

## Performance Indicators of Energy Security and Sustainable Tourism in Enhancing Service Innovation of Island Tourism

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**Abstract:** The purpose of this study is to demonstrate the importance on the sustainable tourism initiatives and consideration of energy in the development of better policy towards innovation of tourism. The study is conducted at an internationally well-known tourism island, Mabul Island. Since natural resources on island are scarce and limited, island tourism usually face sustainability issue in terms of energy and tourism development. Moreover, there is lack of sustainability study on energy security specifically on island tourism among local community. Quantitative approach is used for the study where local communities are interviewed using face to face interview technique. Exploratory factor analysis is used to reduce the dimension on both energy security and sustainable tourism variables. Findings from this study revealed eleven components that were grouped and given new title. The contribution of new scale of energy security and sustainable tourism will assist policy makers to review and revise Malaysia's plans and policies working towards sustainability goals.

**Key words:** Sustainability • Natural resources • Local community • Mabul • Factor analysis

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### INTRODUCTION

In Malaysia, much effort has been put to achieve the goal of sustainability. In the recent National Transformation 2050 plan or TN50 in general, its vision is to become the top 20 countries in economy development, social improvement and innovation. Renewable energy such as solar, wind and biodiesel are the future potential energy development in the country. It can be seen that the trend towards a more sustainable way in the energy usage to overcome the price fluctuation and possibility of depletion of fossil fuel. Meanwhile, the 11<sup>th</sup> Malaysian Plan had clearly raised consciousness of the importance of pursuing green growth for sustainability and resilience as a critical function of the three main pillars of

sustainability. Thus, enhancing awareness to create shared responsibility is one of the strategies positioned as they realise that good coordination from stakeholders will ensure that right messages are communicated to the right target audience. There are many researches on sustainability, either on energy security [1-3, 8-9] or sustainable tourism [4-7, 11-12, 21, 23]. Although many positive approaches for balancing ecological and social aspects in tourism, the conflict between global tourism development and environmental policy's central goals such as protecting climate and energy resources has been increasing [22]. Sustainable tourism research [7] still needs researchers from all backgrounds to work together and adopt an interdisciplinary approach to come out with a more holistic synthesis. However, in Mabul

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Island, the innovation aspects in tourism service industry and energy services didn't play much role. Therefore, the objective of this study is to develop a new scale of energy security and sustainable tourism impacts.

**Energy Security:** There are two main issues highlighted which are the consequence of using fossil fuels that increase the threat of global warming and the lack of access to clean, healthy and affordable electricity among the poorest world community [8]. In terms of affordability or reliability of supply at affordable prices, [9] also reinforced that tourism sectors need constant and high quality electricity supply to enhance the economic growth. The significant number of the poorest and most vulnerable community which doesn't have the access to affordable energy must be addressed.

**Sustainable Tourism:** Natural resources are being consumed intensively in tourism business. It impacted greatly on economy, environment and social as these 3 elements had been mentioned in the sustainable pillar [21, 23]. Well management of natural resources for tourism is important especially those limited resources found on islands which once depleted, would require irreversible cost to restore to its original state [10]. Concept of sustainable tourism thus fits in this context. UNESCO 2009 defined sustainable tourism development as ecologically sustainable, economically viable as well as ethically and socially equitable. It respects the fragile environmental balance that characterizes many tourism destinations, particularly in environmentally sensitive areas; and it is based on a long term perspective [7, 11-12]. It is important to ensure the natural resources on the island can last long and are less vulnerable to those threats.

**Service Innovation:** Schumpeter who was involved in developing theory of innovation defines innovations as "new ways of doing things, or better, unique combinations of the factors of production" and identifies them as the core of an entrepreneur's work [13].

Later innovation used in many fields but in the scope of this study, innovation is more to a service industry, tourism. In a place where there are plenty of competitions among tourism destinations, innovation in service or hospitality is what makes certain organization excel [14-17].

**Energy, Sustainable Tourism and Service Innovation:** Study [23] depicted that tourism had influence on resource and similarly resources too have influence on

tourism. Over development and irresponsible management of tourism will cause the limited resources on the island to further deplete. In this study site, Mabul Island faced energy security issues as the electricity is generated through non-renewable fossil fuels. While more competition on resources happened between tourism business and local community, there is possibility that local community might refuse tourism business being run in their place, destroying the tourism industry. Hence, in order to give better tourism service without compromising the locals' usage on energy services, performance indicators need to be developed to enhance the service industry.

## MATERIALS AND METHODS

This study has employed a quantitative approach which is descriptive correlational design. This design allows the perception of local communities towards energy security and sustainable tourism to reveal in a scale through exploratory factor analysis. In the recent census, the household number of local community in Mabul Island was 502 in 2016 (A. J. J. Amros, personal communication, Jan 18, 2017). Sarjan Ahmad Jaw Jaw Bin Amros hold the position as Head of Radar in the police's Operational Room Island Forward Operation Base (IFOB), Mabul. In this case, a census technique is planned to be conducted since the population is allowed to proceed to household survey. Thus, the study is conducted on the heads of households (n=502) among the local community through face to face interview using quantitative questionnaire. Heads of households are characterized as aged 18 and above, who usually is the chief source of income for the household. The instrument used for data collection is based on reviews from the literature and documents analyses on energy security and sustainable tourism. Within the scope of this study, construct definition of energy security are based on [1, 2, 3] [3]. Whereas sustainable tourism construct are adapted from past studies [4-6, 17].

Data collection technique adopted in this study is face to face interview with the respondents. However, there are language barrier between the researcher and the community since mostly communicate in their native Bajau and Suluk languages. Hence, help was sought from a few translators who are also the local community at the island during the period of data collection. Hence, early communication with the local authorities was to request assistance from them on local translator services, as they were also facilitating the process due to their familiarity in identifying the targeted respondents.

The data was analysed using the Statistical Package for the Social Sciences (SPSS) as a tool. SPSS is a software package widely used for statistical analysis. Descriptive statistics were performed to describe general data of the study such as frequency and percentage. Meanwhile, exploratory factor analysis (EFA) was performed to gather information about inter-relationships among energy security and sustainable tourism impacts. EFA concerned of the number of factors needed to explain the relations between energy security and sustainable tourism impacts. EFA is also associated with the estimation of factor loadings. The purpose of EFA is to identify dimensions that underlie the relationship among a set of observed variables and transform the correlations among a set of observed variables into smaller number of underlying factors. New factor scores for each subject will be created. The items used in the instrument were tested for their reliability.

## RESULT AND DISCUSSION

Majority of the respondents were female as shown in Table 1. This is mainly because the study was conducted during the day when most male members of the community who act as the head of family were out of their home to work. Almost half of the respondents were from the age group of 19 to 30 which signifies that respondents who were in this age group are more readily available for interview compared to other age groups. In addition, most of the respondents married in a young age.

Cronbach's alpha for sustainable tourism economy, social, environment impacts and energy security was found to be .917 (10 items), .809 (16 items), .856 (10 items) and .783 (11 items) respectively. All these values exceeded the recommended value of .70 [18]. Therefore, the instrument is considered highly reliable.

Next, the items used to develop the scale were analysed using factor analysis. The result was demonstrated in Table 2. Eigenvalues of the each 11 extracted components are more than 1. Total variance explained by the extracted factors or components are 66.96% which is an acceptable value. Kaiser-Meyer-Olkin (KMO) resulted as .84 indicating the factor analysis is useful for the study [19].

Based on Table 2, 11 factors were extracted and each was renamed accordingly.

### Factor 1: Economy impacts

- Tourism activities create jobs for my community during high seasons.

Table 1: Demographic Profile of Respondents

Profile	Frequency	Percentage (%)
Gender		
Male	208	41.3
Female	296	58.7
Age		
12-30	22	4.4
19-30	235	46.6
31-50	189	37.5
51-70	56	11.1
71-90	2	.4

- Tourism provides job opportunities for my community.
- Tourism activities create full-time employment for my community
- Tourism activities enable local community to generate monthly income.
- Tourism activities create jobs for my community during low seasons.
- Tourism activities create part time employment for my community
- There are number of businesses related to tourism started by the locals, e.g. tour guide, community cooperatives and local services.
- Tourist arrivals improve my community's income.
- Tourism creates business opportunities for my community.
- The increase of tourists' arrival creates opportunities for the locals to sell their marine products

First factor titled as economy impacts which explained 13.16% variance in the study. The items in this factor are related to economy impacts such as job opportunities, income improvement and also the business opportunities. The results are consistent with the study [12, 19].

### Factor 2: Environmental Awareness

- Tourism teaches me to use natural resources in a sustainable way through education.
- Tourism helps me to appreciate the environment through education.
- There is environmental awareness education.
- Tourism activities contribute to conservation of natural environment.

Factor 2 explained an amount of 7.66% variance. Environmental awareness is named for the factor because elements to care for the environment were among the items.

Table 2: Rotated Component Matrix

	Component										
	1	2	3	4	5	6	7	8	9	10	11
Job creation during high seasons.	.811										
Job opportunities	.804										
Full-time employment	.796										
Generate monthly income.	.750										
Job creation during low seasons.	.750										
Part time employment	.727										
Businesses related to tourism,	.710										
Improve community's income.	.706										
Business opportunities.	.673										
Opportunities to sell their marine products	.530										
Use natural resources in a sustainable way.		.856									
Appreciate the environment		.854									
Environmental awareness education.		.833									
Conservation of natural environment.		.833									
Island popular.			.715								
Sense of pride			.648								
Preserves community values.			.626								
Changes my community lifestyles.			.596								
Increased image of local residents.			.514								
Tourism related training.				.917							
Develop professional skills.				.914							
Enhances personal development.				.758							
Afford to purchase electricity.					.757						
Energy supply					.676						
Stable price of electricity.					.665						
Equal access of energy services.					.656						
Improvement in the solid waste management practices.						.821					
Improvement in garbage disposal system.						.781					
Improve solid waste generation.						.779					
R&D on new and innovative energy technologies.							.729				
Education promotion about energy issues.							.726				
Energy provides clean water.							.714				
Energy used reduces greenhouse gas emissions.							.574				
Tourism decrease air quality.								.898			
Tourism decrease water quality.								.897			
Improved access to potable water supply									.729		
Improved access to energy infrastructure.									.672		
Tourism helps to improve the facilities.									.583		
Tourism empowered community in decision making process.										.595	
Improved access to social services.											.657

Factor 3: Tourism Values

- Tourism makes this island popular.
- I feel a sense of pride upon visitors coming to see our culture.
- Tourism preserves my community values.
- Tourism changes my community lifestyles.
- Tourism has increased the image of local residents.

Factor 3 explained 6.68% variance. The values brought by tourism are more of sentimental value perceived by the community.

Factor 4: Personal Development

- A number of local people are provided with tourism related training.
- Tourism helps to develop professional skills among my community.
- Tourism enhances personal development of locals.

The next factor explained 6.60% variance for the study. The items in this component mentioned about development of skills through training or individually.

**Factor 5: Energy Utilisation**

- I can afford to purchase electricity.
- There is energy supply in my living place.
- The price of electricity is stable.
- There is equal access of energy services to all communities in my living place.

Factor 5 explained an amount of 6.14% variance. Energy usage here was related how the daily usage of electricity from perspective of supply, stable price, affordability and equal accessibility.

**Factor 6: Solid Waste Disposal**

- There is improvement in the solid waste management practices of the community.
- There is improvement in garbage disposal system.
- Tourism helps to improve solid waste generation from tourism activities.

The following factor explained 5.81% variance. The factor given a name of solid waste disposal as the 3 items here were relevant to garbage handling.

**Factor 7: Energy Enhancement**

- There is R&D on new and innovative energy technologies in my place.
- There is education promotion about energy issues in my living place.
- The energy helps to provide clean water to the community.
- The energy used in my life reduces greenhouse gas emissions.

This factor (explained 5.50% variance) was named energy enhancement which is different with factor 5, energy utilisation. The items here were in relation to future issues such as energy innovation, how energy is used to better the community living and environment.

**Factor 8: Negativity from Tourism**

- Tourism decrease in air quality standards.
- Tourism decrease in water quality standards.

Factor 8 (explained 4.43% variance) was titled as negativity from tourism due to negative impacts in reduction of water and air quality standards.

**Factor 9: Basic Facilities**

- I have improved access to potable water supply
- I have improved access to energy infrastructure.
- Tourism helps to improve the facilities on the island.

Factor 9 explained 4.18% variance and named basic facilities as water and energy infrastructure act as necessity in daily living.

**Factor 10: Empowerment**

- Tourism empowered my community in decision making process.

Factor 10 explained 3.78% variance where during decision making, involvement of stakeholder (community) is significant too.

**Factor 11: Social Services**

- I have improved access to social services, e.g. health services.

The final component extracted is factor 11 called social services (only explained 3.00% variance). The individual item here relates to improvement of social services perceived by the community.

**CONCLUSION**

This study found that in order to achieve innovation sustainability towards island tourism, it is essential to take into consideration the following important factors: economy impacts, environmental awareness, tourism values, personal development, energy utilisation, solid waste disposal, energy enhancement, negativity from tourism, basic facilities, empowerment and social services. Specifically for Mabul Island, the above performance indicators can be referred in order to bring the island tourism to higher levels while sustaining the resources and meeting the demands of consumers (tourists). In addition, the tourism industry can exist with energy services at tourism destination with minimum negative impacts on each other. Innovation efforts on island tourism industry can refer to this new scale of energy security and sustainable tourism to assist and facilitate future policy making process and to revise the country's plans and policies towards achieving sustainability goal.

Resilience towards climate change may start with this effort too. Nevertheless, there can be further studies on other ways to conserve the environment sustainability while at the same time moving towards the direction of innovation due to the increasing global demands.

#### ACKNOWLEDGEMENT

Universiti Putra Malaysia IPS Grant (GP-IPS) [9539300] and partially funded by Binary University

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