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Developing of components and indicators of appropriate carrying capacity of community-based tourism attractions in upper north Thailand

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Abstract

This study aimed to develop components and indicators for assessing the capacity of tourist attractions to be appropriate for community-based tourism attractions in upper north Thailand. Concepts of community-based tourism, concepts of limits of acceptable change (LAC), concepts on indicator development, and analytic hierarchy process (AHP) were used as the framework of this. Data were gathered from a group of 20 specialists who were chosen using a specified approach based on the qualifying criteria. They are classified into three groups: government personnel in tourism agencies, experts or academics in community-based tourism planning, and community-based tourism networks in the north. In this study, two types of research tools were used: (1) an interview form; and (2) a questionnaire. Basic statistics and the analytic hierarchy process were used to analyze data for quantitative research. Finally, content analysis was performed to characterize the findings in the qualitative method of study. For sequencing of the components based on four types of the community-based tourist attraction context, the following were found: (1) eco-community based tourism attraction and agro-community based tourism attraction gave priority on sustainable management of natural resources and environment; (2) cultural and handicraft community based tourism attraction gave priority on society and culture; and (3) health community based tourism attraction gave priority on psychology. The study's findings could be used by interested entities to establish carrying capacity evaluation criteria for community-based tourism destinations in upper northern Thailand, and create appropriate and sustainable management of community-based tourism attractions.

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Introduction

Due to its appeal among Thai and foreign tourists, community-based tourist sites in northern Thailand have experienced rapid expansion in the last decade. This could be due to a shift in tourist behavior from relaxing and souvenir shopping to learning and exchange of experiences (Ministry of Tourism and Sports, 2017, p. 2). In fact, having too many people at some tourist spots degrades the local environment and natural resources. As a result, determining the carrying capacity of community-based tourist attractions is critical to tourism resource conservation in terms of natural resources, the environment, local culture and arts, community identity, and so on.

According to a past study on carrying capacity of community-based tourist attraction in Thailand, it was found that recreation carrying capacity (RCC) and limit of acceptable change (LAC) were adopted for the study on potential in carrying of community-based tourist attractions (Songphornwanich et al., 2014). However, community-based tourism has diverse settings depending on the terrain, society, and culture of the location. Furthermore, the tourism service area is linked to the people's residential areas in the neighbourhood. As a result, the area's management and oversight cannot limit the number of tourists who can visit tourist sites as recreation grounds. Previous studies' findings suggest the composition and capacity index for supporting recreational activities are inconsistent with the context of the tourist attraction area by the community, and thus cannot be used to empirically assess the capacity of tourist attractions by the community. Thus, the goal of this research was to investigate and develop the components and an index to assess the capacity of Thailand's community-based tourist attractions. Then, as part of this research, community-based tourism destinations in the upper North were chosen as pilot regions.

Literature Review

The focus of this study was on the community's ability to accept tourist attractions, and to develop components and indicators for assessing the capacity of tourist attractions to be appropriate for community-based tourist attractions. A review of the relevant literature was conducted and the following conceptual framework of research was created:

The Concept of Carrying Capacity

The notion of carrying capacity came from livestock and pasture management, with a focus on assessing the number of animals that the pasture could support for their livelihood without depleting local resources, and allowing the animals to live in peace. This notion is used to describe human activities that have an impact on space and the environment. It serves the objective of determining the maximum number of people that the area can accommodate without causing the place to deteriorate, while simultaneously serving the purpose of utilizing quality space. Furthermore, carrying capacity has been utilized to utilization activities such as recreation trash management and so on (Burch, 1981). Aside from the carrying capacity in terms of environment, Wolters (1991) claimed that carrying capacity is an important social and biological component related to tourism activities and development for tourism carrying capacity.

Mcintyre and Hetherington (1991) stated that carrying capacity is the presentation of a level of utmost utilization by tourists or visitors as well as a level of the development of convenience facilities and infrastructure which an area can accommodate. Over exploitation or development as set has a tendency to cause tourism resource deterioration. Not only this, it reduces tourist satisfaction and causes damages on social, economic, and cultural aspects. As a result, the recreation carrying capacity notion is regarded as a fundamental concept in natural resource management. It is also put to use in the administration of effective and long-term tourism attractions. Two factors are taken into consideration in this regard: (1) the types and levels of impacts resulting from tourism and recreation land use activities, which are related to the amount and type of use; and (2) the goals of area management, which are used to determine factors and measuring criteria that show needed goals in terms of environmental quality, society, culture, and recreational experience. Furthermore, Liebig's law requires that a tourist attraction adopts the utmost capability of each aspect for co-consideration. This law has a condition that the carrying capacity value falling into the maximum crisis level is a highest level of an indicator of the carrying capacity in tourism and recreation (National Park Research Center, Department of National Parks, Wildlife and Plant Conservation, 2005). In this respect, components and factors used for analyzing carrying capacity in recreation were adapted for the assessment of community-based tourist attractions in Thailand. Such can be broken down into five components as follows:

1. Bio-physical or ecological carrying capability (ECC). This can be done by measuring a level of recreational utilization per time span having a relationship with impacts on the ecological system such as, impacts on soil, water quality, plants, wildlife, etc. In other words, a level of acceptable highest impacts is determined from a standard value or acceptable highest impact value found in tourist attractions (Wongphakdee, 2009).

2. The psychological carrying capacity (PsCC) of a resource can be calculated by counting how many operators are utilizing it, an analysis of the relationship between utilization and the frequency with which people meet, as well as congestion monitoring, which represents a person's perspective or feeling of the density of people per square kilometer in a specific location. Congestion monitoring is frequently used to assess both quantity and quality. Together with the density measurement, it is widely employed as a light-scale (Likert scale) or the number of individuals encountered (persons per unit area) (Emphandhu et al., 2005).

3. Physical and facility carrying capacity (PCC). This is the capacity rating or estimation and efficiency of service area/convenience facilities to accommodate tourism per a level of needs. This is on the basis of space of an area or convenience facilities used by one person. Besides, cycle of use must be taken into consideration (Emphandhu, 2014; Wongphakdee, 2009).

4. The social and cultural carrying capacity (SCC) of a tourist attraction is determined by assessing social characteristics and the culture of the local people by using a method to measure feelings or perceptions of social impact and the culture of the people in the community in order to determine the maximum number of tourists that a tourist attraction can accommodate while maintaining a quality recreational experience, which includes assessing social characteristics and the culture of the local people by using a method to measure feelings or perceptions of social impact and the culture of the people in the community (National Park Research Center, Department of National Parks, Wildlife and Plant Conservation, 2005)

5. Economic carrying capacity (ECC). This is an investigation of change after there is the management of local tourism on the basis of occupation, income, expense, debt, capital source and land tenure of local people (Songphornwanich et al., 2014).

Community-Based Tourism

Community-based tourism can be used to help communities develop. This will result in beneficial change with little impact on the town, tourism resources, and surrounding places, as well as a favorable tourist experience (Emphandhu, 2007; Suansri, 2003). The community-based pioneer working group in Thailand describes community-based tourist as a style of tourism that prioritizes environmental, social, and cultural sustainability. The community determines the direction for the community, and the community serves as the owner and has the authority to control and administer it for the benefit of visitors. That is, tourism management in community-based tourism usually involves planning and preparation in order to create a learning process for visitors. This emphasizes sustainability, community-centered, sense of belonging and benefit sharing (Suansri, 2003, Sarobol, 2003). In this regard, community-based tourism puts the importance on the following four main components:

1. Natural resources and community culture: Rich of natural resources with sustainable utilization; the community has unique culture

2. Community organization: the Social system having local scholars in various fields, sense of belonging and community participation in-development

3. Management: Rules and regulations for tourism management, fair benefit distribution and sharing, community social and economic development fund, etc.

4. Learning: Tourism activities can create perception and learning process, mutual understanding about way of life between the host and the visitors. Also, it is the construction of awareness about the conservation of natural resources and culture of the host and the visitor (Ministry of Tourism and Sports and Designated Areas for Sustainable Tourism Administration (Public Organization), 2016). In addition, Suansri (2003) further explained that intent of community-based tourism is using tourism as a tool for development and environmental conservation. This is because tourism resources and the resources which the community uses as a production base are the same resource. Hence, community-based tourism should be connected with community development for development.

The goal of this study was to establish components and indicators for assessing tourist attraction capacity to be appropriate for community-based tourist attractions in Thailand, with community-based tourism destinations in the upper north serving as the study's pilot areas, and to utilize the index to review and plan community-based tourist management, as well as to measure the capacity of community-based tourism that has been built. Such will prevent and reduce negative consequences at community-based tourism destinations. The database of

the Special Area Development Administration for Sustainable Tourism (Public Organization), the Community-Based Tourism Institute, and research on database administration for community-based tourism in northern and central Thailand (Trirat et al., 2019) discovered that community-based tourist sites in the upper northern provinces included all eight provinces, (Chiang Mai, Lamphun, Lampang, Mae Hong Son, Chiang Rai, Phayao, Phrae and Nan) with a total of 163 communities. As a result, in order to be consistent in assessing the carrying capacity appropriate to the context of the upper northern region, this study employed the Tourism Authority of Thailand's tourist attraction classification criteria, as well as the selection of model tourism communities from the upper northern provinces from the fiscal Year 2012–2017 by the Office of Tourism and Sports, and model communities in special areas for sustainable tourism, which considers the potential of management nature of tourism activities and the distinctive identity of resources in tourist attractions mainly by the community. The context of tourist attractions by the community can be divided into four types as follows:

1. Tourist attraction by eco-model community: An eco-model is a tourist attraction created by a community that organizes tourism or tourism-related activities, natural resources and the environment in the area, including a collaborative learning process among those involved in environmental management and local tourism engagement. To concentrate on raising awareness of the importance of ecological preservation.

2. Community-based tourism, the cultural and handicraft model, is a community-based tourism attraction with a distinctive cultural identity. History and archaeology, as well as traditional wisdom and the community's way of life, were all blended into tourism activities. This will allow tourists to learn about and share cultures with the locals, as well as generate a positive experience for themselves. Tourists are also concerned and conscious of environmental and cultural heritage protection.

3. Agricultural Community Based Tourist Attraction: An agricultural area, agricultural plantation, agro forestry, herb garden, and animal farm are all located here. There is a community-based tourism management method that involves learning activities between the community and tourists, which also improves the tourist experience.

4. Tourist attraction by health-model community: This is a community-run tourist attraction that is unique in bringing folk wisdom to be used in sickness treatment and is part of the community's tourism operations. Tourists will be able to unwind and be aesthetically beautiful while also learning how to preserve their health using folk wisdom.

Determination of Limits of Acceptable Change (LAC)

This is developed and adopted for an analysis of a relationship between impacts of tourism and a level of utilization of tourism and recreation in order to estimate tourism carrying capacity (Frissel & Stankey, 1972). This is because the carrying capacity is changeable in accordance with natural/social traits and time span. In addition, impacts of tourism do not only arise from a number of tourists since tourism activities, tourist perception and tourist behaviors can cause the impacts. As a result, the community's determination of carrying capacity in a tourist attraction region is neither articulated nor conclusive. In conjunction with the capacity assessment, the notion of setting acceptable limits of change (LAC) was used by concentrating on establishing standards and measuring tools that the community considers useful for self-evaluation (National Parks Research Center, Department of National Parks, Wildlife and Plant Conservation, 2005; Songphornwanich, et al., 2014). The determination of estimation criteria under a level of arisen impacts and carrying capacity fall into four levels: (1) no/low impacts or less than 50 percent of utilization (below carrying capacity level); (2) moderate level of impacts or 50–80 percent of utilization (at an approaching carrying capacity); (3) high level of impacts or 80–100 percent of utilization (exceeding carrying capacity); and (4) severe level of impacts or above 100 percent of utilization (over carrying capacity) (Emphandhu, 2014; Songphornwanich et al., 2014).

Indicator Development

According to tourism development process, sustainability is regarded as a main goal which can measure success, and it can be achieved. Hence, one way to make sustainable tourism development be measured effectively is the preparation of an indicator (Briassoulis, 2001). The indicator is a simple set of statistics that can be used to measure arisen change. Quantitative or qualitative data might be used as an indicator. A level of difficulties or the current severity of problems could be used as an indicator. It's a sign that something is happening, or is about to happen, in terms of situations or problems. To put it another way, it is a level of risk and potential in risk management (World Tourism Organization, 2004). It's also a basic tool for change

analysis that's simple to grasp and communicate with both specialists and non-specialists. (Office of Natural Resources and Environmental Policy and Planning, 2004). Therefore, the developments of components appropriate indicators are essential since it helps us perceive a level of impacts and standard carrying capacity. Consequently, this will lead to careful planning of community-based tourism management to prevent negative impacts of tourism. Importantly, the process of indicator development comprises six steps as shown in Figure 1 (Wiratchai, 2002).

Analytic Hierarchy Process (AHP)

The analytic hierarchy process was developed in 1970 by Dr. Thomas Saaty. It is a popular technique used in a decision-making process and well accepted internationally. It is the technique used for separating problems into parts in a form of hierarchical chart. Also, there is the weight of each component giving and used for weight calculation. This will lead to priority value of each alternative used for decision-making. In fact, it has the structure which mimics human thinking (Defence Technology Institute, n.d.). Interestingly, the analytic hierarchy process has three aspects to be taken into consideration: (1) analysis hierarchy; (2) prioritization; and (3) data reasonableness analysis (Vudhivanich, 2003). This has a process with four steps as follows (Tansirimongkon, 1999).

1. Structuring decision-making hierarchies. Its components are separated into parts or the form of hierarchical chart comprising goals, major decision-making criteria, minor decision-making criteria, and alternative.

2. Comparative diagnosis of the importance of decision-making criteria

This is a comparison that uses numbers instead of values to determine the important weight between each pair of criteria. This will result in the total importance-score of each choice being calculated in the form of a matrix table. Its goal is to verify the logic's consistency as well as the sensitivity of priority of choice (Tanbanjong, 2011). Dr. Thomas Saaty designed and computed an acceptable value for weigh substitution using the approach of the analytic hierarchy process. Numbers one to nine (1–9) are found to be appropriate with the rational when each pair of criteria is compared. This well reflects a level which is able to distinguish the relationship between the criteria (Table 1).

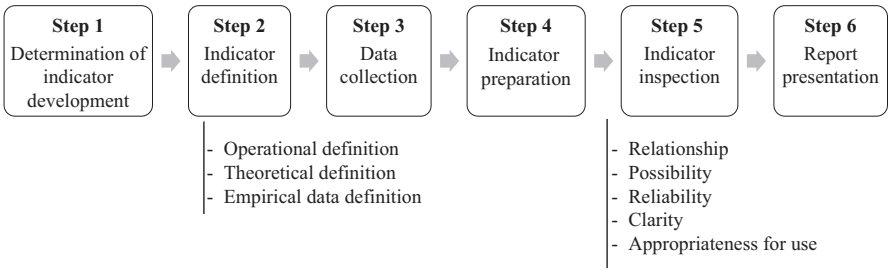


Figure 1 Indicator development process
Source: Adapted from Wiratchai (2002)

Table 1 Modified score sequence according to Saaty's method

Importance level	Description	Meaning
1	Are of equal importance	Both criteria are of equal importance
3	A moderate level of importance	One criterion is slightly more important than the other
5	A high level of importance	One criterion is much more important than the other
7	A very high level of importance	One criterion is clearly much more important than the other and there is actual practice
9	A highest level of importance	One criterion is externally, as much as possible, more important than the other (most agree)
2,4,6,8 The reverse numbers of the number above	Value between decisions that are adjacent to each other	The importance is between adjacent priority level of comparing the first indicator with the second indicator in order to gain a numerical value. Therefore, a comparison between the first and the second criterion will gain a reverse numerical value (The importance of one indicator is less than the other one)

Source: Adapted from "Saaty's method" by Saaty, (1980)

3. Finding the weight criteria. The weight value gained from a diagnosis by a specialist is the form of numbers. Then, it is computed to find the weight of the importance of each hierarchy. After that, a hierarchical analysis of each hierarchy from top to bottom is performed (Chaosuan, 2002).

4. Inspection of consistency ratio: CR. This is the inspection of results of the previous comparison if it has consistency by using rational consistency index (Ponpetch, 2008). This is based on a comparative ratio between consistency index: CI computed from the matrix table and the randy consistency index: RI as the Equation (1) below:

$$C.R. = C.I. / R.I. \quad (1)$$

In this scenario, if the C.R. value is less than.10 or comparable, it is considered acceptable. If the C.R. value is greater than.10, however, it is undesirable. As a result, this study uses the analytic hierarchy process (AHP) to rank components and indicators of community-based tourism attraction carrying capacity. The weight of each component and an indicator of each hierarchy are determined, and the components are then arranged in order of importance.

In conclusion, the conceptual framework of this research aimed to synthesize and develop elements that support capacity indicators suitable for use in the context of tourism by communities in the upper north in collaboration with experts by studying the components of and indicators for determining the carrying capacity of an area in Thailand from its inception to the present, model communities, as well as a network of tourist directors. The research looked at five different aspects: (1) the ecological component; (2) The psychological aspect; (3) physical elements and infrastructures; (4) social and cultural elements; and (5) economic elements combined with the concept of establishing the limits of allowable change in developing the criteria to determine the amount of impact or the capacity to support the area's use. To apply the capacity index to evaluate the context of community-based tourism sites in Thailand's upper northwestern region for local people, a community-based tourism capacity index was used by persons working for a tourist government agency to analyze the amount of resource usage in the area and to be aware of the level of effect that occurs in the community. According to the research conceptual framework presented in Figure 2, this will lead to the creation of policy ideas for collaborative preventive actions or mitigation techniques in the future.

Methodology

The development of appropriate components and indicators of carrying capacity of community-based tourism attractions in upper north Thailand under the synthesis of related theoretical concepts had the following procedures:

1. Create a team of experts by selecting from the eligibility criteria and expertise in developing components and indicators of the community's capacity to accommodate tourism with a group of 20 people, consisting of group 1, government officials, tourism agencies; group 2, academics in planning and managing tourism by the community (continually experienced in CBT research and graduated with a doctorate degree or holding an academic position); and group 3, a community-based tourism network group in the North.

2. Specialist interview: Structured interview was employed based on two main issues: (1) opinions about a model development of an assessment of carrying capacity of community-based tourism attractions; and (2)opinions about the determination of components and measurement criterion of each component.

3. Use the concept's components and indicators to assess carrying capacity of community-based tourism attractions in upper northern Thailand. Experts evaluate linked hypotheses by compiling them into questionnaires. The index of conformance (IOC: index of item objective congruence), which is a structural validity check, must be

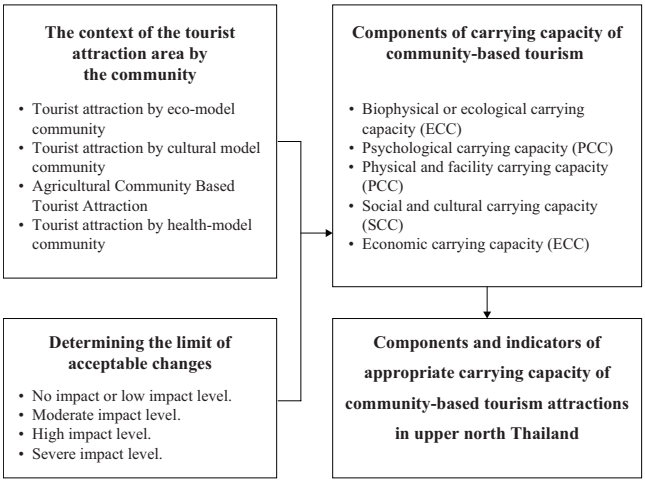


Figure 2 A conceptual framework for the development of appropriate components and indicators of carrying capacity of community-based tourism attractions in upper north Thailand

determined as to whether the material is consistent or in the same direction in each component, as well as the consistency of the indicators in each component. From a pool of 20 experts, the researcher chose the scorecard with an IOC value larger than 0.50 as a query. Every scorecard created by the researcher was verified to be accurate in its content. as well as the research objectives.

4. The components and the indicators passing structural validity and consistency inspection were developed to be a questionnaire, and the specialists assessed it for the second time. This aimed to inspect appropriateness of the indicators on the basis of five aspects: relationship, reliability, clarity, possibility and appropriate adoption. The following were scoring criteria.

1 = Low 2 = Moderate 3 = High

Scale Limits Description (Validity)

1.00–1.67 is an indicator that has all characteristics at a low level

1.68–2.34 is an indicator that has all characteristics at a moderate level.

2.35–3.00 is a high-level indicator that has characteristics in all aspects.

5. Ranking of the components and the indicators for finding important components and indicators by using analytic hierarchy process: AHP, the hierarchical organization, was as follows:

5.1 Goal: refers to the carrying capacity of community-based tourist attractions

5.2 Criteria: Components of the carrying capacity of community-based tourist attractions

5.3 Sub-criteria: indicators of components of the carrying capacity of community-based tourist attractions

The acceptable consistency rate was not more than .1 or 10 percent. In the case of more than .1, the data would be deleted or a comparison had to be done again. Finding the consistency rate was done to each hierarchy to confirm the obtained importance weight.

Results and Discussion

The results of an interview with experts involved in the creation of a model for assessing the carrying capacity of community-based tourism attractions revealed that the majority of the experts believed that assessing the carrying capacity was an important problem for community-based management. It was acceptable since it was used as a tool to govern the usage of tourism resources. As a result, the results of the assessment might be used by all relevant public and private parties, as well as entrepreneurs in tourist attraction areas, to prepare for the conservation or maintenance of tourism resources.

The structural validity and consistency of each component's indicators related to the carrying capacity of community-based tourist attractions in upper northern Thailand were examined under five components, including 31 main indicators and 59 minor indicators. The criteria were met by 29 major indicators and 52 minor ones (0.50–1.00). According to the recommendations of the experts, all of the components and indicators that passed the requirements were upgraded to be compatible with the adoption. In this regard, the components and indicators were classified into four categories based on the context of the tourist attraction:

1. Tourist attraction by eco-model community;
2. Tourist attraction by cultural model community;
3. Agricultural Community Based Tourist Attraction; and
4. Tourist attraction by health-model community

Then, an assessment was conducted to find appropriateness of the indictors on the carrying capacity of community-based tourist attractions based on five aspects: relationships, possibility, reliability, clarity, and appropriate using. The following were results of the assessment.

1. The component indicators on sustainable natural resource and environmental management were found to be at a moderate up to a high level in terms of relationship, possibility, reliability, clarity, and appropriate using ($\bar{x}$ = 2.10–3.00). It included the following components: psychology, physical and convenience facility, society and culture, and economy.

2. The component indicators on community-based cultural tourist attraction and handicraft were found at a moderate up to a high level in terms of relationship, possibility, reliability, clarity and appropriate using ($\bar{x}$ = 2.3–2.95). It included the following components: sustainable natural resource and environmental management, psychology, physical and convenience facility, society and culture, and economy.

3. The component indicators on community-based agro-tourism were found at a moderate up to a high level in terms of relationship, possibility, reliability, clarity and appropriate using ($\bar{x}$ = 2.10–3.00). It included the following components: sustainable natural resource and environmental management, psychology, physical and convenience facility, society and culture and economy.

4. The component indicators community-based health tourism were found at a moderate up to a high level in terms of relationship, possibility, reliability, clarity, and appropriate using ($\bar{x}$ = 2.20–2.95). It included the following components: sustainable natural resource and environmental management, psychology, physical and convenience facility, society and culture, and economy.

Results of the rating of the components and the indictors for finding important components and indicators by using analytic hierarchy process: AHP based on the four types of community-based tourist attraction were as follows:

1. Regarding results of a hierarchical analysis of five components based on the carrying capacity of community-based eco-tourist attraction, it was found that the component on natural resource and environmental management had influence on decision-making most (weight value = 47.95%). This was followed by psychology, physical and convenience facility, society and culture, and economy (weight value = 24.21, 15.62, 9.12, and, 3.08%, respectively). In this respect, the consistency ratio: C.R. was –.86 (less than .1), which implied that the components were consistent and could be used as weight value.

2. Regarding results of a hierarchical analysis of five components based on the carrying capacity of cultural/handicraft community-based tourist attraction, it was found that the component on society and culture had influence on decision-making most (weight value = 45.37%). This was followed by psychology, economy, physical and convenience facility, and sustainable natural resource and environmental management (weight value = 29.72, 10.49, 7.48, and 6.94%, respectively). In this respect, the consistency ratio: C.R. was -.83 (less than .1), which implied that the components were consistent and could be used as weight value.

3. Regarding results of a hierarchical analysis of five components based on the carrying capacity of community-based agro-tourist attraction, it was found that the component on sustainable natural resource and sustainable environmental management had influence on decision-making most (weight value = 47.38%). This was followed by physical and convenience facility, psychology, society and culture, and economy (weight value = 26.48, 12.71, 8.89 and 4.53%, respectively). In this respect, the consistency ratio: C.R. was -.87 (less than .1), which implied that the components were consistent and could be used as weight value.

4. Regarding results of a hierarchical analysis of five component based on the carrying capacity of health community-based tourist attraction, it was found that the component on psychology had influence on decision-making most (weight value = 44.46%). This was followed by society and culture, economy, physical and convenience facility, and sustainable natural resource and environmental management (weight value = 26.72, 16.80, 8.37 and 3.66%, respectively). In this respect, the consistency ration: C.R. was -.80 (less than .1), which implied that the components were consistent and could be used as weight value.

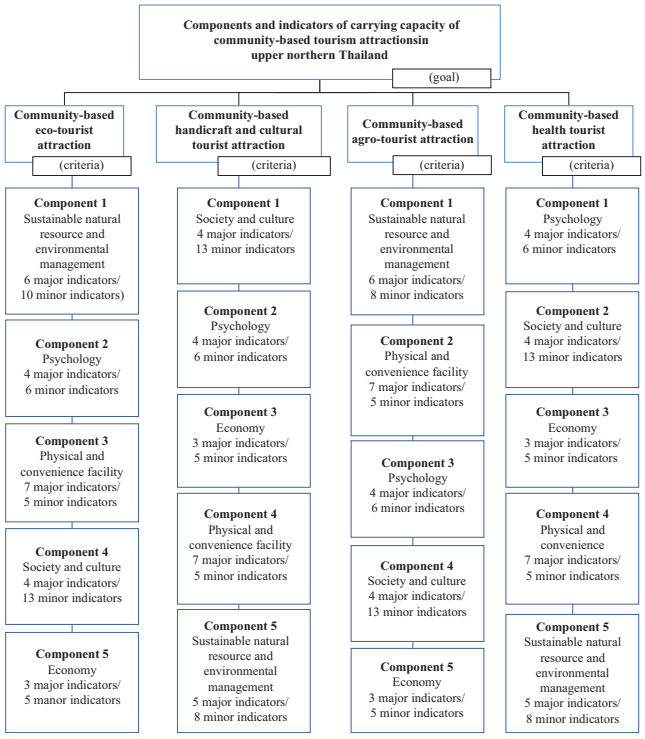


Figure 3 Components and indicators on carrying capacity of community-based tourist attractions in northern Thailand

Conclusions

The development of components and indicators on the carrying capacity of community-based tourism attractions in upper northern Thailand revealed that the components and indicators were divided into four groups, each with a different order of priority. This indicated that prioritization was mostly dependent on the tourist attraction's setting, management system, tourism activity characteristics, and unique identity as a community-based tourist attraction. In this regard, the component of sustainable natural resource and environmental management is prioritized by community-based

eco-tourist attractions (Type 1). This was followed by the components on psychology, physical and convenience facility, society and culture, and economy, respectively. This was because the community-based eco-tourist attraction had abundant natural resources and production mainly relied on it. Besides, management of tourism activities was in relation to eco-system, natural resources, and environment in its area e.g. nature trail, bird watching, and local plant varieties. In addition, concerned workers participated in a joint learning process in environmental management and participative local tourism. This was done in order to instill a sense of environmental sustainability. As a result, prioritizing of the components placed a premium on long-term natural resource and environmental management. This was in line with a study by Tidtichumrernporn et al. (2014), which found that the indicator used to assess community-based eco-tourism carrying capacity should take into account the area's condition and prioritize criteria and indicators related to resource management, forest, and wildlife, among other things. As a result, in order to prevent deterioration, the type of carrying capacity management emphasizes management planning, rehabilitation, caretaking, and monitoring of tourism resources.

Community-based handicraft and cultural tourist attraction (Type 2) put the importance on society and culture as a priority. This was followed by the components on psychology, economy, physical and convenience facility, and sustainable natural resource and environmental management, respectively. This was because the community-based handicraft and cultural tourist attraction had distinctive identity on tradition, history, archaeology and local wisdom. Also, interesting livelihoods were included in tourism activities such as cloth weaving, wickerwork, and arts & culture performance. In this respect, tourists could join and exchange experience in knowledge and culture with local people and other tourists. This must be on the basis of responsibility and an awareness of cultural and environmental conservation. Lertphokhanon and Lertphokhanon (2017) explained that cultural tourism mostly attaches to rural life and distinctively creative achievements which provide relaxation, enjoyment and knowledge. As a result, both locals and tourists or visitors must understand local culture in order to be responsible for cultural and environmental preservation. Importantly, the feelings or attitudes of tourists or visitors must not have an impact on the destination (Songphornwanich et al., 2014). As a result, while determining the carrying capacity of a community-based handicraft and cultural tourism attraction, society and culture are given first attention. Its goal was to determine the extent to which local tourism has impacted or changed society and culture. This would lead to the development of local culture restoration plans as well as the management of cultural capital for the efficient operation of tourism operations.

Community-based agro-tourist attraction (Type 3) put the importance on sustainable natural resource and environmental management as a priority. This was followed by the following components: physical and convenience facility, psychology, society and culture, and economy, respectively. This is due to the fact that the community-based agro-tourist attraction works in the pastoral and arable areas, as well as the agricultural garden, agro-forest, and herbal garden. Its community-based tourism management was accomplished through collaborative learning activities involving both locals and visitors. That is, existing local natural resources were used for tourism-related activities that were held for the sake of communal learning. As a result, determining the carrying capacity of a community-based agro-tourist attraction focuses primarily on natural resource and environmental sustainability. This would result in tourist resource management, restoration, care, and monitoring to prevent degradation.

Community-based health tourist attraction (Type 4) put the importance on psychology as a priority. The following components were added after that: society and culture, economy, physical and utility facilities, and sustainable natural resource and environmental management, in that order. This was due to the community-based health tourist attraction's unique character in utilizing local knowledge to treat sickness. It was also a part of the community's tourism activities for tourist relaxation and beauty, as well as learning health-care skills from locals. Finding a balance between community-based tourist activities and suitable density was also part of the tourism activity holding. Shelby and Heberlein (1986) cited that the determination of a level of maximum utilization at a particular time which does not have impacts on quality tourism experience must have decision criteria for maintaining quality tourism experience. In this respect, factors effecting the capability based on psychology included the number of people whom have been met, feeling of congestion, behaviors of people whom have been met, and area where a group of people have been met. Therefore, the determination of carrying capacity of the community-based health tourism attraction put the importance on the management of a number of people scattered in each learning station. This aimed to reduce tourist density and keep good tourism experience of tourists.

Recommendations

1. Personnel of concerned agencies in tourism can adopt results of the study for the determination of tourism policy and promotion strategies. This helps create appropriate and sustainable community-based tourism attractions. These personnel include the Director of Strategy and Planning Division, Office of the Permanent Secretary, Ministry of Tourism and Sports; the Director of Special Area Administrative Organization for Sustainable Tourism (Public Organization); and Head of Community-based Tourism Research Institute Section.
2. Results of the study are especially effective to community-based tourism attractions in upper northern Thailand. Therefore, the next study should expand to other regions of the country.
3. The next study should determine weight score or measurement criteria of each component and indicator based on sequence of importance. This can be used for empirical assessment of carrying capacity of other community-based tourist attractions.

Conflict of interest

The authors declare that there is no conflict of interest.

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