

# An Investigation of the Supply Chain Strategy for Social Carrying Capacity: A Study of Pangkor Island, Perak, Malaysia

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**Abstract**—Tourism is one of the fastest-growing sectors and plays a vital role in economic development in most countries, including Malaysia. An application of supply chain strategy in tourism is not new. It also aims to increase the social carrying capacity among tourists. With an extraordinary growth of tourist arrival, it has given effect on the environment, social and economic structures. Of these, the primary purpose of the current study is to investigate the perception of domestic tourists on the intensity of social carrying capacity through supply chain strategy at Pangkor Island, Perak, Malaysia. This quantitative study is designed using a survey questionnaire (self-administered) to 332 domestic tourists during four phases of public holidays as a tourist option to visit Pangkor Island. The results of this study indicated that the Social Carrying Capacity (SCC) assessment through supply chain strategy is based on tourists' response, crowding rate at a tourist spot/location and the satisfaction level of tourists while travelling to the area. By applying the supply chain strategy, the perception of domestic tourists is divided into three parts, namely, satisfaction with the facilities, quality of experience and acceptance from the locals. Also, using the People at One Time (PAOT) method, respondents were given five options and picture showing the tourist situation during their visit to Pulau Pangkor. From PAOT analysis, 37.5% tourists chose Picture C followed by picture D (31.2%), Picture B (11.8%), picture E (8.1%), Picture F (7.7 %) and picture A (3.7%). As a result, from these two methods, SCC in Pangkor Island is still acceptable for domestic tourists. This study provides significant information to stakeholders to make sure that SCC via supply chain strategy at Pangkor Island is within tourism activities control.

**Keywords**—Social Carrying Capacity, Supply Chain Strategy, Tourism Carrying Capacity, Intensity

## 1. Introduction

Tourism is one of the fastest-growing sectors which contribute on economy [1]. However, tourism sector needs a good strategy for increasing social carrying capacity. A supply chain strategy will help the tourism contribution in improving the socioeconomic of society. The tourism sector also is among the sectors that play an important role in economic development in most countries, including Malaysia.

According to the latest statistics released on [2], international tourist arrivals expanded by 3.9% to reach 1,235 million people in 2016 as more than 46 million tourists (overnight visitors) travelled internationally compared to 2015. Such growth was at a pace which is equal to the world average for the period 2005-2015 (+ 4%) [2]. In 2017, the number of tourists reached 1326 million, and the amount of income had increased to 1340 billion US Dollar [2]. The increasing number of tourists provides economic returns to the country and players in the tourism sector. For instance, the tourism industry has contributed 4.7% of GDP (Growth Domestic Product) in Europe only.

Looking at the Malaysian context of tourism, where does the statistics fit in? As known to all, tourism is often considered as a tool for the country's development [3]. For Malaysia, that is endowed and surrounded by its beautiful nature such as the breathtaking beaches and islands. It is impossible not to make full use of such an advantageous feature for tourism development purposes. The number of tourist arrivals to Malaysia increased from 25.72 million people in 2015 to 26.76 million in 2016 with total revenue

also rising from RM69.1 million in 2015 to RM82.1 million in 2016. Domestic tourist arrivals at each tourist location have also been increasing from time to time. Based on statistics released by the Department of Statistics Malaysia (2017), the number of domestic visitors increased by 7% from 176.9 million in 2015 to 189.3 million in 2016.

With this extraordinary growth, it will often have an impact on the environment, social and economic structures. Many researchers were claimed that a large number of communities would have an impact including soil erosion, growth and water quality [4]-[7], wildlife management [8], the minimum flow of water resources [9] and facilities development requirements (Ormiston et al., 1997). Environmental threats from tourism activities can be seen in coastal areas like the Mediterranean Basin. The beach can be dirty and no longer become a tourist attraction [10]. The mountainous area is also inevitably impacted due to the pressure caused by the arrival of visitors. For example, the Alps area, which used to accommodate about 40-50 million visitors with thousands of ski routes, has been heavily affected by erosion [11].

Besides, the development and competition in tourism activities for employment, investment, infrastructure, energy and other resources have led to changes and domination of the local population, and those create social conflicts [12]-[13]. The increase in tourist numbers also sometimes causes negative impacts on economic aspects such as inflation [14]. That explains why many tourist destinations are experiencing rapid development in unplanned and casual ways to accommodate the influx of tourists. At the same time, the emergence of evidence, especially from the Mediterranean region indicates that tourism can erode the physical and social environment in the destination [15]. It is therefore clear that unplanned development can permanently alter or disrupt the nature of natural and cultural resources and result in loss of tourist demand.

The strengths, weaknesses and threats of growth and development of tourism require a careful task in the context of sustainable development. A suitable balance must be developed through three dimensions: environmental, social and economical to ensure long-term sustainability [2], [16], [17]. The concept of Tourism Carrying Capacity is used as a prime estimate. It is in line with the perspective of tourism growth should not have had a reversal effect on the local population system in

the environmental, social and economic aspects [18]. This concept can be interpreted in various ways, for various types of destinations such as shelters, national parks, archaeological sites, mountains and coastal areas. This capacity theme can be directly linked to crowding. Basically, there should be a limit on the number of visitors at a time [2]. It is crucial to understand the concept of carrying capacity by national and / or local planners to look at the level of sustainable development and the use of specialists in particular regions on the development of many destinations causing socio-cultural and environmental degradation, or the decline in the quality of the overall experience of tourists [19]. Therefore, the Tourism Carrying Capacity (TCC) refers to the maximum number of people who can use an area without providing unacceptable changes to the physical environment and without causing a decline in the quality of the tourist experience. There are three commonly used components in TCC especially in the environment, social and economic considerations. However, the objective of this paper will only focus on Social Carrying Capacity (SCC).

SCC refers to the maximum level of consumption that can be absorbed by an area without unacceptable decline in the quality of the tourist experience and without the adverse effects that the locals cannot accept [19]. The two main components of SCC are (i) the quality of tourist / visitor experience that is acceptable before finding alternative destinations (tourist psychological potential) and (ii) the level of tolerance of 'host' or locals to the presence of tourists (psychological capacity locals). Therefore, this study aims to examine how far the SCC of tourism development in Pangkor Island based on the domestic tourists' perspective.

Pangkor Island tourism development is rugged with tourist arrivals each year. The number of tourist arrivals in 2019 is 1,389,923 people and 1,420,514 people in 2018. With the entry of many tourists whether domestic tourists or even international tourists, it has transformed the tourism landscape at Pangkor Island. The number of tourist arrival here is noticeably high especially during public and school holidays. The island also has a fairly large population. According to Pangkor leader Office, the total of Pangkor Island residents are 12,999 people in 2012 and in 2016, Pangkor Island residents reached 16,482 people. Therefore, it is deemed suitable to be the location of the

current study for this social mobility issue as there are significant stakeholders in tourism involved here. Pangkor Island's width is 22 km<sup>2</sup> including Pangkor Laut Island which is 1.3 km<sup>2</sup>. Pangkor Island is a combined island of ten small islands. The development of this tourism sector affects tourists whether they are positive or otherwise.

In determining the SCC of a particular area, the stakeholders need to be scrutinized include tourists (both domestic and international) and the locals. However, the focus in this study is based only on the perception of domestic tourists. Domestic tourist arrivals in Malaysia are increasing at each tourist location from time to time as mentioned above. Pulau Pangkor is very dominant with the arrival of this domestic tourist because it is one of the promoted tourism attractions for "budget travel" or low-cost travel [20]. Such sensible attraction makes it a favorite destination for domestic tourists for island tourism. Therefore, the perception of this party needs to be studied in terms of the level of tourism development in an area.

With the increase in the number of tourists from time to time, it will certainly impact both positive and negative on the quality of experience for the domestic tourist. In assessing the social capacity of a particular area of tourism, aspects of satisfaction and quality of tourism need to be studied. The question is what exactly the level of satisfaction of domestic tourists in Pangkor Island is. This issue is assessed based on several indicators that have been set by the investigators. This indicator determines whether the supply chain strategy plays a crucial role in increasing the social carrying capacity of Pangkor Island is already on its threshold or at an acceptable level.

## 2. Literature Review

### 2.1 Tourism Carrying Capacity Definition

Ever since from the early 1960s, research on outdoor recreational activities has adopted the concept of Tourism Carrying Capacity to address the sources and social impact of visitor use [21]-[22]. This concept has been used by researchers and managers in the context of tourism and environmental science to address financial resources and avoid negative social impacts [23]. It gives priority to ecological and social parameters, such as the quality of the environment and the experience of their visitors [24]. This way, policymakers will drive sustainable tourism

through 'ratio distribution to tourism activities' without exceeding threshold limits for each area based on their properties and characteristics' [25].

The basic element of the concept is the need to set limits on tourism activities that reflect the concerns and priorities of local managers and planners [26]-[27]. In the early 1990s, the TCC concept was largely replaced by sustainable tourism ideas, but many of the challenges outlined for this new concept are similar to the past issues regarding TCC in terms of objective definition, practice, utility and diversity [28]. Sustainable tourism is defined as "economically viable tourism but does not destroy sources where future tourism will depend, especially the physical environment and social fabric of the host community" [29]. The discourse on sustainable tourism development revolves around the major issues of how to manage the resources of the host community to meet the basic criteria in promoting their socio-economic well-being [30] at the same time meeting the needs of tourists [31]. The concept of TCC occupies an important position to sustainable tourism [32] and is interpreted as a sustainable tourism applying and describing that both can exist and can be useful frameworks to analyze the effects and constraints of development [33]. Each tourism destination can sustain a specific level of acceptance of tourist development and use, beyond which further development can result in socio-cultural deterioration or a decline in the quality of the experience gained by visitors [34].

Every process in tourism growth needs to be preserved with the use of the Tourism Carrying Capacity (TCC) concept at each destination [35]. The tourism system is an integrated system comprising ecological (biological and physical), social, cultural, infrastructure and management (economic and institutional) sub-systems [35]. Therefore, TCC is the result of the capacity of all these sub-systems. These different levels of power may conflict with each other; for example, mass tourism may be appropriate if viewed from an economic point of view as it increases local aggregate income, but social and ecological can be affected if crime rates rise and the environment is destroyed. This means practically policymakers need to plan well to compensate for each existing capacity and will exist for long term sustainability [35].

For many years, TCC has been rated for individual destinations and destinations around the

world [36]-[41]. They suggest that a destination should not be developed beyond its natural capacity for tourism. Although there are limitations related to the concept of TCC, it has been described as an appropriate tool for management as it enables the preservation of resources [42]. While not always getting the approval of other researchers, TCC evaluation remains one of the most useful and widely used techniques [43] for tourism and recreational planning and management, especially when combined with other management tools [42].

After years of TCC running, various definitions are highlighted by agencies and researchers. Tourism Carrying Capacity as the maximum number of visitors who can visit a tourist destination within the same period without causing the devastation to the physical, economic and socio-cultural environment as well as unacceptable declines in quality of tourist satisfaction. Hens (1998) mentions TCC as the maximum number of people using a travel site without affecting the environment when meeting demand during travel [44]. It is the highest benchmark for the natural, environmental and socio-economic system beyond its saturated facilities (physical force), environmental quality (environmental degradation) or drops in quality of tourist satisfaction (perception or psychological capacity) [45]. Mexa and Coccossis (2004) claim that despite some criticisms against TCC it is still a strong concept that can be used for sustainable tourism planning and management [46]. Segrado et al. (2008) describe that all factors limiting tourism growth; the concept of capacity is also a compensation tool for managing tourist flows to destinations [47]. Bonilla and Bonilla (2009) point out that this concept should be seen as a positive and dynamic prism contemplating temporal space as a fundamental value for implementing sustainable coast management principles [48].

TCC is the number of users within a single unit where recreation/tourism areas survive each year without causing a natural/physical deterioration of its ability to support recreation, without compromising the deterioration of the visitor experience [49]. McIntyre (1993) emphasizes TCC as the maximum use of any area without causing a negative impact on resources, visitor satisfaction and without adverse effects on the community, economy or culture of the area [50]. Boniface and Cooper (1994) define the TCC concept as a connection between the travel destination with their

visitors [51]. Chamberlain (1997) interpreted TCC as a level of human activity in an area that can be accommodated without the deterioration of the area affecting the community and maintaining the quality of visitor experience [52]. Clark (1997) defines TCC as a certain threshold of tourism activity and if it discovers environmental damage and natural habitat may occur [53].

The most common definition is derived from UNWTO (1981) which states TCC as "the maximum number of people who can visit tourist destinations at the same time, without destroying the physical, economic and socio-cultural environment and the unacceptable quality of visitors". From this definition, it is clear that early research on TCC have focused on the environmental and physical capacity of tourist destinations, while later studies discussed the perceptions of host communities, social capabilities, tourist perceptions and psychological capabilities. Zelenka and Kacatl (2014) summarize the concept of carrying capacity in the protected area as an opportunity – "the carrying capacity application has the best potential in protected regions, in every cultural and natural attraction, and in connection to supporting the lifestyle of the local community and tourism destination potential in general [54].

## 2.2 Social Carrying Capacity and Its Supply Chain Strategy

Social Carrying Capacity (SCC) involves the perceptions and views of stakeholders in tourism, namely tourists and locals on the condition of tourism at a tourist destination. By using the Supply Chain Strategy, the SCC is the maximum level of consumption that can be absorbed by an area without an unacceptable decline in the quality of tourist experience and without the adverse impacts that the locals cannot accept [19]. The two main components of this social capacity are (1) acceptable quality of visitor/visitor experience before finding alternative destinations (tourist psychological potential) and (2) level of 'host' tolerance or locals on the presence of tourists (psychological capacity locals).

SCC is the level of tolerance of host residents to the presence and conduct of tourists in the destination area, and the high level of consumers (tourists) and willingness to accept by others (other tourists) [55]. Social carrying capacity in tourism can be seen in Table 1.

**Table 1.** Social Carrying Capacity in Tourism

Social Carrying Capacity (SCC)		
Tourist	Interaction between tourists and tourist	Satisfaction
Local Resident	Interaction of locals – tourists	Quality of life

In determining this social carrying capacity, it is calculated based on the level of satisfaction of domestic tourists. As most researchers emphasize [56], tourist satisfaction as one of the indicators in measuring sustainable tourism and social mobility. These indicators are usually based on the amount of satisfaction or dissatisfaction of tourists and suggest a ratio between two types of travelers.

### 3. Methodology

A survey was conducted on domestic tourists to find out their perceptions of their tourism experience at Pangkor Island. Tourist perceptions are important in determining the extent of social capacity at a particular tourist location. This study was conducted during public holidays as the number of tourists was high during this time and this would trigger various responses from tourists. As written in the study of Lopez-Bonilla et al. (2008), the selection of tourism season concept is appropriate because during tourist season such as public holidays and school holidays, the number of tourist arrivals is noticeably high [57]. When it comes to high expectations it will cause higher usage levels at that time than normal times. The high number of arrivals and the high volume of consumption will affect the level of tourist satisfaction. The questionnaire was conducted only to see the perception of domestic tourists on social aspects and the impact of tourism development at Pulau Pangkor. A descriptive analysis was used in this study. To examine domestic tourist response, 5 points Likert scale was used as an instrument in this study from strongly disagree (1) to strongly agree (5). In addition, the Picture At One Time (PAOT) method was also used in this study to examine crowding in the study area. This study was carried out during a tour of the tourist at Pulau Pangkor. The questionnaire was circulated while the tourists were on the ferry home. The method is considered the most suitable for studying tourists experience while at Pangkor Island.

## 4. Results

Table 2 displays the result of demography profile from 332 respondents, the highest number of domestic tourists was from Perak (25.9%) followed by Selangor (17.5%) and Kuala Lumpur (11.4%). It is probably due to the location of Pangkor Island, which is in Perak state. That pretty much explains the feasible entrance of tourists from Perak to Pangkor Island. The lowest number of tourists was from Sabah (0.9 %) while Terengganu recorded 1.5%. The number of male respondents was higher than female respondents, with 55.4% and 44.6% respectively. For the age category, the highest number of respondents were in the category of age 21 years to 30 years old with 38% followed by age 41 to 50 years old (29%), and the least number was age 51 and above (6 %). The majority of the respondents came from the single-party (64.5%) compared to the married respondents that recorded 32.8%. In comparison, the respondents from the widowed/divorced party reported only 2.7% of the total population.

For education level, majority of respondents possess a high school/university/college degree (49.7%) followed by secondary education (44.3%), primary education (4.5%) and no formal education at the lowest level only 1.5%. It clearly shows that the majority of respondents have a good level of education and can respond to the given questionnaire well. For the category of visiting frequency, respondents visited Pulau Pangkor for the first time recorded the highest with 45.2% followed by three times, 31.3% and the lowest recorded was twice with 23.5%. Based on these findings, it is clear that the purpose of tourists visiting Pangkor Island is for vacation, to engage in recreational and leisure activities (84.8%).

### 4.1 The situation at Pangkor Island

In identifying the situation at Pulau Pangkor, researchers conducted the Image Capture Technology (ICT) method developed by Johnson et al. (1994) where respondents were asked to select one of the images related to the situation of the tourist location. It is described as Picture At One Time (PAOT) approach by [4]. Some image options (Fig. 1) are prepared to give respondents an option in determining the crowding situation/impression at Pangkor Island. These images are based on the actual image display of

Pangkor Island and then processed using photo editing software. The results of the study on [21], [23] indicate that it is unrealistic and uncertain to determine the SCC if it only applies Closed-ended method especially in areas with height. Therefore, this study is supported by the PAOT method in determining SCC in Pangkor Island.

**Table 2.** Demographic profile

Demographic Profile	Frequency	Percent
<b>State Of Origin</b>		
Perak	86	25.9
Selangor	58	17.5
Kuala Lumpur	38	11.4
Pulau Pinang	32	9.6
Kedah	30	9.0
Johor	28	8.4
Kelantan	15	4.5
Pahang	12	3.6
Negeri Sembilan	11	3.3
Perlis	7	2.1
Melaka	7	2.1
Terengganu	5	1.5
<b>Gender</b>		
Male	184	55.4
Female	148	44.6
<b>Age</b>		
Below 20 years old	41	12
21-30 years old	126	38
31-40 years old	48	15
41-50 years old	96	29
51 years old and above	21	6
<b>Marital Status</b>		
Single	214	64.5
Married	109	32.8
Divorced	9	2.7
<b>Education Level</b>		
Higher Education	165	49.7
Secondary Education	147	44.3
Primary Education	15	4.5
No Formal Education	5	1.5
<b>Frequency of Visit</b>		
First Time	150	45.2
Second Time	78	23.5
More than three times	104	31.3
<b>Total</b>	<b>332</b>	<b>100.0</b>

Based on the response from the overall respondents (Table 3), the most selected image by domestic tourists was image C (37%) followed by

image D (31.3%) while the least was image A (3.9%). Based on that, it can be concluded that the situation at Pangkor Island is not too crowded. In terms of tourist comfort based on those images, 38.9% of tourists expressed their comfort if the situation on image C (Table 3). Images B and D recorded a small gap of difference with 22.9% and 22.0% respectively followed by Image A (7.8%) and the least was Image F (5.4%). In view of this approach, domestic tourists are comfortable with the crowding situation at Pangkor Island during their visit.

#### 4.2 Domestic Satisfaction Level

In determining the SCC at a tourist area, the level of tourist satisfaction needs also to be evaluated. This satisfaction study will explain the quality of the travellers' experience while traveling here. It coincides with the definition of SCC described by [19], that the quality of a tourist experience that is acceptable before finding another destination is a component in determining the SCC itself. There are three components in determining the satisfaction of these tourists (Table 3). The first component is the level of satisfaction of tourists towards facilities in Pangkor Island. The second is about the number of tourist doing activities and the third is about the response of the locals to their arrival to Pangkor Island.

The first component in Table 4 indicates that the satisfaction level of domestic tourist towards facilities and experience at Pangkor Island during their vacations. From this component, it can be seen that all of the items recorded as yellow. It shows domestic tourist satisfaction for this item was at a moderate level. The highest means satisfaction was about transportation (taxis and ferries) with 3.18 (SD=1.0255) followed by satisfaction with marine life (means=3.11, SD=0.932) and satisfaction with telecommunication systems (means=3.08, SD=3.08). The lowest satisfaction was about parking state 2.84 means (SD=1.054) followed by coast guard (means=2.85, SD=0.935). For component two, which is about the number of tourist doing activities also recorded moderate level. The highest means were the numbers of tourist snorkelling (means=3.07, SD=1.1205) and the lowest was the numbers of tourist visiting historical sites (Means=2.81, SD=1.136). For the third component, which is about the acceptance of local residents, it displays a significant difference



between component one and two. For this component, findings show that the level of acceptance of local communities for tourist was excellent. Every item in this component was

recorded at excellent level (Green color). Based on that, the findings highlight that local communities could positively accept tourists coming to Pangkor Island (See Table 5).

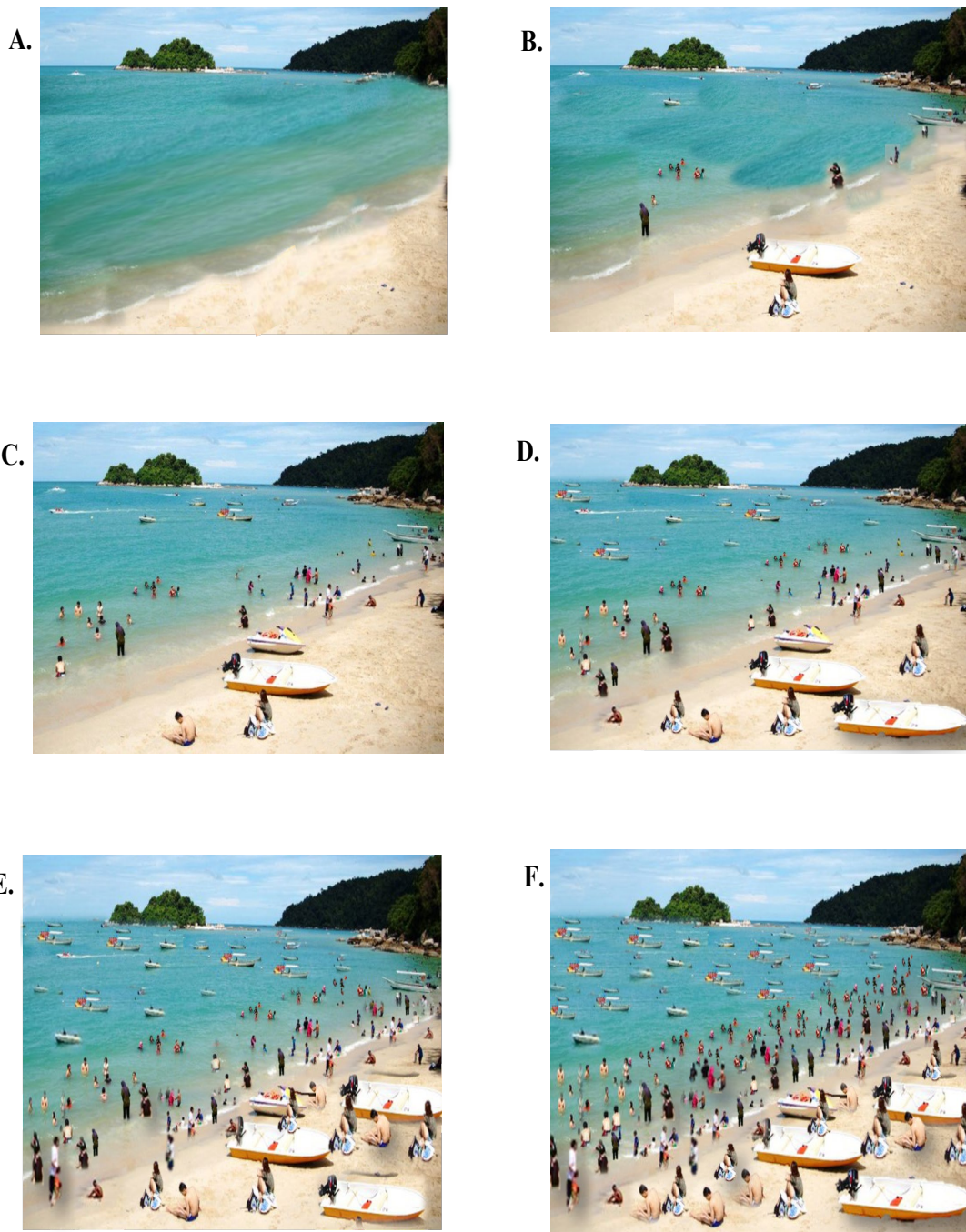


Figure 1. Illustrate the crowding at Pangkor Island

**Table 3.** Crowding & conditions that provide comfort at Pangkor Island

Image	The situation of Crowding at Pangkor Island		Conditions that provide comfort while at Pangkor Island	
	Frequency	Percent	Frequency	Percent
A	13	3.9	26	7.8
B	39	11.7	76	22.9
C	123	37.0	129	38.9
D	104	31.3	73	22.0
E	28	8.4	18	5.4
F	25	7.5	10	3.0
<b>Total</b>	332	100.0	332	100.0

**Table 4.** Perceptions of tourists and potential social impacts on Pulau Pangkor

Components and Items	Means	SD	Colour
<b>Component 1: Satisfaction on facilities &amp; experience</b>			
Satisfaction with parking	2.84	1.054	
Satisfaction of bathroom / toilet	2.88	1.000	
Satisfaction with the trash can	2.99	1.016	
Satisfaction lack of rubbish	2.93	1.101	
Satisfaction with the picnic table	2.90	0.981	
Satisfaction with the beach bench	2.87	0.914	
Satisfaction about information boards	3.03	0.906	
Satisfaction with coast guard	2.85	0.935	
Satisfaction with clean beaches	2.99	1.025	
Satisfaction about reefs	2.96	0.926	
Satisfaction with marine life	3.11	0.932	
Satisfaction with transportation (taxis & ferries)	3.18	1.0255	
Satisfaction with telecommunication systems	3.08	0.986	
<b>Component 2: Number of tourists doing activities</b>			
Numbers of tourist sunbathing	3.04	1.226	
Numbers of tourist swimming	3.06	1.161	
Numbers of tourist snorkeling	3.07	1.205	
Numbers of tourist at historical site	2.81	1.136	
Numbers of tourist driving	3.03	1.109	
<b>Component 3: Acceptance of local residents</b>			
Tourist arrivals are well accepted by locals	3.86	0.86912	
The locals give good cooperation during the holidays	3.90	0.99569	
The locals are very friendly towards tourists	3.89	0.91511	

**Table 5.** The scale determines the situation in Pangkor Island

Scale	Colour
Excellent > 3.27	
Moderate >1.7. <3.26	
Poor <1.6	



## 5. Discussions

The findings indicate that the supply chain strategy that used to increase social carrying capacity in tourism activity at Pangkor Island is still acceptable by domestic tourists. Average domestic tourists are satisfied with the development of tourism at Pangkor Island. However, to assess the exact nature of the SCC at a tourist destination, the tourist perception alone is insufficient. It needs to be complimented with the response from local residents to the arrival of tourists in their area. As defined by [19], [35], to determine the SCC at a location, the quality of tourist quality and the level of acceptance of local residents should be assessed.

From these findings, domestic tourists are most satisfied with the transportation facilities (ferry & taxi) available at Pangkor Island with the highest mean value of 3.18. Other facilities are at a moderate level and can be improved in the future to achieve excellent level. For component two, the number of tourist arrivals, the mean reading is at moderate level but lower than the mean reading in component one. The large tourist arrivals to Pangkor Island do not cause major problems to these domestic tourists. The issue of crowding at Pangkor Island is not an issue that worries domestic tourists. This is supported by the PAOT approach which shows that image C has the highest percentage value in terms of domestic tourist acceptance by 38.9%. Image C also shows the highest crowding (37%) during the survey and domestic tourists can receive the crowding during their visit to Pangkor Island.

For component three, domestic tourist are very satisfied with the level of acceptance from local residents on the arrival of tourists to Pulau Pangkor. The findings show that domestic tourists are tremendously comfortable with the attitude of the local communities. It is likely that domestic tourists are more than happy with the attitude of locals. They feel local communities provided warm cooperation during the holidays and they were also found very friendly towards tourists. These findings express that local communities are delighted with tourist arrival to Pangkor Island. In other words, SCC from local communities' side is seemingly excellent. Overall, tourism at Pangkor Island is still at an acceptable level by domestic tourists. Each of the indicators is still in good and excellent standing. However, there are some

indicators that need to be addressed so as not to remain listed in the worst category (red).

## 6. Conclusions

In achieving sustainable tourism, this tourism carrying capacity should be looked at from every aspect of physical, social, economic and socio-cultural. This social carrying capacity is a rather complicated aspect to examine and it is difficult to identify its validity over physical and economic aspects. The social capacity must assess from two aspects, namely tourism quality and population acceptance local area in a tourist area. Thus, this study concludes that the SCC indicators play an implicit function in measuring and evaluating the travel barometer. The travel barometer is an ideal tool for measuring an impact and destruction. This data is useful to Local Authorities to manage and plan the tourism sector at Pangkor Island. The findings confirm that tourism development at Pangkor Island has a moderate (positive and negative) impact from the perception of both domestic tourists and the locals. However, to study the SCC on sustainable tourism development, there is a crucial need to carry out another advanced analysis that may result in more precise carrying capacity. This study only assesses according to a series of comparison statistical methods (min ratio).

## References

- [1] Harahap, M. A. K., Sirojuzilam, Harahap, R. H., Marpaung, B. O. Y and Saputra, J. "The Effect of open tourism space on regional development through supply chain management in Panatapan Danau Toba area Simalungun, Indonesia." International Journal of Supply Chain Management, vol. 8, no. 5, pp. 994-1007, 2019.
- [2] United Nations World Tourism Organization. *Indicators of Sustainable Development for Tourism Destination*. Madrid: World Tourism Organization, 2014.
- [3] Dahles, H and Bras, K. *Tourism and small entrepreneurs: development, national policy, and entrepreneurial culture: Indonesian cases*, New York: Cognizant, 1999.
- [4] Manning, R., Lime, D., Hof, M., and Freimund, W. "The Visitor Experience and Resources Protection (VERP) Process. The Application of Carrying Capacity to Arches National Park." The George Wright Forum, vol. 12, no. 3, pp. 41-55, 1995.
- [5] Ryan, C., and Cessford, G. "Developing a visitor satisfaction monitoring methodology: Quality gaps, crowding and some results." Current

- Issues in Tourism, vol. 6, no. 6, pp. 457-507, 2003.
- [6] Shelby, B., and Heberlein, T. A. "A conceptual framework for carrying capacity determination." *Leisure Sciences*, vol. 6, no. 4, pp. 433-451, 1984.
- [7] Shelby, B., Vaske, J. J., and Heberlein, T. A. "Comparative analysis of crowding in multiple locations: Results from fifteen years of research." *Leisure Sciences*, vol. 11, no. 4, pp. 269-291, 1989.
- [8] Vaske, J. J., and Donnelly, M. P. "Normative evaluations of wildlife management: A comparison of three publics." In annual congress of National Parks and Recreation Association, Indianapolis, Indiana, 1989.
- [9] Shelby, B., and Whittaker, D. "Recreation values and instream flow needs on the Dolores River." In third conference on social science and natural resources. College Station, TX, 1990.
- [10] William, P. W. "Tourism and the Environment: No Place to Hide." *World Leisure and Recreation*, vol. 34, no. 2, pp. 13-17, 1992.
- [11] Ryan, C. *Recreation Tourism: Demand and Impacts*. Australia: University of Queensland Press, 2003.
- [12] Hall, T., and Shelby, B. "Temporal and Spatial Displacement: Evidence from A High-Use Reservoir and Alternate Sites." *Journal of Leisure Research*, vol. 32, no. 4, pp. 435-456, 2000.
- [13] Sax, J. L. *Mountains without handrails*. Ann Arbor: The university of Michigan Press, 1980.
- [14] Fleming, W., and Toepfer, L. "Economic Impact Studies: Relating the Positive and Negative Impact To Tourism Development." *Journal of Travel Research*, vol. 29, no. 1, pp. 35-41, 1990.
- [15] Inskip, E. *Tourism planning: an integrated and sustainable development approach*. Netherland: Van Nostrand Reinhold, 1991.
- [16] Saat, S. A., Saputra, J., Jamin, R. M., Muhamad, R. and Nawi, R. M. "A study of supply chain management for sustainable solid waste plan in Perhentian Island, Terengganu." *International Journal of Supply Chain Management*, vol. 8, no. 5, pp. 1022-1029, 2019.
- [17] Saat, S. A., and Saputra, J. "A study of sustainable management of solid waste in Perhentian Island, Malaysia." *Opcion*, vol. 35, no. 21, pp. 239-253, 2019.
- [18] World Tourism Organization. *Saturation of Tourist Destinations: Report of the Secretary General*. Madrid, World Tourism Organization, 1981.
- [19] Saveriades, A. "Establishing the social tourism carrying capacity for the tourist resorts of the east coast of the Republic of Cyprus." *Tourism management*, vol. 21, no. 2, pp. 147-156, 2000.
- [20] Manjung Municipal Council. *Rancangan Tempatan Daerah Manjung 2020*. Ipoh: Department of Town and Country Planning Perak State, 2011.
- [21] Manning, R., Valliere, W., Wang, B., and Jacobi, C. "Crowding Norms: Alternative Measurement Approaches." *Leisure Science*, vol. 21, pp. 219-229, 1999.
- [22] Lawson, S., Manning, R., Valliere, W., and Wang, B. Proactive Monitoring and Adaptive Management of Social Carrying Capacity in Arches National Park: An Application of Computer Simulation Modeling. *Journal of Environmental Management*, vol. 68, 2003, 305-313.
- [23] Manning, R., Lime, D., Freimund, W., and Pitt, D. "Crowding Norms at Frontcountry Sites: A Visual Approach to Setting Standards of Quality." *Leisure Sciences*, vol. 18, pp. 39-59, 1996.
- [24] Harahap, M. A. K., and Saputra, J. "Analyzing the moderating effect in relationship between tourism open spaces and regional development in lake Toba North Sumatera, Indonesia." *International Journal of Advanced Science and Technology*, vol. 29, no. 7, pp. 1654-1663, 2020.
- [25] Decleris, M., *The law of sustainable development - General principles*. New York: European Commission, 2000.
- [26] Coccossis, H., and Mexa, A. *The Challenge of Tourism Carrying Capacity Assessment*. Ashgate: Theory and Practice, 2004.
- [27] Supriatna, A., Hertini, E., Saputra, J., Subartini, B. and Robbani, A. A. "The forecasting of foreign tourists' arrival in Indonesia based on the supply chain management: An application of artificial neural network and holt winters approaches." *International Journal of Supply Chain Management*, vol. 8, no. 3, pp. 156-163, 2019.
- [28] Jurado, E. N., Tejada, M. T., García, F. A., González, J. C., Macías, R. C., Peña, J. D and Gutiérrez, O. M. "Carrying capacity assessment for tourist destinations. Methodology for the creation of synthetic indicators applied in a coastal area." *Tourism Management*, vol. 33, no. 6, pp. 1337-1346, 2012.
- [29] Swarbrooke, J. *Sustainable tourism management*. Wallingford, UK: CABI, 1999.
- [30] Ghani, N.A., Adam, F., Saputra, J., Abdullah, B., and Puteh, D. A. H. M. A. "Do socio-economic factor affect on the quality of life of Malaysian fishermen?." *Opcion*, vol. 35, no. 21, pp. 145-160, 2019.
- [31] Ko, T. G. "Development of a tourism sustainability assessment procedure: a conceptual approach." *Tourism Management*, vol. 26, pp. 431-445, 2005.
- [32] Tribe, J., Font, X., Grittis, N., Vickery, R. and Yale, K. *Environmental management for rural tourism and recreation*. London: Cassell, 2000.
- [33] Butler, R.W. "Concept of carrying capacity: dead or merely buried?." *Progress in Tourism and Hospitality Research*, vol. 2, no. 3, pp. 283-293, 1996.

- [34] Subash, J. and Rajiv D. “*Relationship between Social Carrying Capacity and Tourism Carrying Capacity: A Case of Annapurna Conservation Area, Nepal.*” *Journal of Tourism & Hospitality Education*, vol. 9, pp. 9-29, 2019.
- [35] Marzetti, S., and Mosetti, R. “*Social carrying capacity of mass tourist sites: Theoretical and practical issues about its measurement.*” Working papers, pp. 1-10, 2005.
- [36] Barancok, P. and Barancokova, M. “*Evaluation of the tourist path carrying capacity in the Belianske Tatry Mts.*” *Ekologia*, vol. 27, no. 4, pp. 401-420, 2008.
- [37] Lone, S., Lone, F. A., and Malik, A. “*Carrying capacity assessment for the promotion of ecotourism in Bangus Valley: A future tourist destination of J&K-India.*” *International Journal of Scientific Research*, vol. 2, no. 3, pp. 187-198, 2013.
- [38] McCool, S. and Lime, D. “*Tourism carrying capacity: Tempting fantast or useful reality.*” *Journal of Sustainable Tourism*, vol. 9, pp. 372-388, 2001.
- [39] Nghi, T., Lan, N.T., Thai, N.D., Mai, D. and Thanh, D. X. “*Tourism carrying capacity assessment for Phong Nha-Ke Bang and Dong Hoi, Quang Binh Province.*” *VNU Journal of Science, Earth Sciences*, vol. 23, pp. 80-87, 2007.
- [40] Sayan, M. S. and Atik, M. S. “*Recreation carrying capacity estimates for protected areas: A study of Termessos National Park.*” *Ekoloji*, vol. 20, no. 78, pp. 66-74, 2011.
- [41] Malik, M. I. and Bhat, M. S. “*Sustainability of tourism development in Kashmir - Is paradise lost?*” *Tourism Management Perspectives*, vol. 16, pp. 11-21, 2015.
- [42] Queiroz, R. E., Ventura, M. A., Guerreiro, J. A., and da Cunha, R. T. “*Carrying capacity of hiking trails in Natura 2000 sites: a case study from North Atlantic Islands (Azores, Portugal).*” *Revista de Gestão Costeira Integrada-Journal of Integrated Coastal Zone Management*, vol. 14, no. 2, pp. 233-242, 2014.
- [43] Zacarias D.A., Williams A.T. and Newton A. “*Recreation carrying capacity estimations to support beach management at Praia de Faro, Portugal.*” *Applied Geography*, vol. 31, no. 3, pp. 1075-1081, 2011.
- [44] Hens, L. *Tourism and Environment*. Belgium: University of Brussels, 1998.
- [45] Pearce, D. G. *Tourism Development*. UK: Longman, Essex, 1989.
- [46] Mexa, A. and Coccossis, H. *Tourism carrying capacity: a theoretical overview*. England: Ashgate, 2004.
- [47] Segrado, R., Muñoz, A. P., and Arroyo, L. “*Medición de la capacidad de carga turística de Cozumel.*” *El Periplo Sustentable*, vol. 13, pp. 33-61, 2008.
- [48] Bonilla, J. M. L., and Bonilla, L. M. L. “*La capacidad de carga turística: revisión crítica de un instrumento de medida de sostenibilidad.*” *El periplo sustentable*, vol. 15, pp.123-150, 2008.
- [49] Coccossis, H., and Parpairis, A. *Tourism and the Environment: Some Observations on the Concept of Carrying Capacity*. New York: Kluwer, 1992.
- [50] McIntyre, G. *Sustainable Tourism Development: Guide for Local Planners*. Madrid: World Tourism Organization, 1993.
- [51] Boniface, B. G., and Cooper, C. *The Geography of Travel and Tourism*. Oxford: Butterworth-Heinemann Ltd, 1994.
- [52] Chamberlain K. *Carrying capacity, UNEP Industry and Environment*, Paris: UNEP, 1997.
- [53] Clark J. *Coastal Zone Management Handbook*. Boca Raton: Lewis Publishers, 1997.
- [54] Zelenka, J. and Kacetl, J. “*The Concept of Carrying Capacity in Tourism.*” *The Amfi teatru Economic Journal*, vol. 16, no. 36, pp. 641-641, 2014.
- [55] Hunter, C. *Tourism and the environment A sustainable Relationship?*, London: Rutledge, 1995.
- [56] Choi, H. C. and Sirakaya, E. “*Sustainability indicators for managing community tourism.*” *Tourism Management*, vol. 27, pp. 1274-1289, 2006.
- [57] López-Bonilla, J. M., and López-Bonilla, L. M. “*Measuring Social Carrying Capacity: An Exploratory Study.*” *Journal of Tourismos*, vol. 3, no. 1, pp. 116-134, 2008.
- [58] Johnson, R. L., Brunson, M. W., and Kimura, T. “*Using image-capture technology to assess scenic value at the urban/forest interface: a case study.*” *Journal of Environmental Management*, vol. 40, no. 2, pp.183-195, 1994.