Ecotourism

Paths			Estimate	S.E	C.R	*p*
HI	Awareness	--- > Ecotourism	0.081	0.113	0.410	0.682
H2	Interest	--- > Ecotourism	-0.164	0.211	-0.616	0.538
H3	Activities	--- > Ecotourism	0.270	0.090	2.595	0.009*
H4	Support	--- > Ecotourism	0.422	0.061	4.152	0.000*
H5	Willingness	--- > Ecotourism	0.208	0.138	1.117	0.264

*$p<0.05$

IV. Conclusion

This paper proposes that a cost-effective and efficient means of raising awareness of invertebrates should be included in existing and future ecotourism activities. In the process some form of value will be applied to them. The inclusion of invertebrates in ecotourism services and products would also enhance the quality of both conservation measure and tourism industry, and thus their competitiveness.

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