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PHYSICAL CARRYING CAPACITY OF CULTURAL TOURIST SITES

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ABSTRACT

Cultural tourism is the study of local arts, culture, traditions, and customs, whose unique qualities and charms attract visitors. Today, cultural tourism has received a lot of attention from tourists. For instance, in Chiang Rai, there are a total of 3,726,670 tourists; in Ayutthaya, a total of 8,345,957 tourists; Nakhon Ratchasima 9,972,316 tourists; and Nakhon Si Thammarat, the total number of 3,911,063 tourists (Ministry of Tourism and Sports, 2019). During special festivals and holidays, there are more tourists than normal visiting attractions which leads to environmental degradation, decreasing visitors' satisfaction, and overwhelming demands for limited facilities and local resources. Therefore, this research aims to assess the physical carrying capacity in the selected cultural tourism sites and to suggest proper measures for the management of the sites, so that they can cope up with the increasing numbers of visitors in the future. The four sites that were selected to be the studied areas were Mae Fah Luang Art and Cultural Park, Muang District, Chiang Rai Province; Ayutthaya Historical Park Phra Nakhon Si Ayutthaya District, Phra Nakhon Si Ayutthaya Province; Phimai Historical Park, Phimai District, Nakhon Ratchasima Province; and Khiri Wong Village, Lan Saka district, Nakhon Si Thammarat province. The variables that were studied to measure tourist capacity are the sites' physical aspects. The results of the analysis of these variables will lead to the more effective management of tourist attractions to accommodate growing future tourist volumes.

Keywords: *Physical Carrying Capacity, Cultural Tourism, Tourist Attraction Management*

1. INTRODUCTION

The tourism industry is a service sector that plays a very important role in the Thai economy because Thailand's main revenue comes from tourism, accounting for 12% of the GDP (KKP Research, 2020). Presently, the travel needs of Thai people are diverse and the presence of modern technology makes it easier for

Thais to access information about interesting tourist attractions in many places, thus creating fiercer competition in the tourism industry, both domestic and abroad. This puts cultural tourism in an important role because when local arts, culture, traditions, and customs are used as main products or services in tourism, they can be a strong selling strategy due to their uniqueness and charms which help differentiate them from other competitors. Cultural tourism is the study of local arts, culture, traditions and customs. It also includes valuable traditional architectures or natural sites that reflect a local way of life, traditional living conditions, and social and human development throughout history. In Thailand, there are a lot of tourist activities. In Chiang Rai, there are a total of 3,726,670 tourists; in Ayutthaya, a total of 8,345,957 tourists; Nakhon Ratchasima 9,972,316 tourists; Nakhon Si Thammarat Province, the total number of 3,911,063 tourists (Ministry of Tourism and Sports, 2019). The number of tourists gets much higher, especially during special festivals and holidays. This increasing number leads to environmental degradation, decreasing visitors' satisfaction, and overwhelming demands for limited facilities and local resources. Although there has already been a large amount of research involved in the assessment of physical capacities, as the capacities can be more clearly defined than other aspects, a study of cultural tourism in Thailand's four main regions altogether has not yet been done.

Therefore, this research aims to study the physical capacities to support cultural tourism in all four regions (North, Central, South, and Northeast); to propose guidelines and measures to control tourist traffic to be at a level, that maximizes the potentials of the tourist sites and, still, does not negatively affect the nature of cultural tourism itself. This research can also be used as a guide to assess the efficiency and effectiveness of the management of the cultural tourist attractions in the four regions (North, Central, South, and Northeast).

2. EXPERIMENT

2.1 Objectives

1. To assess the capacity to support tourists in the studied cultural tourism sites
2. To recommend measures for managing cultural tourism sites

2.2 Experiment apparatus

- A tourist counting tool
- A form to record information on the distribution of tourists within each site and the number of tourists participating in activities in each site
- Questionnaires for tourists on the spatial needs for each type of activity
- The application for measuring the area is Ling App.

2.3 Technique

2.3.1 Data acquisition

- The study areas were selected from all four regions of Thailand which consisted of

1. Mae Fah Luang Art and Cultural Park, Chiang Rai
2. Ayutthaya Historical Park, Phra Nakhon Si Ayutthaya Province
3. Phimai Historical Park, Nakhon Ratchasima Province
4. Kiriwong village, Nakhon Si Thammarat Province

The population and sample groups used in this study to find the capacity to support cultural tourism were Thai and foreign tourists visiting the mentioned cultural attractions. The exact number was unknown. The sample groups were assigned using the cluster sampling technique in major tourist attractions in each region. Concerning the size of sample groups, the researchers would use the formula designated to calculate infinite population, which allows error at 95% confidence interval.

Table 1 Populations by local administrative areas in 2020 and the number of samples

Subdistrict Administrative Organizations	2020		Sample sizes (Household)
	Households	Population	
1. Robwieng SAO	1,937	4,417	388
2. Ban Koh SAO	1,665	4,319	
3. Phimai SAO	5,736	15,775	
4. Kamloan SAO	3,191	9,106	
Total	12,529	33,617	

From the household sampling data, by using Yamane's formula, and setting the value of e at 0.05, the equation can be explained as follows,

When n = the desired sample size

N = the population size

e = the acceptable error value of the sample groups ($e = 0.05$ or 5%) Therefore, the sample size in this study could be calculated using the formula.

Regarding the study of the impacts of tourism on local people, the researchers collected data by interviewing no less than 388 samples. The researcher used convenient sample selection from the village near the studied area and used the number of tourists counted from the study of physical carrying capacity.

Collection of information for each type of activity

Counting the number of hotels and other accommodation types along with room capacity at the studied area

Recording the number of travelers to determine the occupancy trend, with the cooperation of hotel owners for information

Find the area size for each type of activity using Ling App, an application for area measurement

Inquiring about the needs of tourists to use the space for each type of activity

Conducting a facility census around the sites to find out the rate in which it was used, the adequacy, and the quality of each facility



Fig 1 An example of the use of Ling App to find the parking space of Mae Fah Luang Art & Cultural Park

3. ANALYSIS

3.1 Governing Equations

The formula used to calculate the physical capability was:

$$PCC = (A \times Rf) / a$$

PCC = physical carrying capacity. The unit is the number of people per area for a specific period.

A = the amount of space that can be used for each tourism activity. The data was acquired from the tourist distribution map.

Rf = number of sessions for a given period.

a = the amount of space a tourist will need to carry out their activities. The unit is area per person, depending on the type of tourism areas (ROS).

4. RESULTS AND DISCUSSION

The study areas are located in the four regions of Thailand which consist of

4.1 Mae Fah Luang Art and Cultural Park Chiang Rai

4.1.1 Parking Area: The total parking area for tourists, both personal cars and buses, was 1,852.5 square meters. The area for parking a car that was perpendicular to the route was regulated to have an area not less than 12 square meters/vehicle (Ministerial Regulation No. 41,2537). Therefore, it was able to accommodate 154 four-seater personal cars per round.

PCC of the parking area (person(s)/day) = the number of tourists (person(s)/cycle) × the number of round(s) of the visit (round(s) day)

PCC of the parking area (car(s)/day) = (154 × 4) people/cycle × (1 time/day)

PCC of the parking area (person(s)/day) = 616 people/day

From the calculation, it was found that the capacity of the parking area at Mae Fah Luang Art and Cultural Park could not keep up with the high number of tourists. 947 tourists were using the car park per day, which exceeded the capacity because the parking space can only accommodate only 616 people/day.

4.1.2 Free clean restrooms were available.

4.1.3 Accommodation / homestays

According to the statistical data of Chiang Rai, 2019, there were 119 guest houses, 196 hotels, and 354 resorts and other types of accommodation. These combined equaled 17,053 rooms. With two people per room, Chiang Rai can accommodate a total of 34,106 tourists.

4.1.4 Tourism area

Lanna Art and Cultural Park, formerly known as Rai Mae Fah Luang, was originally the office of the Thai Hill Tribes' Products Foundation in the patronage of Her Royal Highness Princess Maha Chakri Sirindhorn. Hill tribe youths from remote villages were brought together and given royal funds to study. They were also trained to learn how to live together and do internships according to royal initiatives, before departing for a career. When the project ended, Rai Mae Fah Luang, therefore, was transformed into Lanna Art

and Cultural Park. Within an area of 150 rai (240,000 square meters), it was a place to preserve ancient Buddhist arts, antiques, art objects, Lanna architecture, and provide knowledge about the Lanna cultural heritage. The working days and hours were Tuesday - Sunday (Closed on Monday) from 08.30-17.00 hrs. In 2018, there were 296,262 both Thai and foreign visitors. There are 365 days in one year or 52 weeks. $365 - 52 = 313$ days, so there were $296,262 / 313 = 947$ tourists / day.

PCC of Mae Fah Luang Art and Cultural Park's viewing area (People / Day) = (240,000 square meters × 1 round / day) / (240,000 Square meters / 947 people)

From the calculation of the area, it was found that the capacity of tourists to see the Mae Fah Luang Cultural Art Park was 947 persons/day.

4.2 Ayutthaya Historical Park, Phra Nakhon Si Ayutthaya

4.2.1 Parking area

At Ayutthaya Historical Park, all kinds of personal cars could be parked (sedans, pickup trucks, vans, etc) every day. Buses, however, could not, especially throughout the Pa Thon Road and Klong Tho Road, from 8:00, am to 5:00 pm, due to traffic congestion in Ayutthaya. The width of the parking space and the placement of the parking space is as follows. [11]

- The width of the parking space was 2.40 - 2.50 square meters; the length was 4.50 - 5.00 square meters. So, the parking space for a car was 12.5 square meters.

PCC of the parking area (cars / day) = Amount of space (sq m / round) × number of visits (round(s) / day) / amount of parking space that tourists need

PCC of the parking area (cars / day) = (1,250) sq m / round × (1 round / day) / 12.5 (sq m / car)

PCC of the parking area (cars / day) = 100 cars / day.

Therefore, the number of visitors' cars exceeded the carrying capacity of Ayutthaya Historical Park which could only accommodate 100 cars/day.

4.2.2 Free clean restrooms were available.

4.2.3 Accommodation / homestays

According to the statistical data of Phra Nakhon Si Ayutthaya in 2017, there were 95 standard hotels/homestays/guesthouses, equaling a total of 5,372 rooms. With a tourist rate of 2 people/room, it could accommodate 10,744 tourists. [10]

4.2.4 Tourism area

The venue of the event was Ayutthaya Historical Park, Ban Ko District, Phra Nakhon Si Ayutthaya. Ayutthaya Historical Park had a total area of approximately 3,000 rai (4,800,000 square meters) and

historical parks within Phra Nakhon Si Ayutthaya Province had an area of 1,810 rai (2,896,000 square meters).

PCC of Ayutthaya Historical Park's area (person(s) / day) = (4,800,000 square meters x 1 round / day) / (2,896,000 Square meters / 7,000 people)

From the calculation of the area, it was found that the carrying capacity of the tourists was 11,602 people/day.

4.3 Phimai Historical Park, Nakhon Ratchasima

4.3.1 The parking area at Phimai Historical Park was open for visitors every day from 7:30 AM to 6:00 PM and there is a parking lot for not more than 30 cars. Busses could not park there, so they needed to drop passengers off at the gate and go park elsewhere (Maneevan Putsathien, 2005). A personal car was a four-seater. A tour bus was a 36-seater.

PCC of the parking area (person(s) / day) = number of tourists (people / round) × the number of round(s) of the visit (round(s) / day)

PCC of the parking area (cars / day) = (4 x 30) people / cycle × (1 cycle / day)

PCC of the parking area (person(s) / day) = 120 people / day

There were regular Thai and foreign tourists visiting Phimai Historical Park, which were no less than 300,740 people per year, stated by the tourist information of Phimai Historical Park covering the years 2017 - 2019 (Phimai Municipality, 2020). That means 300,740 / 365 = 824 people per day would want to use the provided car park, which exceeded the carrying capacity because the parking area could accommodate only 120 people/day. Instead, busses were used to drop off passengers and came back to pick them up later.

4.2.2 Free clean restrooms were available.

4.2.3 Accommodation / homestays

Phimai Historical Park is visited regularly by both Thai and foreign tourists, at least 300,740 people per year according to the tourist information of Phimai Historical Park covering the years 2017 - 2019 (Phimai Municipality, 2020). It meant that at present, the average number of tourists staying overnight was 300,740 / 365 = 824 people/day, so it was not over the accommodating capacity.

Many tourists are visiting Phimai Festival. The hotels there were fully booked both in the city of Korat and in Phimai. On average, a number of 4,000 tourists stayed overnight, so it was still not over the capacity of the accommodation.

4.2.4 Tourism area

Phimai Festival is an event held to preserve the valuable culture and traditions of the local Phimai citizens and to promote tourism in Nakhon Ratchasima

to be more well known. In the event, there are many activities such as a parade of a royal barge model, boat race to win a royal cup, entertaining shows, a Vimayana dance, folk cultural performances, local cooking contest, cheering contest, Thai country music singing contest, Exhibits from the public and private sectors, a market selling goods from One District, One product initiative, and a Korat cat contest. Many tourists are visiting the fair. Hotels are fully booked both in the city of Korat and in Phimai. The event is held for 5 days during the 2nd week of November every year. This year, the event ran from 9 to 13 November 2005 and has more than 4000 tourists and local visitors.

The venue of the event is in Phimai Historical Park, Phimai District, Nakhon Ratchasima Province, in Phimai District Office area, and along Chakkarat River. This festival was held for the first time in 1989, and the Phimai Historical Park has a total area of approximately 3,000 rai (4,800,000 square meters); Phimai Historical Park has an area of 115 rai (184,000 square meters), laid out in rectangular, with a width of 565, and a length of 1,030 (565,950 square meters).

PCC of Phimai Festival area (person(s) / day) = (4,800,000 square meters x 1 round / day) / ((565,950-184,000) square meter / 4000 people)

From the calculation of the area, it was found that the carrying capacity of tourists during the Phimai Festival was 50,269 people/day.

4.4 Khiri Wong Village, Nakhon Si Thammarat

4.4.1 Parking area: Kiriwong Village had certain guidelines for limiting the number of tourists. Around five to six busses were allowed to bring in visitors. The tour bus contained 36 seats. [7]

PCC of the parking area (cars/day) = Amount of space (sq. m./round) x number of visits (round(s)/day) / amount of parking space that tourists need

PCC of the parking area (cars/day) = (6x 36) people / round) × (1 round/day)

PCC of the parking area (person/day) = 216 people/day

Therefore, Khiri Wong village had more traffic than the physical carrying capacity that could accommodate only 216 people/day.

4.2.2 Free clean restrooms were available.

4.2.3 Accommodation / homestays

According to the recorded statistics of Nakhon Si Thammarat in 2016, 280 hotels/homestays/guesthouses meet the state's standards, which equaled 16,800 rooms. With a tourist rate of 2 people per room, the province can accommodate 33,600 tourists. [8]

4.2.4 Tourism area

Most of the activities are eco-activities, consisting of trekking up to Khao Luang mountain and studying nature up there, bird watching, swimming, cycling, relaxing, setting up a camp and appreciating local ways of life, studying the history and stories of floods of the community, studying community organizational & communal activities, and visiting various traditional events.

The venue of the event is a part of Kamloon Sub-district, Lan Saka District, Nakhon Si Thammarat. The total area is approximately 38,150 rai (61,040,000 square meters) and Khiri Wong Village has an area of 2,569 rai (4,110,400 square meters) [9]

$$\text{PCC of Khiri Wong Village area (person(s) / day)} = (61,040,000 \text{ square meters} \times 1 \text{ cycle / day}) / (4,110,400 \text{ Square meter} / 1000 \text{ people})$$

From the calculation, it was found that the tourist carrying capacity was 14,850 people/day.

5. CONCLUSIONS

The results of the research on the physical carrying capacity to support the current tourism activities can be summed up as follows. When calculating the carrying capacity of the number of tourists who engage in activities at the Mae Fah Luang Art and Cultural Park, Chiang Rai; Ayutthaya Historical Park, Phra Nakhon Si Ayutthaya; Phimai Historical Park, Nakhon Ratchasima; and Khiri Wong Village, it is found that Mae Fah Luang Art and Cultural Park, Ayutthaya Historical Park and Khiri Wong Village had the numbers of tourists exceeding the acceptable capacity, both during low and high seasons. Therefore, there should be recommendations for implementing measures to manage tourist attractions and to effectively accommodate the growing number of tourists in the future. To tackle the problems of overflowing tourists or congestion in the much-visited area, the number of tourists should not exceed 947 people/day for Mae Fah Luang Art and Cultural Park, 11,602 people/day for Ayutthaya Historical Park, and 14,850 people/day for Khiri Wong village.

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PHOTOS AND INFORMATION



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