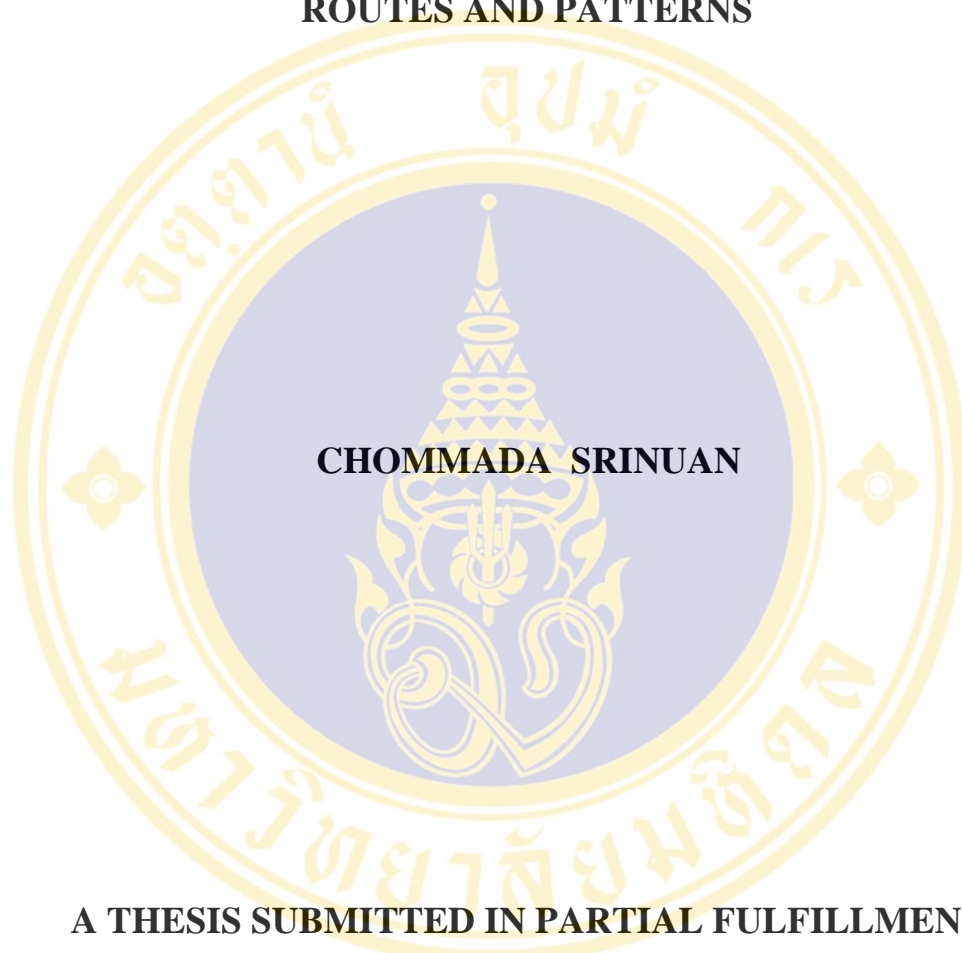


**BICYCLE USE OF RESIDENTES AND TOURISTS IN
SONGKHLA MUNICIPAL AREA: SUITABLE BICYCLE
ROUTES AND PATTERNS**



**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
(ENVIRONMENTAL PLANNING FOR COMMUNITY AND
RURAL DEVELOPMENT)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY**

2007

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Thesis
Entitled

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SONGKHLA MUNICIPAL AREA: SUITABLE BICYCLE
ROUTES AND PATTERNS**

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Chommada Srinuan

BICYCLE USE OF RESIDENTS AND TOURISTS IN SONGKHLA MUNICIPAL AREA: SUITABLE BICYCLE ROUTES AND PATTERNS

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ABSTRACT

This research has 3 main objectives 1) to study the bicycle use of residents and tourists in the Songkhla Municipal area; 2) to find out suitable bicycle routes; 3) to find out suitable bicycle patterns for each road. The research was done as survey research by using questionnaires, observations and interviews. The samples of this study were composed of 160 people who resided in the Songkhla Municipal area, 160 tourists and 6 Songkhla Municipality officers concerned with this subject.

Results obtained from the study reveal that residents in the Songkhla Municipal area use their bicycles mainly for exercise and going shopping and because of its lower costs. Most tourists visited the Songkhla Municipal area for recreation. The study suggests that Chalathat, Ratchadamnoen and Prince Chumphon Monument Roads are the most suitable bike routes, Kaoseng, Ramwithi and Thaleluang Roads are moderately suitable bike routes whilst Nakhon Nok Road is the least suitable route.

According to the proposed bicycle patterns, the study area could be developed into 4 patterns 1) Shared Roadway on Nakhon Nok Road, 2) Bike Lanes on Kaoseng and Thaleluang Roads 3) Sidewalk Bikeway on Chalathat, Ratchadamnoen and Ramwithi Roads 4) Bike Paths on Laem Son On and Prince Chumphon Monument Roads.

KEY WORDS: BICYCLE ROUTES AND PATTERNS / BICYCLE USE / SONGKHLA MUNICIPALITY

143 pp.

การใช้จักรยานของประชาชนและนักท่องเที่ยวในเขตเทศบาลนครสงขลา: เส้นทางและรูปแบบทางจักรยานที่เหมาะสม (BICYCLE USE OF RESIDENTES AND TOURISTS IN SONGKHLA MUNICIPAL AREA: SUITABLE BICYCLE ROUTES AND PATTERNS)

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บทคัดย่อ

การวิจัยในครั้งนี้ มีจุดประสงค์ 3 ประการ ได้แก่ 1) เพื่อศึกษาพฤติกรรมการใช้จักรยานของประชาชนและนักท่องเที่ยวในเขตเทศบาลนครสงขลา 2) เพื่อหาทางเลือกเส้นทางจักรยานที่เหมาะสม 3) เพื่อหาทางเลือกรูปแบบทางจักรยานที่เหมาะสมสำหรับถนนแต่ละสาย โดยใช้วิธีการวิจัยเชิงสำรวจ ซึ่งมีเครื่องมือวิจัย ได้แก่ แบบสอบถาม แบบสังเกต และแบบสัมภาษณ์ โดยมีกลุ่มตัวอย่างศึกษาเป็นประชาชนที่อาศัยอยู่ในเขตเทศบาลนครสงขลา 160 คน นักท่องเที่ยว 160 คน และเจ้าหน้าที่เทศบาลนครสงขลาที่เกี่ยวข้อง 6 คน

ผลการศึกษา พบว่า ประชาชนในเขตเทศบาลนครสงขลา นิยมใช้จักรยานเพื่อออกกำลังกายและไปซื้อของ เพราะประหยัดค่าใช้จ่าย ส่วนนักท่องเที่ยวที่มาเที่ยวในเขตเทศบาลนครสงขลา เพื่อมาพักผ่อนหย่อนใจ สำหรับเส้นทางที่มีความเหมาะสมระดับมากในการทำเป็นทางจักรยาน ได้แก่ ถนนชลลัทสน์ ถนนราชดำเนิน ถนนแหลมสนอ่อน ถนนบริเวณกรมหลวงชุมพรเขตอุดมศักดิ์ เส้นทางจักรยานที่เหมาะสมปานกลาง ได้แก่ ถนนเก้าเส้ง ถนนรามวิถี ถนนทะเลหลวง และเส้นทางจักรยานที่เหมาะสมระดับน้อย ได้แก่ ถนนนครนอก

รูปแบบทางจักรยานที่เหมาะสมกับถนนแต่ละสาย พบว่ามี 4 รูปแบบ คือ แบบที่ 1 การใช้จักรยานเดินทางร่วมกับยานพาหนะอื่นๆ เช่น ถนนนครนอก แบบที่ 2 การจัดทำช่องทางจักรยาน เช่น ถนนชลลัทสน์ ถนนราชดำเนิน ถนนรามวิถี แบบที่ 3 การจัดทำช่องทางจักรยาน เช่น ถนนเก้าเส้ง ถนนทะเลหลวง ส่วนแบบที่ 4 การจัดทำเส้นทางเฉพาะสำหรับจักรยาน เช่น ถนนแหลมสนอ่อน และถนนบริเวณอนุสาวรีย์กรมหลวงชุมพรเขตอุดมศักดิ์

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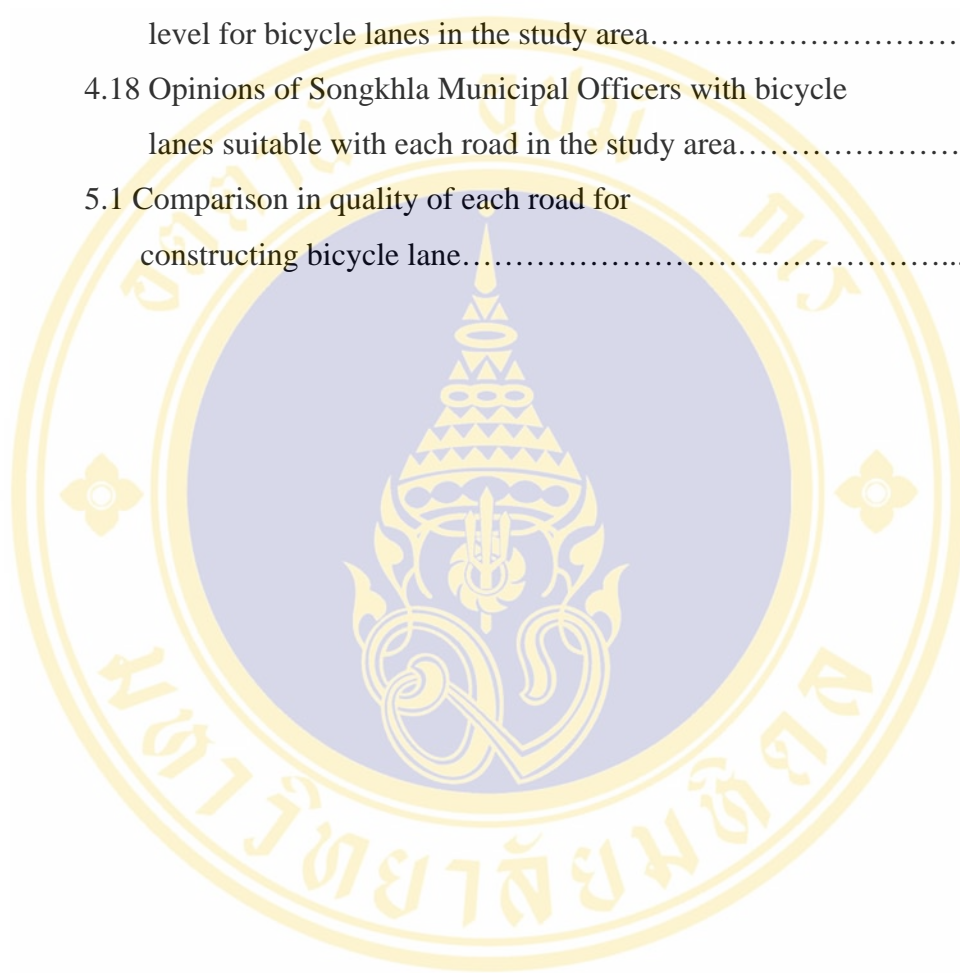
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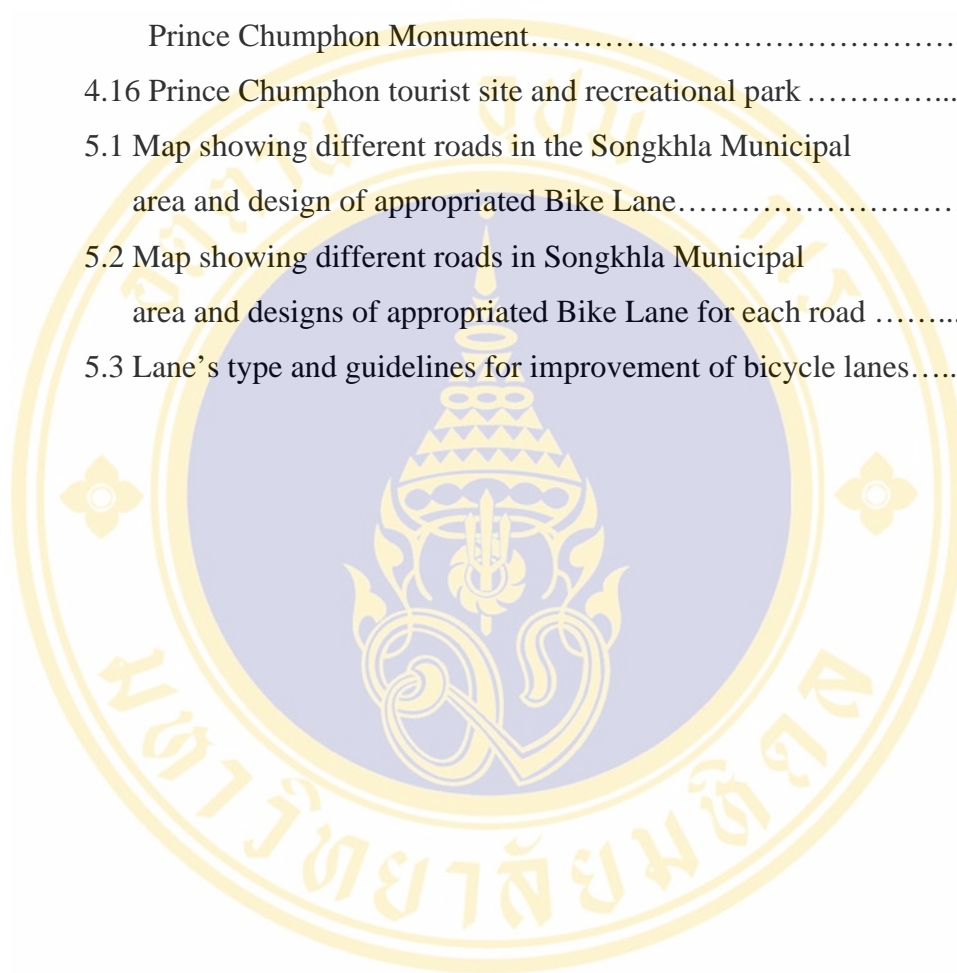


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CHAPTER I

INTRODUCTION

1.1 Background and significance of problems

Recently, traveling with automobiles and bicycles which is quite popular among most people has resulted in traffic problems not only in Bangkok but also in other parts of Thailand. These problems are classified by government agencies and people as one the most important tasks to be solved. This is due to the increase in their intensity in both space and time. Other areas of the country that have been assigned to support economic development or center of government offices tend to face such traffic problems. Some large suburban cities affected by these problems include Chiang Mai, Songkhla, Saraburi, Chonburi, Samutprakarn, Rayong, Lampang (Thongchai Phanasawat, 1996:165).

Traffic congestion has caused tremendous economic and social losses in terms of increasing costs and time. In 1995, the Office of the Committee, National Energy Policies estimated that traffic congestion has wasted fuel for 11.8 million liters daily or approximately 73.4 Baht per day. Besides, working time loss made production down to about 188 million Baht daily (Office of the Committee, National Energy Policies, 2002:27).

Traffic congestion has created chain reactions resulted in social impacts. Traveling for longer period in each day tend to change lifestyle. Most of the times are spent on the roads, in offices or educational institutions to create many tensions. Essentially, people's health is being deteriorated resulted from air pollution causing allergies and respiratory diseases. According to noise pollution, it can deafen hearing and affects other parts of the body such as sudden impacts on blood vessels, quick heart beat, high blood pressure, stomachache and brain degenerated (Narumol Arpinivet and Pisarn Piemmettawat, 1997:75).

Apart from human, traffic problems have also caused huge damages in environmental impacts in which hazardous gases have been released from exhausted pipe e.g., SO₂, NO₂ which will be formed as H₂SO₄ and HNO₃ when combining with vapour or rainfall. These can erode facilities, metal structures, monuments, and marbles, and destroyed natural food chains.

In 1998, Songkhla Municipality has planned a project at Lam Son On Park in aiming at constructing roads which include bicycle lanes and improving landscapes around the park for traveling and recreation. However, there are inadequate facilities such as traffic signs, parking or resting areas, road maps, linking points for bicycles at the intersections or entrance and exit alley, main roads and others. These things must be kept in good condition, safe and convenience for use before promoting for more bicycle use. More importantly, trees and forestry having low acid tolerance and Methane gas may cause Greenhouse Effect (Greenhouse Foundation, 1991:70).

Traffic congestion in many major cities is resulted from increasing numbers of vehicles over those from roads or lacking road surface suitable for supporting traffic congestion (Office of Committee for Land Traffic Management (SJR), 1994:6). According to these reasons, effective planning for communication and transportation systems in Thailand should prevent traffic congestion within cities or communities (Chuchawal WattanaBunjong, 1996:23). Although technology involved with huge investment will be operated successfully, it may be the cause of environmental impacts including toxic gasses. Accordingly, traffic planning should be considered not only for responding to the need of traveling but also for creating and supporting suitable environmental aspects (Marcia, D. and Lowe, 1989:7).

According to problems mentioned above, there have been some promotional activities to encourage people to use more public transportation. Another alternative is to promote people to use bicycle for traveling in short distance (between 3 and 5 kilometers) instead of using private automobile because it needs human power to run. Traveling by bicycles has also produced certain advantages for rider's bodies and environmental aspects with lacking of fuel waste (Piyadech Limsuthirat, 2002:1). Besides, its price is lower than other vehicles with less maintenance cost, less traffic surface and parking space. In addition, bicycles have great flexibility and minor accidents, and, of course, strengthen rider's health (Mayuree Patrachaiyakup, 1999:2).

Recently, traveling by bicycles is popular in many countries such as the United States of America, Japan, Australia, Vietnam and other countries in Europe. There are many countries having good successes in planning and rallying for bicycle use. The Netherlands and United States of America are examples of this.

The Netherlands, the country of bicycles, is the country where most people prefer to use bicycles in the world. It has 15 million bicycles out of its population 15 millions. This means that each Netherlander has his/her own bicycles for traveling in both urban and rural areas (Rimrungs Vatasarn, 1995:5). Bicycle lanes have been managed on road surfaces, and automobiles and trolleys are forbidden to use any bicycle lane. In some cities, the bicycle lanes are being constructed as tunnels under the buildings. This indicates the admiration and lifestyles of the bicycle use in this country (Muthita Pinsuwan, 1999:37).

Referring to the study in the United States of America (Non-Motorization), the results indicate that traveling by bicycles instead of automobiles could save money about 0.2 U.S dollars or 9 Baht, and 0.8 U.S dollars or 34 Baht per 1 kilometer distance in the suburban and city areas, respectively during rush hours (www.manager.com: February 21st, 2001).

In Thailand, Office of Committee for Land Traffic Management (SJR) has supported and encouraged the development of traveling systems as Non-Motorization which is classified as the best way to solve traffic problems and provide fuel-savings. This, in turn, should solve economic problems and reduce environmental impacts as well as being used for traveling in short distance because most Bangkok areas and vicinities have many minor roads, small lanes and alleys. Furthermore, many frontage roads and sidewalks along main roads can be developed as being bicycle lanes. This can be seen under the motorways in the Bangkok Metropolitan area, and along the sidewalks in the outskirts of Bangkok (www.manager.co.th: February 21st, 2001).

Because of Songkhla is a province classified as a center for economics, trades, communication, and education, people from the adjacent areas have migrated into this center resulting in traffic congestion especially during morning and evening rush hours. Increasing numbers of vehicles in association with narrow roads in the municipal areas and lacking of sidewalks in some parts are also reasons for traffic

congestions. Furthermore, automobiles have caused air pollution and accidents on roads known as threats to human health and safety in the Songkhla Municipal area.

Currently, some people in the Songkhla Municipal area ride bicycles for their daily lives (with critical problems in energy shortages, city environmental protection and health preservation of community). Hence people should be encouraged to use bicycles for energy reduction. This will lead to the Songkhla as a livable-enjoyable city in Thailand which will be coincided with the Songkhla provincial strategies. These strategies include the projects related to tourism and environmental preservation such as International Environmental Sculptures, Songkhla Municipality Lam Son On Park Project, Quality Preservation and tourist site development-Kao Noi-Kao Tang Kuan (www.songkhlanum.org, October 1st, 2005).

In 1998, Songkhla Municipality created Lam Son On Park Project intended for road construction, having bicycle lanes along with regular lanes and improve landscapes at Lam Son On Road for traveling, exercising and recreations. However, inside the Songkhla Municipal area, there have never been bicycle lanes especially the one connected in system as well as having inadequate facilities such as traffic sign, resting areas, road map. Problems occurred at the intersections where vehicles are in and out constantly until bikers are unable to pass through. These things need the development and improvement for more safety and better conditions and conveniences for use before promoting for more bicycle uses.

Field data in the Songkhla Municipal area presented in this thesis are obtained from random-sampling interviews, people living in the area, tourists, government officials, entrepreneurs including route exploration and important tourist sites within the area. The results reveal that people in the area agree with the bicycle use for traveling in the Songkhla Municipal area in short distance (estimated 3-5 kilometers). Some people have their own bicycles and use them for daily activities. Major problems caused by the use of bicycles for traveling are involved with unsafe accidents, inconveniences of bicycle lanes and inadequate sidewalks, and system disconnection. According to the observations of route, tourist site location, community location and number of traveling people in the area. The researcher has randomly defined the following routes: Kaoseng-Chalathat Roads, Ratchadamnern - Laem Son On Roads, Thaleluang-Ramwithi Roads, and Nakhon Nok Road-Prince

Chumphon Monument. Generally, these routes are major and minor roads that widely used for traveling which also passing through important places of Songkhla Municipality and joining into network.

1.2 Research Objectives

1.2.1 To study behaviors of people and tourists for using bicycles within the Songkhla Municipal area.

1.2.2 To select suitable roads for bicycle lanes in the Songkhla Municipal area.

1.2.3 To design suitable bicycle route patterns for each lane in the Songkhla Municipal area.

1.3 Scope of the Study

1.3.1 The study area is located within Songkhla Municipality covering an area of 9.27 square kilometers with the following details:

- North is adjacent to Samila Beach
- South is adjacent to Kao San Road (Kao San Beach)
- East is adjacent to Chalatat Road (Chalatat Beach, Gulf of Thailand)
- West is adjacent to Lam Son On (next to Songkhla Lake)

1.3.2 Details of Methodology

1.3.2.1 Study behaviors and attitudes of local people and tourists using bicycles in the Songkhla Municipal area by interviewing and inquiring to learn attitudes and demands of people in this area.

1.3.2.2 Study physical conditions of various lanes including traffic conditions in each lane within the Songkhla Municipal area, and to analyze suitable bicycle routes in this area.

1.3.2.3 Study bicycle lanes and facilities coincided with physical environments and tourist sites of Songkhla Municipality, and to propose and recommend an arrangement of suitable bicycle route patterns for each lane within the Songkhla Municipal area.

1.4 Conceptual framework

In this research study, the researcher has applied principles associated with research objectives identified as guidelines in constructing research concepts (Figure 1.1) as follows:

1.4.1 Behaviors of residents and tourists in using bicycles

The study of local people and tourist's characteristics, and to study various habits of local people and tourists visiting the area including the opinions towards the managements of bicycle lanes for good health and traveling by dividing into two groups, local people and tourists. This will be done for the better understanding in lifestyle of local people and tourist's behaviors including the demands of the people and tourists.

1.4.2 Physical environments of the study area

-To study traffic and environmental conditions of the bicycle lanes and tourist sites for finding out areas having their potential and suitability for the management of bicycles for daily life and tourism.

1.4.3 Standard of managing bicycle lanes

-To study types of bicycles, bicycle lanes and facilities used in the same lanes for the designs of suitable bicycle lanes in the study area.

All four topics must be analyzed to find out conclusions regarding tendency for bicycle use in the study area, suitable lanes for being bicycle lanes and recommendations from the study and tourism in the Songkhla Municipal area as shown in the following conceptual frameworks.

1.5 Expected Outcomes and Benefits

1.5.1 To receive data on the tendency of people and tourists in using bicycles.

1.5.2 Finding suitable bicycle lanes in the Songkhla Municipal area.

1.5.3 Results of this study will be useful as guidelines for bicycle lane developments with suitable bicycle route patterns in the Songkhla Municipal area and being case study for development in other areas.

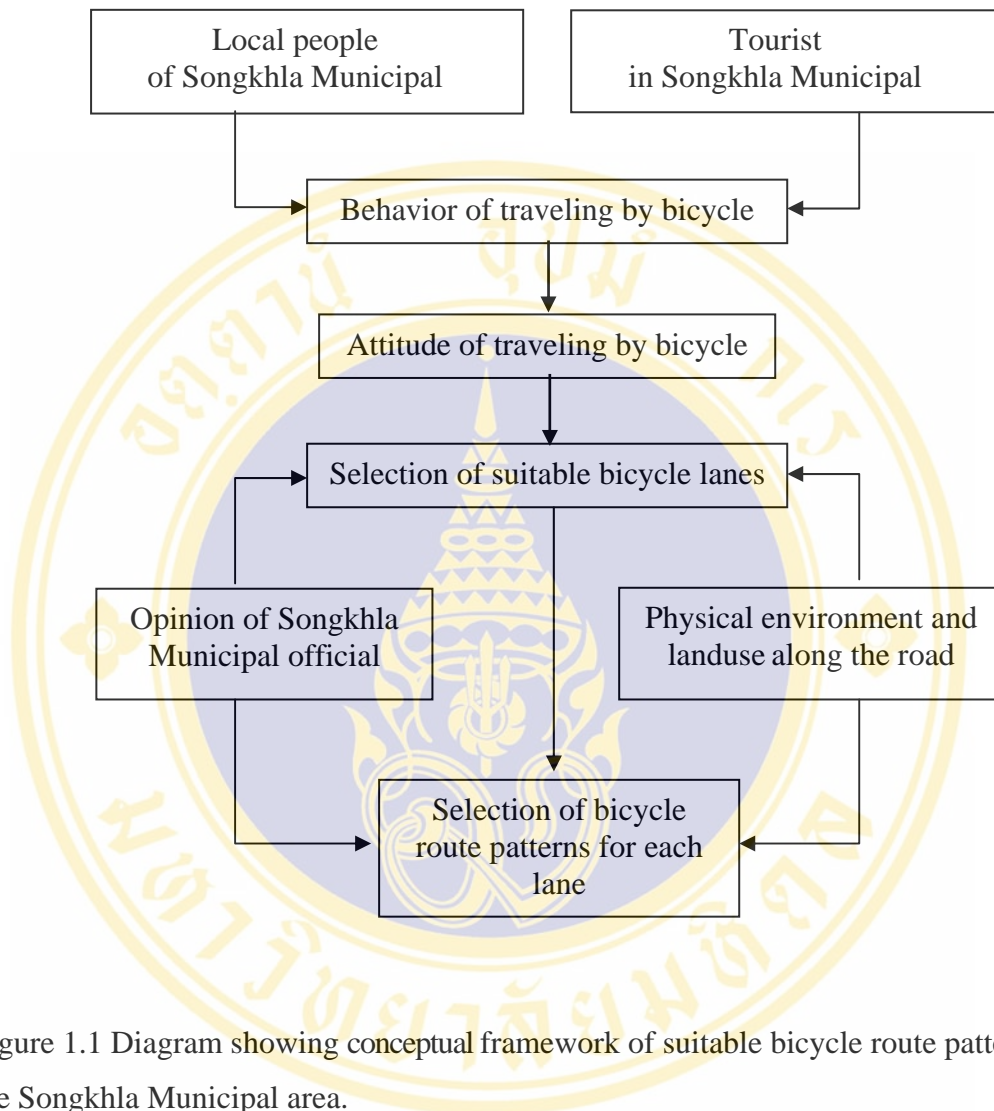


Figure 1.1 Diagram showing conceptual framework of suitable bicycle route patterns in the Songkhla Municipal area.

1.6 Definitions

- Bicycle is defined as vehicles with 2 wheels used by the power of rider.
- Bicycle lanes are defined as the designated area especially for bicycle use with enough width to ride cross each other with convenience and safety in the Songkhla Municipal area.
- Tourism is defined as traveling with traveler’s satisfaction from the place of residence to the Songkhla Municipal area, Songkhla Province for recreation to visit important historical places and architectural monuments, conferences, competitions and religion activities.

- Tourist is defined as travelers who visit the Songkhla Municipal area both Thais and foreigners with different purposes apart from going to work or study. One must not be local people who are residing or studying in the Songkhla Municipal area.

- Tour lanes are defined as traveling lanes for tourists to travel from one place to another tourist site in the Songkhla Municipal area.

- Proper bicycle lanes are defined as bicycle lanes with safety features and extended as straight line, slightly tilt with smooth surface, clear sign symbols.



CHAPTER II

LITERATURES AND RELEVANT RESEARCHES

Bicycle use of residents and tourists, and suitable bicycle routes and patterns in the Songkhla Municipal area was conducted based on data collection, analysis, documents and relevant researches in this study for guidelines as follows:

2.1 Bicycle usage history

2.1.1 Bicycle history

Bicycle was first used in Paris in 1810 and was then built as 2 wheels with a piece of wood in between and its seat was made of leather. The biker must use his feet to push on the ground to make the bicycle run. Before turning left or right, the biker must lift the bicycle in the direction wanted. Two-three years later, the front wheel was modified to make it looser to turn in the wanted direction.

In 1839, Kirk Patrick Macmillan, a Scottish, modified the bicycle with shifting stick connected to the wheel which made from steel. The front wheel is slightly smaller than the rear wheel with seat and handle for controlling front wheel and for seating steady on the seat. There was ladder for paddling and turning wheel to take the bicycle and biker forward as well as having the step for pedals without raising his legs only slightly bended his knees up and down alternately. There was no chain and the shifting stick attached to the back of front wheel. The wheel could be turned by the grinder which was later changed in design.

The contraption called Bicycle which was originated in Paris in 1865 registered its right for the first time by Pier Lallement, a French mechanic who modified for more convenient use by making front wheel slightly larger than the rear wheel which was different from that of Kirk Patrick Macmillan. His bicycle used the belt to pull the grinder to make the wheel turn with the crank and pedals. He built a

factory to produce lots of bicycle to sell to French people as well as exporting to England and U.S.A (Thongchai Pansawat, 1993:250).

In 1873, a British, H.J. Lawson, modified the bicycle almost as good as the current form and had been sold worldwide. Subsequently, in 1882, his improved bicycle had similar features as the present one. He produced many bicycles and sold them all over the world. The four most popular brands are Dason, Raley, Phillips and Sunbeam (Yosh Vachatasathien, 1998: 107-108).

In Thailand, bicycles were imported during King Rama IV (same as horse-drawn carriage), together with the construction of Charoenkrung Road. During the reign of King Rama V, (1898-1899), bicycles were quite popular for Thai people. There had been many bicycle riders in Bangkok including chubby men like Phra Bat Som Dej Phra Phut Chao Luang and Chaophraya Pasakornvong. During Prince Pittsanulok Phrachanat's visit to the flower festival in rural areas, bicycles were decorated with flowers, and bikers also have fancy dresses.

Mr. Lert Sethabut (Phraya Pakdeenorset) was the first entrepreneur who imported the bicycle into Thailand for sale. Then he was also the owner of a department store and the 1st ice-producing factory of Thailand. The following entrepreneur was the Hogjun Department store located at Wat Tuk intersection during the reign of King Mongkut. Many streets were full of bicycles because their bodies could be made in Thailand; only parts were imported leading to much cheaper price. However, bicycles were still imported from overseas due to their luxurious designs (Yot Wacharasathian, 1978: 21). Later, the bicycles played the important roles in communication for Thailand. Many Thai dealers imported bicycles for sale and the popularity was spread to suburban and rural areas in which vehicles were assigned to be used for agriculture, and transporting products to the market. Moreover, bicycles were also used for traveling in short distance, in the alleys, and being family vehicles (Thongchai Pansawat, 1993: 250).

2.1.2 Type of bicycle

Muthita Pinsunthorn (1999:20) reported the details of bicycles used in various aspects as follows:

2.1.2.1 Ordinary Bike: This type is used for shopping, made with fender, front and rear light, stall, and chains. Some brands provided air pump and front screen. This type of bicycle has one gear and is unable to adjust weight of paddle to match with changing surroundings such as undulating hills, trail and reverse wind directions. However, the type can be used for exercise, even though its speed is generally slower than other types of bicycle because of heavier weight.

2.1.2.2 Racing Bike: This type is mainly used for competition or racing and is suitable for fast riding. It can also be used for other purposes even though its seat is uncomfortable as designed for that used for exercise or traveling. The type has small cut face tires and lighter weight, 12-14 gears, soft brake, and affective properties of racing bike, and is able to use for exercise when paddling on metal roads.

2.1.2.3 Exercise Bike (so-called Touring Bike): This type is adapted version of Racing Bike for carrying more weight and belongings, and more distance but has more weight than the previous one. This type can be classified as follows:

- Mountain Bike is the bicycle adapted from BMX designed for children with expanding gear, stronger structure, lighter weight, and wider tires with thicker rubber. This will lead to the better riding for all types of undulating terrains than the BMX.

- Special Racing Bike is similar to the Racing Bike but different in terms of equipments and materials. This type, having 10-20 gears, is more suitable for exercise or tourism than the Racing Bike. Due to its moderate quality and durability, it should be used in the smooth and sealed roads.

- Touring Bike, having 10-18 gears and strong body, is designed for traveling only with rear screen. It can be used for multi purposes including long-distance riding.

- Hybrid Bike, the mixed design between Mountain and Touring Bikes, is adapted for being used not only for undulating terrains and metal roads but also for sealed roads with increasing the speed. This type, having 15 gears or so, has no definite design with set handle resembles either Mountain Bike or Special Racing Bike. The tires may be wider than regular bicycle but narrower than Mountain Bike. Number of gear and weight are similar to those of Mountain Bike.

- Tandem is the bicycle having 2 riders at the same time but the riders must be familiar with this type of bicycle. This type is designed for family use and group demand. Recently, the bicycle having 3 riders or so are also available.

2.1.3 Group of bikers

Bikers are classified as follows:

First Group: Bicycle racers, athletes or riding experts. This group has high skill in riding bicycle because of their regular training that enables them to ride for over 100 kilometers per day at the speed of 29-32 kilometers per hour.

Second Group: Tourists, travelers or riders for recreation. This group can ride skillfully for recreation or enjoyment but without art in riding or regular training as well as the First Group. However, they can ride 16-64 kilometers per day with the speed of 19-26 kilometers per hour.

Third Group: Riders used the bicycle for shopping, market, and the vicinity. This group can ride without skill and training for 1.6-3.2 kilometers but not exceed 8 kilometers per day per one trip at the speed of 13-19 kilometers per day.

Fourth Group: Children aged 4-16 years who ride slowly for school or recreation (AASHTO 1989, cited Muthita Pinsuwan, 1999:25).

The classification of bicycle riders in each group is involved with capability and different purposes for the use of bicycle. Therefore, bicycle managements to meet a standard is necessary for responding to the demand of all bicycle riders to reach different destination safely.

2.1.4 Factors affecting the bicycle use

The use of bicycle should be realized in terms of convenience and effect. Many affecting factors are considered as follows:

2.1.4.1 Traveling distance: Bicycle is suitable for short-distance traveling.

2.1.4.2 Personal traveling: Bicycle is suitable for personal use.

2.1.4.3 Temperature and conditions: Hot, drought, cold, raining, hail, snow, windy.

2.1.4.4 Topography: Undulating terrains with long distance in which the riders will be riding up and down. Riders should have strong stamina riding up and will control handles steadily when riding down hill.

2.1.4.5 Other factors:

- Time period during days and weeks
- Public Depot surrounding conditions

- Biker's age and income
- Land utilization and population density
- Limitation of traveling by automobile
- Bike stores for selling, renting and repairing

2.2 Concept of bicycle routes management and patterns

2.2.1 Type of bicycle lanes AASHTO (1991 cited Pannipa Jangvittya, 1997: 10).

2.2.1.1 Bike Path is the Bicycle Lane separated from regular traffic lanes and Sidewalk with open-spaced area or obstruction that may be part of highway or regular road, and is suitable for frequent and large-number uses of bicycles. Another advantage of Bike Path is that it can be constructed in the area even outside road systems but it has limitation in investment which will be higher than the others.

Moreover, AASHTO also provided additional suggestions on the width of Bike Path which will be at least 0.60 and 2.40 meters for one way and two ways traffic, respectively. If the width of proposed Bike Path is wider than the specific width, road shoulder on each side may be reduced. In the case of the Bike Path and Sidewalk are shared in the same area, the Sidewalk should be at least 3.00 meters wide with distinctive colors and symbols between Bike Path and Sidewalk as can be seen in Tsukuba, Japan (Figure 2.1).



Figure 2.1 Bike Path is completely separated from Sidewalk in Tsukuba, Japan.

2.2.1.2 Bike Lane is the bicycle lane having barriers, painted lines, cement edges, and traffic signals or marking to divide the area from other parts of automobile traffic or pedestrian where road are wide enough to be bicycle lanes. Main purpose of Bike Lane is to improve environment to suit for the bicycle use and able to predict the movement and increase safety to bikers during traffic congestion. Considering to the investment, Bike Lane has lower cost than Bike Path. The difference between Bike Lane and Bike Path is summarized as follows:

Bike Lane is generally arranged in one-way rather than two-way traffic and the width of Bike Lane is based on the following:

- Urban bike lane with bicycle lanes should have at least 1.50 m wide.
- The width of Bike Lane located in the suburban area should be at least 1.50 meters.
- Bike Lane located near the shoulder without parking area or drainage system should be at least 1.20 meters wide as seen in Songkhla (Figure 2.2).

2.2.1.3 Sidewalk Bikeway is a path designed for being used by both bicycles and pedestrians. Generally, the path is 2-3 meters wide with the example in Tsukuba, Japan (Figure 2.3). The minimum width of this path is at least 0.9 meter wide based on the capability to support the use of pedestrian.



Figure 2.2 Bike Lane is completely separated from Sidewalk of Songkhla Municipality, Songkhla Province.



Figure 2.3 Sidewalk Bikeway in Tsukuba, Japan.

2.2.1.4 Shared Roadway is the Bike Path distinctively separated by the signs or colour to share with other road traffics (Figure 2.4) such as automobiles and pedestrians. Even though this type of Bike Path is the cheapest one, but it is interpreted as the least safety way for automobile drivers, pedestrians and bikers. The width of this type is uncertain depending up on many factors including aspects of traffic congestion, automobile’s speed, visibility, and parking areas.



Figure 2.4 Shared Roadway in Songkhla Municipality, Songkhla Province.

2.2.2 Directional and warning signs

AASHTO (1974: 28-30) stated that adequate installation of signals or signs is necessary for safety and effectiveness in all types of bicycle lanes. Such signs and

signals can be used as tools for predicting precise directions and places, and warn the bicycle riders in any unforeseen danger and setback as well as automobile and motorcycle drivers, and pedestrian to beware of bikers. Installation for the signals and signs should be considered as follows:

2.2.2.1 Signals and signs must be adequately installed in the area in which the bicycle riders are able to decide the precise route such as directional signs in the area for changing route.

2.2.2.2 Signals or signs must be installed in suitable places where the bicycle users are able to know the traveling route. The signs must be easy to understand and to be written in both domestic and international languages.

2.2.2.3 Warning signals for automobile drivers and motorcycle riders must be placed in the intersections at the beginning and ending points of the bicycle lanes or areas with traffic congestion.

2.2.2.4 In the urban area, warning signs should be arranged at every half block or the intersection where automobile, motorcycle and bicycle can be met.

2.2.2.5 There must be enough warning and directional signs placing together with other signs.

2.2.3 Type of bike parking ASCE. (1980 cited Pannipa Jangvittya, 1997:10).

2.2.3.1 Bike Lockers are provided as the cabinet that can keep the bicycle inside with the lock to prevent theft and protect the bicycle from all kinds of weather.

2.2.3.2 High Security Racks are iron bars that enable any part of bicycle and wheels can be locked in either one or two sides.

2.2.3.3 Conventional Racks are wooden frame or steel with only locking point for wheel or any body of the bicycle.

2.2.4 Safety design for bikers

Accidents in bicycle lanes may be caused by carelessness of bikers and their counterparts while riding on the road, or road conditions (Slinn, Matthew and Guest, 1998, cited Pannipa Chanwitthaya, 1997). Therefore, safety design for bicycle lanes will be needed to reduce such accidents. The safety design includes the following aspects:

2.2.4.1 The bicycle lanes are distinctively arranged

If there are enough areas for bicycle routes, it should be made into well-proportioned bike lanes with the width at least 2 meters wide and located on both sides of the road at various crossings provided that bikers could see the traffic thoroughly. On the contrary, the other vehicle users must be able to detect bikers as well.

2.2.4.2 Sharing facilities with pedestrian

If sidewalk is at least 3 meters wide, it could be used together with bicycle lanes except in the high slope area because the speed of the bicycle would make the pedestrians feel unsafe. Accordingly, bike lanes must be painted to divide distinctively from bicycle lanes or building the barrier in between the two. This will make the bicycle lane too narrow.

2.2.4.3 Speed limit and movements of other vehicles

Bikers could ride safely in the area where the automobile's speed is lower than 32 kilometers per hour. Bikers should also be comfortable riding on the road even when the automobile's speed is at 48 kilometers per hour but the bicycle lanes should have suitable width. If the automobile's speed is faster than 64 kilometers per hour, it is necessary to separate bicycle lanes from the road. Curved areas or intersections must be constructed to reduce the automobile's speed for the safety of bikers.

2.2.4.4 Various roundabouts should be suitably designed and modified by providing warning signals and signs for automobile users to reduce speed for safety or separate bicycle lanes from the road at the roundabouts. Generally, smaller roundabouts are safer than larger ones.

2.2.4.5 Placing the warning signs that could be easily detectable at the intersection with the stopping line on the bicycle lane at the turning lanes or intersections to warn bikers beware of automobiles from other routes. Painting must be done with thick lines to separate bicycle lanes from automobile routes without passing the line. If automobiles are allowed to pass through bicycle lanes, dotted lines should be painted.

2.2.4.6 Generally, bicycle lanes should have smooth and even surfaces without holes or undulating points including good drainage systems to avoid flooding.

2.2.4.7 Bicycle lanes should have suitable parking areas close to convenient destination, and safety without bicycle's robbery (M. Slinn, P. Matthews and P. Guest. 1998).

Furthermore, more traffic criteria should be considered on the basis of those of New Jersey DOT (1996) as follows:

- Roads with speed limit of 56 kilometers per hour.
 - The traffic having 1,200 cars per hour or less, facilities are not necessary. Bikers could share their bicycle lanes together with other vehicles.
 - The traffic having 1,200-10,000 cars per hour, the bicycles may be used together with automobiles provided that the bicycle lanes must have barriers or distinctive signals.
 - When the traffic is over 10,000 cars per hour, the bicycle lanes must be separated completely from the road.
- Roads with speed limit at 64 kilometers per hour.
 - The traffic having 1,200 cars per hour or less, the bicycles may be used together with automobiles provided that the bicycle lanes must have barriers or distinctive signals.
 - When the traffic is over 10,000 cars per hour, the bicycle lanes must be separated completely from the road (M. King.n.d.).

According to the study of safety designs for bikers, concepts for providing facilities as well as arranging suitable routes will be understandable. The concept "safety first" should be considered as the first priority and this will ensure people and tourists in using bicycles.

2.2.5 Application scenarios which differ from one area to another

Since the bicycle usage has been depended on areas containing different features, some recommendations have been made to improve the Bike Path area as follows:

2.2.5.1 An Entire Community

The area suitable for developing bicycle lanes in complete system must contain the following features:

- Small area with maximum traveling distance at 8 kilometers is considered as crowded community.

- The ages of most people range from 15-35 years old
- Flat land
- Suitable climate
- Various activities such as shopping, recreation and education
- Wide roads with spaces for bicycles
- Public parks with parallel spaces along rivers, canals and railroads
- Shared social activities with awareness of environment

These areas include urban and universities areas in which bicycle lanes should be built on main roads with their networks, and bicycle parking areas and bars should also be provided in various recreation centers.

2.2.5.2 A Residential Neighborhood

Suitable areas for developing the bicycle use in residential areas should have the following aspects:

- Moderately dense population
- Local service center within 3 kilometers distance
- Not too many cars passing by the area
- Location near the public bus stations
- Flat lands
- Suitable climate

2.2.5.3 Feeder Service

It is the service system for traveling to the public bus stations. Required facilities must be set for the following.

- Safe places to park bicycles
- Bicycle lanes around the stations

Bicycles include private and public ones which can be hired and used in the specific area, or take them home and return back in the next day.

2.3 Relevant laws for the bicycle use in Thailand

2.3.1 History and background of the bicycle use law in Thailand

Legal evolution on the bicycle use has been developed from the law of communication, vehicles and traffic system since the reign of King Rama V. Previously, the laws listed on the use of bicycle and bicycle lanes based on types and duration were announced in various Bills with history of modifications and many editions have been drafted and issued as the new Bill to replace the old one.

2.3.2 Registration and application for driver license

Since January 1st, 1957, requirements for registration of 2 wheels bicycle have been deleted. However, personal bicycles having 3 wheels must be registered before driving on regular roads including vehicles for hire over 3 wheels.

2.3.3 Car features, traffic rules and manners

2.3.3.1 Status: Two wheels bicycle running with motor or electricity or other energy such as solar power must be classified as same as the motorcycle. If the wheel size is over 10 inches, it would have the power as equal as the engine cylinder of 50 C.C which may be classified as motorcycle. According to the Traffic Laws, the bicycle should be registered and subjected to insurance as required by Protection Laws for Accident Victims. According to Motor Pedal (MOPED) and PAS (Power Assist System) bicycles which require stepping on the pedal before starting the motor, these types of bicycles must also be registered if wheel size and engine power fall into the specification of the Department of Land Transport.

2.3.3.2 Head Light: It requires bicycle having 2 wheels to have white light attached to the front of bicycle and a red light or a reflective shield at the rear that should provide enough light to see the obstructed objects in the distance at least 150 meters. It is mandatory for head light to beam in the road at least 15 meters and lower than the eyes level of the driver in the opposite vehicle.

2.3.3.3 Transportation: The bicycle is not allowed for carrying people, only 30 kilograms of goods can be transported.

2.3.3.4 Hiring: According to the Traffic Laws, two wheels bicycles hired to deliver documents and small packages are allowed to load as much as 30 kilograms. As mentioned earlier, loading passengers are prohibited for two wheels bicycles

2.3.3.5 Fifteen prohibited areas for bicycles are as follows: (1) Sidewalk (2) Bridge or Tunnel (3) Intersection (4) Crossing (5) Prohibited parking (6) Distance 3 meters from fire hydrants (7) Distance 10 meters from the signal light (8) Distance 50 meters from railroads (9) Overlapping with other areas (10) Entrance of buildings (11) between safety zone and road edge or 10 meters from the end of safety zones in both sides (12) Tight areas (13) Distance 50 meters before bus stop signals (14) Distance 30 meters from the postal box (15) Places for obstructing traffic.

2.3.3.6 Identifying speed: Based on Traffic Act, article 81 (1).

The bicycle must be riding cautiously and safely to avoid damages to individual or assets to comply with the Traffic Laws.

Pulling is not allowed by bicycles or more than 1 other vehicle at once.

If the bus lane is present on the left, riders must keep the bicycles on a lane right hand to the bus lane. The bicycle should be riding in the left side of the lane.

There are 4 types of mandatory equipments with 2 major equipments attached to the bicycle structures as follows:

- Bell
- Brake
- White front light to see at least 15 meters
- Red rear light or reflective shield

Regulations or relevant laws with the bicycle have been identified for a long time. Some rules have been neglected or practiced without strict rules or transparent punishments. Some rules provide extremely benefits to the safety for the bicycle users (Chaiyot Rattanapong, 2003).

2.4 Overseas and domestic bicycle use

2.4.1 The bicycle use in the Netherlands

The Netherlands is considered as the country that used most bicycles for traveling in Europe at 50% until being named as “ Land of the Bicycle” (under the

publicity, the country has the most beautiful bicycle lanes and tourist sites in the world). The bicycle lanes are limited on the road surface. Automobiles and trolleys are forbidden to run in the bicycle lanes. In some cities, the bicycle lanes are built as tunnels under the buildings. This is the lifestyle of people living in Amsterdam, the Netherlands.

During 1960s (the bicycle use was decreased after growing numbers of automobiles). The bicycle lanes were demolished to make way for road constructions resulting in energy crisis with the support of public transportation and the bicycle use. In 1975, Ministry of Transport and Communication delivered funds to construct traffic planning for the bicycle lanes. Since then, the Netherlands has, therefore, used the bicycles for primary communications (Muthita Pinsoonthorn, 1999:37).

2.4.2 The bicycle use in Australia

Canberra, the capital of Australia, is one of the cities received highly praise for being one of the countries with the most enjoyable bike lanes. Citizen of Canberra have their own bicycles as much as 40% or more than 110,000 persons. They ride bicycles at least twice weekly because they have realized the future trend and accepted this concept as well as recognizing benefits from the bicycle use for traveling and recreation. Bikers in Canberra have 2 traditional practices as follows:

2.4.2.1 Riding legally on sidewalks, bikers especially Primary School students can ride safely on the sidewalks.

2.4.2.2 Riding on the bicycle lanes is safe for long distance.

The sidewalk and bicycle lane networks have extended to newly developed areas with environmental friendly surroundings. The bicycle lanes must be separated from other traffic areas. The needs for shared roads with other vehicles have grown rapidly among bikers. In Canberra, bikers can ride on the sidewalks legally and specific bicycle lanes are built over 300 kilometers in length, leading to other specific bicycle lanes as long as 1,000 kilometers. Most bikers have agreed that specific bicycle lanes provided convenience and reduced tension while riding on the road. Inexperienced bikers and children should ride on such specific bicycle lanes.

According to the survey in 1991 from 1,000 households in Canberra, the results indicate that 40% of adult (excluding children under 14 years old) ride the

bicycle at least twice weekly, 21% of these people ride for their works or schools, over 50% ride bicycle for shopping and 75% ride for recreation. Bicycles can be easily available for some people. Based on the survey in 1997, results also indicate that 3% of people would ride bicycle to work continuously during summer and winter. However, the traffic officials in Australia are aiming at increasing the bicycle use for work from 3% in 1997 to 6% in 2007 (Muthita Pinsoonthorn, 1999).

Referring to safety aspects, the bicycle accidents occurred without proportion to total accidents recorded in the hospital. Accidents occur frequently while the bicycle is riding on roads, including collision with automobiles. Accidents at the intersections often occur without any control, and most damages are located on the right-hand side with injuries and casualties while riding on specific bicycle lanes. However, there is no report because biker does not need the treatments. The causes of accidents reported by injured riders are resulted from unsmooth road surfaces and dim lights, including bicycle's speed which is slower than that run with engine. Moreover, bicycle has less visual ability than cars and trucks particularly at night time and bikers trend to avoid the rules while driving bicycles. All injured riders admitted that injuries from riding the bicycle would be subsided if the bikers have dressed properly and well protected with helmets even though the helmet law has been used since 1992. Male bikers usually ride with more accident than the female. Bicycle accidents occur frequently on the main road and intersection.

2.4.3. The bicycle use in Japan

The bicycle has been parts of Japanese lives since the Meiji dynasty (1868-1940). The earliest bicycle used was called "Miso", and most Japanese prefer to use bicycles which can be seen at the many train stations. In Japan, the government was requested to construct more bicycle lanes for biker's safety. Although Japan is one of the leaders in economics and the rich country, the people are aiming at saving rather than spending. Accordingly, many people have used bicycles for traveling (Pairoj Varasarn, Look Japan, www.sukulthai.com).

Japanese have used bicycles for daily traveling, going out for shopping, work or schools, including for recreation and exercises. People who have taken trains or subways preferred to ride the bicycles to the train stations instead of using

automobiles because of their convenience and flexibility. However, the bicycle preferences have initiated problems called “Bicycle Pollution” resulted in crowded bicycle users at the stations every morning. According to this reason, in 1980, the Japanese government assigned the Local Administrative Officers to build enough bicycle racking. This was done with the cooperation with the train stations or the owners of the building with the government subsidy for cost of construction. As a result, in 1984, Japan provided parking areas for bicycles in the working places and private institutions over 8,600 sites which could park the bicycles over 2.4 million tonnes. It may be stated that the bicycle use in Japan is very important and being the mechanism to control the increasing numbers of automobiles. Consequently, the Japanese government set up higher rate for automobile taxes. Meanwhile, more facilities have been supported and improved for bicycle users e.g. improved bicycle lanes (Marcia, D. 1989:33-34 cited Mayuree Patrachiyakupp, 1999).

2.4.4 The bicycle use in China

In China, the bicycle has become the most important vehicle for people to use. The roads in China are congested of bicycles with sound of bicycle wheels and bells. It may be stated that bicycle is one of symbols of China and tourists prefer to buy T-shirts with the statement, “The People’s Republic of Bicycles”. In 1987, China recorded the total numbers of 300 million bicycles or in the proportion of 1 bicycle per 4 people as compared to 1.2 automobiles.

China is also the world largest bicycle manufacturers. In 1992, China produced 36 millions bicycles while the total numbers of bicycles produced all over the world were only 35 millions. The next largest bicycle producers are Japan, India, Taiwan and the United States of America with the estimated production nearly 8 million bicycles annually, followed by Germany at 5 million bicycles per year, and Brazil and Indonesia with 2 million bicycles annually (Lester R. Brown, 1995:76 cited Mayuree Patrachaiyakup, 1999).

2.4.5 The bicycle use in Germany

Germany has planned the best bicycle use with Government and Local Municipal Protection Policies and facilities for bikers. This is resulted from traffic

congestions and air pollution in Orlangen, Germany. The network of bicycle lanes has been installed completely for over 100 miles which is half length of city's roads. Therefore, the bicycle use has been increased dually (Lester R. Brown, 1992).

2.4.6 The bicycle use in the United States of America

The United States of America (U.S.A) is the country having most automobile owners in the world. Traffic congestion has ruined quality of life for American people in the big city such as Los Angeles. This indicates that drivers have their wasted times during traffic congestion approximately 100,000 hours daily (calculated from all types of automobiles). Traffic congestion together with toxic gasses has caused death among U.S. citizen for approximately 30,000 persons annually (Lester R. Brown, 1992).

According to the study in 1983, the results reveal that if the Americans traveled to the stations with bicycles instead of traveling by automobiles, gasoline should be saved at the rate of 150 gallons annually per person (half of the fuel used for driving automobiles). If only 10 % of the Americans who traveled by the automobiles have selected to use bicycles instead, the expenses for fuel cost in U.S.A should be reduced to 1 billion dollars per year (Marcia D, 1989).

Although the number of bicycles in U.S.A has reached 103 millions, next to China, only 1 out of 50 bicycles are being used for traveling. The rest is used by children and sport players otherwise the bicycles would be kept in their storage rooms. Comparing to India, U.S.A has number of bicycles twice more than India but traveling by bicycles is three times less than that of Indian people (Marcia D. Lowe, 1989). However, bicycles are still necessary for the Americans in the big cities such as New York where the office messengers used them to deliver news and documents, and small packages. Referring to the Seattle Police, results indicate that the use of bicycle to chase thieves during traffic congestion in the heart of the city seems to be successful (Lester R. Brown, 1992).

2.4.7 The bicycle use in Thailand

Referring to the study of the bicycle use in Thailand, results indicate that there are many divisions and private groups recognized the value of bicycles and rallied for

more use of bicycles. For example, the Bangkok Metropolitan Administration is well aware of the increasing use of private automobiles and public transportation in trolleys, tricycles and hired motorcycles. These vehicles have caused traffic problems and increased accidents as well as air pollution and any inconvenience to pedestrians and wasting fuel. Accordingly, this agency has assigned the Engineering Division to consider the suitable traveling style to replace short-distance traveling by selecting the small pilot area inside the community. Traveling by bicycles from residential areas to the alley entrance is so quickly before connecting with the public transportation.

The rally to use bicycles in Bangkok is not only limited for the government offices but also for the Bicycle Association for Health established in 1991 with the purposes to promote the use of bicycles in all activities such as health, communication, traveling, recreation, solving traffic problems, and nature and environmental conservation. This is assigned as coordinate works among the bikers all over the country (Bicycle Association for Health, unknown year 2 cited Mayuree Patrachaiyakup, 2003).

Furthermore, Valailuk University, Nakhon Si Thammarat province promoted the use of bicycles for traveling inside the campus by arranging traffic systems into 2 zones: inside and outside educational areas. In the former area, only the bicycle use and walking are allowed whilst in the latter, the use of automobiles is permitted. This is carried out with the intention to keep the area green and clean without pollution. Good environmental surroundings contain bio-diversity and traffic management system. In order to promote the use of bicycle, the University provided undergraduates with University own bicycle as well as the officers. At the same time, the University set up the funds for undergraduates to buy their own bicycles (Thailand Bicycle Association for Health, 1997:2). This rally was the beginning of promotion for bicycle use inside the University previously done by Kasetsart and Silapakorn Universities (Sub Committee for Bicycle lanes in Bangkok Metropolis, 1997:2).

In Songkhla Province, there is still inactive rally for the bicycle use. Only the Mountain Bike Tournament among bicycle lovers are arranged (www.aboutmth.com, January 29th, 2006). In 1998, Songkhla Municipal Divisions planned projects to improve landscape at Lam Son On with the construction of Bicycle Lanes to be shared with the automobiles; the estimated distances are calculated for 2 and 4

kilometers along the Lam Son On and Kao Saeng Beaches, respectively. The main objective is to create sidewalks for viewing beautiful sceneries at Kao Saeng and Chalathat Beaches.

2.5 Lanes and traffic volume survey

2.5.1 Roads are essential for land communication and have influential impacts toward the bicycle lanes and are important factors linking parts of city. Roads are classified (Chulalongkorn University, 1988: 6-10) as follows:

There are 5 types of roads within the city areas:

2.5.1.1 High Way such as road connecting from one city to another. It is the main road that allows vehicles to drive at high speed. It is wider than the other types of roads which usually have at least 6 traffic lanes.

2.5.1.2 Primary Distributor is the major road crossing most areas in the city having more traffic congestion than the other roads. generally, this road is located at many important Provincial Monuments with at least 4-6 traffic lanes.

2.5.1.3 District Distributor is the minor road separated from the Primary Distributor having less traffic than other roads with at least 3-4 traffic lanes.

2.5.1.4 Local Distributor is the road separated from the District Distributor having moderate to light traffic next to the major road with at least 2-3 traffic lanes.

2.5.1.5 Access Road is the road separated from Local Distributor leading to various monuments having lighter traffic than the other types of roads (Architectural Terrain, Faculty of Architecture).

Primary and District Distributors, and city entrance have important parts of the city sceneries because both roads should connect these parts. Most people often travel through these roads. Therefore, they may well represent the city which should be impressive for the visitors.

2.5.2 Traffic volume survey

There are two current methods for Traffic Volume Survey widely used.

2.5.2.1 Surveying with Equipment: Traffic volume on the highway varies depending on time, day and season. Surveying only one or more days may not

represent the true traffic volume for the whole year. This includes the manual counting suitable for practice because of high cost or error from being fed up. Therefore, the most suitable method is the counting equipment.

To date, the traffic volume surveys have been developed quickly such as separating types of vehicles, measuring speed and headway. Data collection may be transmitted from the locations in the field through telephone network to the operational places.

2.5.2.2 Manual Counting: Manual counting for traffic volume provides accurate information and precise details such as data for both types and movement in the right direction. Currently, the Highway Department specified the traffic volume at Monitoring Stations by dividing vehicles into 10 types as follows: Bicycle, motorcycle, passenger cars, small passengers, small trucks, big bus, 6 wheelers trucks, (large 10 wheelers with 3 axles and trailer and tractors).

In general, the traffic volume survey with manual counting should be done in the morning and afternoon during 6.00 a.m. to 9.00 p.m. In case of bus and truck volumes are heavy during the night time, the night survey may be required for accurate data proportionately with numbers of vehicles.

Regarding to the traffic volume survey at the intersection, the study is dealing with the number of automobile traveling from one place to another, left or right and what type of vehicles to apply with geometry, or modifying the traffic light through manual counting. Therefore, the survey of such objective should be done during rush hours i.e. 2 hours in the morning and 2 hours in the evening (Visit Prathumsuwan, 1999:4).

2.6 Tourism and tourists

2.6.1 Definition of tourism

2.6.1.1 World Tourism Organization or WTO has defined the meaning of "Tourism" as any traveling based on 3 international conditions as follows:

- First Condition: Traveling for normal residence to other place temporarily, not for permanent settlement.

- Second Condition: Traveling must be done voluntarily or from traveler's satisfaction not by forcing or committing war.

- Third Condition: It is the traveling with any purpose for recreation or visiting relatives, enjoyment, entertainment or sports, regardless of occupations or incomes (www. Nectec.or.th, December 1st, 2005).

2.6.1.2 Thailand Institute of Scientific and Technological Research (1997:2-5 cited Lawson and BaudBovy, 1977) stated that recreation is another occurrence during leisure involving with traveling from the place of residence to another place or tourist site.

2.6.1.3 Saree Vangpaichit (1989) stated that "Tourism" may be defined as overall results of phenomenon and association resulted from interaction of tourists, entrepreneurs, government and host community in the hospitality and welcoming tourists and other visitors.

2.6.1.4 M.L Tui Chumsai (2004: 4-5) defined the meaning of tourism and traveling as "Tourism is caused by traveling and there may not be tourism without traveling".

2.6.1.5 Sombat Kanchanakit (2001:18) mentioned that tourism is the process of recreation happened during the leisure time through traveling. It is the traveling from one place to another or tourist site to change atmosphere and environment with driving force from the demands in physical, tradition, lifestyle, tradition and status for gaining acceptance.

2.6.1.6 Panayu Chairattannon (2003: 16) defined field trip tourism as tourism for understanding by seeing or studying outside the class for joint activities.

2.6.1.7 One may realize that tourism is the traveling from one place to another voluntarily with the purposes for recreation, knowledge enlightenment, seminar meeting, business contact, sports, visiting relatives. It is done without occupation and income motivations. Knowledge obtained from field trips is considered as an interesting form of tourism that should be promoted. Moreover, field trip creates knowledge, understanding and entertainments among the participants.

2.6.2 Type of Tourists

2.6.2.1 Tourists are classified into 3 types of tourism (Apitut Rongsopha, 2003:62).

- Tourist is defined as a traveler who travels to other place of residence for temporary stay from 24 hours (at least 1 overnight staying), but not over 90 days as being traveled voluntarily with any purposes regardless of occupations or incomes.

- Excursionist is defined as a traveler who stays at temporary places in short period of time nearly 24 hours (not stay overnight). The traveler is traveling voluntarily regardless of occupations or incomes. Therefore, a cruise passenger who has stayed overnight is considered as a tourist, but a transit passenger of an airline is not classified as a tourist.

- Visitor is defined as a traveler who has visited the country by classifying tourist or traveler based on characteristic or definition in either category (www.nectec.or.th, December 1st, 2005).

2.6.3 Classification of Tourists based on 2 types of behavior

2.6.3.1 Thai Tourists: Most Thai tourists have made their visits to the area for recreation rather than interesting in buying souvenirs and not expecting much from orientation because they are able to find information themselves and are not too concerned about the uniqueness of tourist sites.

2.6.3.2 Foreign Tourists: They have gained their enthusiasm from extreme interests which are much different from what they have seen before. They are interested in buying souvenirs, art and expecting more orientation than Thai Tourists.

2.6.4 Tourist's behavior classification is divided into 2 major types

2.6.4.1 Independent Tourists are travelers who have traveled alone based on information from brochures. Therefore, they do not expect traveling for conveniences and sightseeing even though they have high expectation in orientation.

2.6.4.2 Group Travelers consist of travelers who relied on the tour company for services. They have expected grouping and information and details of tourist sites and high demand in those subjects.

2.6.5 Objectives of Tourism (Apirat Rongsopha, 2003:63)

2.6.5.1 Tourism caused by curiosity: It is traveling desire to encounter new experiences such as seeing different traditions, politics and socials as well as persons, unique nature and natural phenomena.

2.6.5.2 Tourism caused by desire for recreation: It is traveling to relax for daily chores such as playing sports, natural sightseeing, viewing arts and music or other recreations which could be included in traveling through amusement park and zoo, pub and bar as well as shopping for relaxation.

2.6.5.3 Tourism caused by the interest in religion and black magic such as seeking merit, paying homage to religious monuments or famous religious guru, including important historical or religious monuments.

2.6.5.4 Tourism caused by occupation and business of tourists such as traveling for surveying, searching, meeting, job training, education as being the field trips to increase knowledge or fame.

2.6.5.5 Tourism caused by other reasons such as traveling to visit relatives or friends in other areas which usually occurred during weekend or public holidays and other festivals

2.6.6 Type of tourist sites

2.6.6.1 Tourist sites are classified into natural and man-made as follows (Apirat Rongsopha, 2003:63-65):

- Natural tourist sites such as seashores, beaches, forests, waterfalls and geysers.
- Historical monuments such as beaches and seashores, forests, waterfalls and geysers.
- Art tourist sites such as arts, cultures, tradition, activities in tradition, lifestyles, Art culture, local goods, orchards, fields and mines.
- Other tourist sites such as recreational place, shopping center and bazaar.

2.7 Relevant researches

2.7.1 Boonark Tewkul (1984: 45) studied bicycle usage for traveling around the Nakhon Pathom Municipal area. Based on questionnaires and interviews, the research results indicate that people traveling to work within the Nakhon Pathom Municipal area by bicycle are 30.77 percent while students riding bicycles to schools are 41.23 percent. According to the study of travelers' attitudes towards traveling by bicycles, the results reveal that both workers and students accepted traveling by bicycles. Regarding their opinions towards bicycle routes, most people prefer to ride bicycles to work at 57.69 percent and students at 75.49 percent.

2.7.2 Pittsamai Jaruwan (1992: 17-18 cited Nittaya Patkao, 2546:68) studied traveling safety by bicycles within the city. He also studied accidents from bicycles and found that accidents happened in different patterns depending on ages and associations of bicycle usage. In another words, bikers who rode bicycles for recreations are mostly children. Therefore, accidents with this group are less severed while bicycle usage for long distance traveling is increased. Serious accidents are happening among older travelers whereas less serious accidents frequently occur in the residential areas, straight and dry roads, and intersections during fine weather. Serious accidents may be happening outside residential areas and at intersections during dry weather in the night time with dim light.

Accidents could be reduced properly by changing in 3 aspects: humans' behavior, mechanism, and surrounding environments. In order to improve safety of bikers, it must be involved with the following strategies: basic skill in bicycle, knowledge and practice in riding bicycle, and acknowledgements other for biker's presence from other road riders.

2.7.3 G.R. Leake (1997:176) studied behaviors and demands of bikers to make bicycles riding more convenience. Data are also provided in designing bicycle lanes to match the demands of bikers to comply with the law. Bicycles have moved out slowly with less balance and steadiness and poorer visuality than automobiles. Bikers need good facilities in places where there are traffic congestions or high speed

drivers and in various intersections with driving safety, barrier-free lanes to avoid swooping and interaction with other bikers or pedestrians.

Facilities for bikers are generally related with other bikers and pedestrians as follows:

- All facilities must provide more convenience and safety to drivers.
- There must be some areas where bicycles and automobiles frequently cross with each others, i.e., different intersections or roads with heavy congestions. It must be reassured that traffic in the area with heavy bikers was done with low speed (e.g., residential areas).

2.7.4 Mayuree Patrachaiyakup (1999: abstract) studied acceptances and factors affected bicycle usage as parts of daily life among population in Muang District, Nakhon Nayok Province through questionnaires. Research study indicates that most sampling groups are well aware of traffic problems and maintains attitudes towards bicycle usage at fair level. However, they admitted the high demands for bicycle usage in daily life. Factors affecting bicycle usage with statistical significance are educational levels, monthly household incomes, government supports, and public relation of bicycle projects, knowledge in bicycle traffic, and attitudes in bicycle usage.

2.7.5 Nittaya Patkao (2003: abstract) studied bicycle lanes and bicycle usages within Nakhon Ratchasima Province. Based on questionnaires and interviews, research study reveals that people need information on bicycle lanes, demand, bicycle parks and bike stations with potential. The researcher also presented bicycle networks including facilities for traveling by using questionnaires, observations and interviews as research tools. Research results indicate that bicycle lanes with potential could be divided into 2 main parts, at Sueb Siri Road around old city ditch and bicycle lanes for traveling at Suranaree Monument-old city ditch. Setbacks in the study of bicycle usage in traveling are involved with bicycle lanes and networks which will be covering the Municipal area, changing habits in bicycle usage among sampling groups through times. Therefore, bicycle areas must be improved to keep up with time.

2.7.6 Mutita Pinsuwan (1994: abstract) studied planning of proper bicycle lanes for traveling within Rattanakosin in order to find out such bicycle lanes for Inner and Outer Rattanakosin through the application for area analysis and GI. Main factors for bicycle lanes are involved with roads and possible sidewalks. Total 11 experts with experiences in riding bicycles in the area were asked to determine possibility through the application of data overlaying together with actual survey for tourism routes in Rattanakosin area with distance of 13.5 kilometers.

2.7.7 Panayu Chairattananon (2003: abstract) studied conceptual trends to promote tourism within the island of Ayutthaya by arranging bicycle routes with network accessible to important places. The study was done through field surveys, interviews and questionnaires. Results indicate that most tourists never used bicycles for traveling but they agreed with the idea in using bicycles for traveling within this area. They intend to use bicycles if the bicycle lanes and facilities are arranged and are able to support tourists regardless of how they arrived there. Bicycle routes have been built to access all tourist attractions within the island; main and minor roads are also being used. Most roads are expanded and some have sidewalks while others with shoulders possible for constructing bicycle lanes.

2.7.8 Arpirak Rongsopha (2003: 129-130) studied bicycle usages for conserved traveling around the Nakhon Pathom Municipality area. He found out that there are 2 types of visitors visiting to Nakhon Pathom Province, foreigners and Thais with major differences. Foreign travelers have interested eagerly in new cultures for their new experiences which never encountered before. They prefer to take pictures as souvenirs. Foreign travelers consist of both single and group tourists.

Results from these studies create conceptual trends in using bicycles and bicycle lanes for regular uses and traveling. Differences in each area are depended on many factors. i.e., physical attributes, traveling routes, tourist sites, community conditions, daily livings. Data obtained from analyses and relevant research reviews are summarized to collect all variations based on educational issues in the possibility of bicycle usages among people and tourists, managing bicycle lanes and evaluation on proper bicycle lanes with possibility for traveling which should lead to appropriate

pattern for bicycle lanes suitable for the area conditions and the need of people and tourists in the study area.

2.8 Songkhla Municipal area

2.8.1 Background

Songkhla Province was built in 700-800 B.E (157-257 A.D). It is formerly known as a small town in the kingdom of Sri Vichai which is currently located in Sathing Phra District. In 1832, King Mongkut provided his royal permission to move the town of Songkhla across the lake to re-settle at Bor Yang Subdistrict.

- In 2463 B.E., it was appointed as Songkhla Sanitation Town.
- In 2478 B.E., it was upgraded to Songkhla Municipality.
- In 2542 B.E., there was the Royal Decree to change the town status into Songkhla Municipality.

2.8.2 Size of the area

Songkhla Municipality is situated in the entire area of Bor Yang. Its shape is similar to a cape located between Songkhla Lake and Gulf of Thailand with an area of 9.27 Square kilometers or estimated 5,739.75 Rais (Figure 2.5). It is located at latitude of 7 degree north and longitude of 101 degree east and is also located 947, 950, and 725 kilometers from Bangkok along railroads, Highway No. 4, and by sea, respectively (www.Songkhlamun.org, Nov. 1st, 05).

2.8.3 Locations and boundaries

- North: adjacent to Singha Nakorn District
- South: adjacent to Kao Rup Chang Sub District Administration
- East: adjacent to Gulf of Thailand
- West: adjacent to Songkhla Lake

2.8.4 Terrains

Most areas are coastal plains with slopes from official coastline to the lake. Shape of the areas resembles lengthy cape along the southern side leading towards

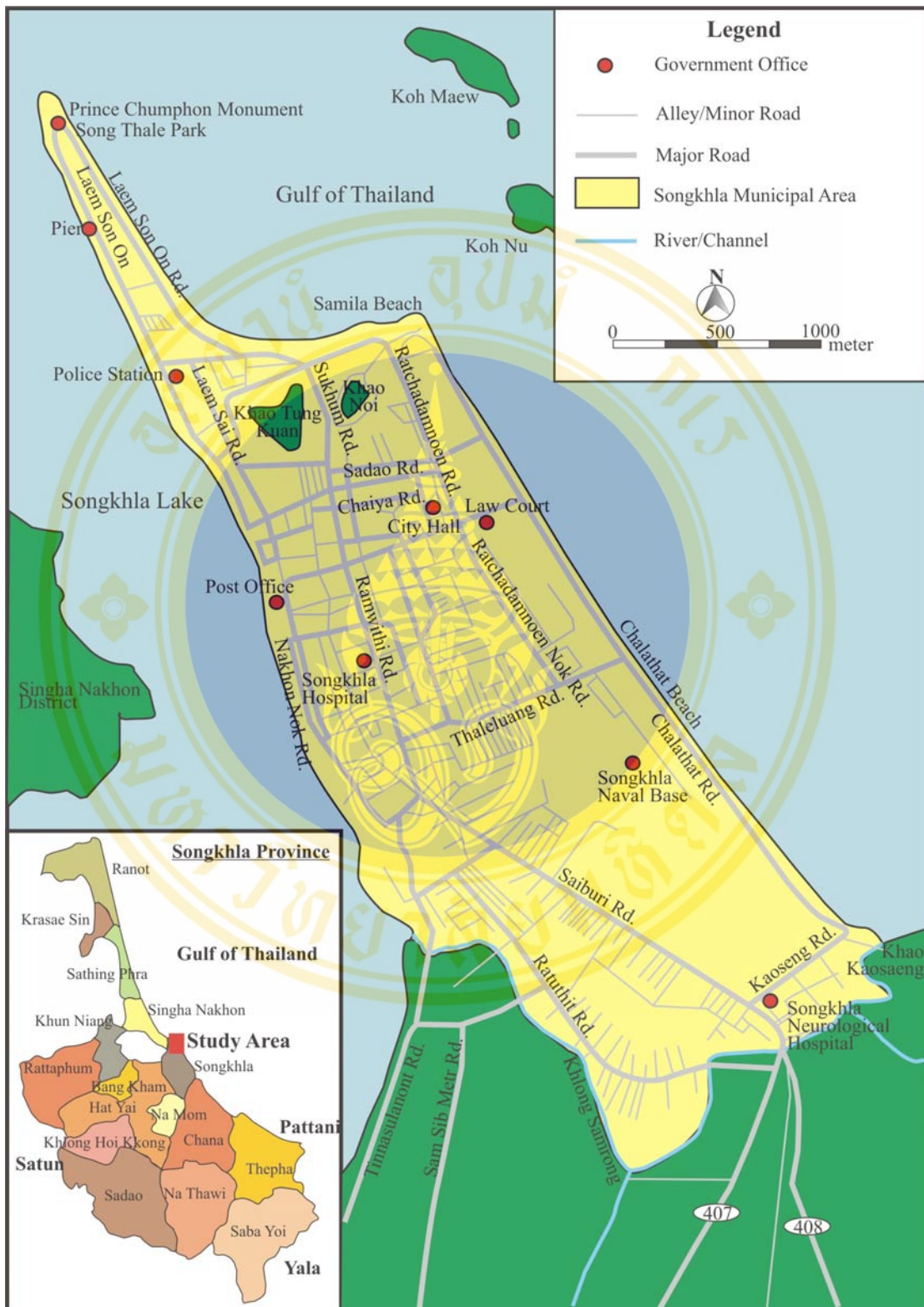


Figure 2.5 Map of Songkhla and detailed map of the study area covering the Songkhla Municipal area, Songkhla Province.

the sea between Songkhla Lake on the eastern side and the Gulf of Thailand. On the east side, there is Klong Sumrong which flows from the east to the west, joining between the Gulf of Thailand and Songkhla Lake with the length of 5.27 kilometers. Beaches are beautiful with white sand starting from Kao Saeng Beach to Chalatat, Samila and Laem Son On with estimated length of 9 kilometers (www.Songkhlamun.Org. Nov. 1st, 05).

2.8.5 Climate

2.8.5.1 Summer starts from February to July which is period without Monsoon which should started after the end of northeast monsoon, The weather would start to get hot and climbing to the highest temperature in April even though the weather is not too hot because of its location near the sea.

2.8.5.2 Rainfall starts from August to January. Songkhla province has frequent rainfall during northeast and southeast monsoon. However, during the period of northeast monsoon, there would be heavy rainfall flow in from the Gulf of Thailand. As for Southeast Monsoon, it has been barricaded by Banthad Ridge which reduced the amount of rainfall in Songkhla province in 2004. Average annual rainfall is 1,431.1 millimeters. Maximum rainfall has occurred during November which measures at 3,299 millimeters. Minimum rainfall has been measured at 123 millimeters during January with average temperature at 28.0 Celsius. Highest and lowest temperatures are averaged annually at 37.0 Celsius and 23.0 Celsius, respectively (Meteorology Department southeast region, www.songkhla.co.th).

2.8.6 Population (data as of April 20th, 2005)

2.8.6.1 Population in Songkhla Municipality consists of total 75,930 people divided into the following: 36,398 males, 39,532 females, with 24,197 households (http://www.songkhla.go.th, 1 November.2005).

2.8.6.2 Data obtained from Songkhla Tourism indicate that during January to December 2004, both Thai and Foreign tourists visited the Kao Tung Gwan area to pay respect to Phra Tat Jedi Luang, one of the significant religious monuments of Songkhla Municipality. According to the statistical data, there are total 210,299

visitors divided into 202,533 Thai and 7,766 foreign tourists (Statistical Tourism of Songkhla Province, 2004).

2.8.7 Tourist site data in the study area

2.8.7.1 Significant Natural Tourist Sites:

- Lam Son On is the area located at the end of Songkhla Peninsula that has been developed into the permanent sand dune at the mouth of Songkhla Lake. Many pine trees planted in the area have provided shady areas and natural sceneries. At the end of Son On Peninsula, the dike is constructed to prevent accumulation of sands spreading along Lam Son On Peninsula and in turn create new niche of plants extended from the old pine tree lines.
- Samila Beach is the area located at the center connecting to Laem Son On with beautiful beaches 7 meters in length. Samila Peninsula is also the symbol of Songkhla. Besides beaches, stone peninsulas, mermaid statute, musical and cultural court and resting pavilion, B.P Hotel, Samila Beach and golf course are parts of touring services. In these areas the tourists can enjoy seeing sceneries along the shore including Ko Nu, Ko Maeo, and swimming. There are also vendor's stalls and various activities in arts, cultures and tourism.
- Kaoseng Beach-Khao Kaoseng is situated in the southern area of the beaches extended from Samila to Kaoseng Beaches. Pak Khlong Samrong is the narrow beach having roads along the shore, and the resting court sparsely. Kaoseng Beach is the beautiful and placid beach in which Kor Lae and Hua Singha Boats landed at the shore next to Muslims fishermen Village can be seen. Areas at the beach are covered by rock outcrops including an outstanding one, namely, "Hua Nai Rang". Khao Kaoseng formerly called Khao Kaosaen is located next to Kaoseng Beach where the National Institute of Breeding Seashore Marine Animals is also existed. At a Buddhist temple located in the area, beautiful sceneries of Kaoseng Beach and Songkhla can be clearly seen.
- Ko Nu, Ko Maeo is a group of islands on the off shore area. This group is the rocky islands and cliffs with beautiful sceneries and interesting folklores.
- Khao Tung Khuan has been announced as the site for monument. It is located 2,000 feet above mean sea level. Here, Phra Tat Jedi Luang, a Songkhla

sacred pagoda, is located which presumably built during the empire of Nakhon Si Thammarat with Tawarawadee art restoration in the reign of King Rama IV. East side facade has been decorated with molding lime with figurines of Phra Maha Pichai Mongkut and tiered umbrella on both sides. Sala Viharn Daeng and Phraya Vichien Kiri lighthouse were built in 1997. Spectacular views of Songkhla can also be clearly seen on the top of Khao Tung Khuan.

- Khao Noi is located next to Samila Peninsula with an asphaltic road leading to its summit where people pay respect to Krom Luang Lop Buri Ramet Monument, tend to see beautiful sceneries of Songkhla. At the foothill of Kao Noi, there is a public park for recreation with decorated flowers as animal's figurines.

2.8.7.2 Historical Tourist Sites: Ancient artifacts and monuments:

- Jedi Phra Barommatham is located in the Wat Chai Mongkol area along Petchmongkol Road-Chaimongkol Road. In 1892, Phra Archan Na Issaro who taught Bali language at Wat Chai Mongkol traveled to Sri Lanka and made acquaintance with a rich man who has given him the Relics of Lord Buddha. When Phra Archan Na Issaro returned to Songkhla Province, he built a Jedi to hold the Buddha Relics for Buddhists to worship until today.

- Tumnak Khao Noi is located at the base of Khao Noi on the southern side at Sadao Road. It was built in 1811 for being the residence of Prince Yukolkumporn (Krom Luang Lopburi Ramet) in the appointment as Royal Viceroy of the south. Khao Tumnak Noi was appointed as the Royal residence for His Majesty the King and Her Majesty the Queen during the Royal visit to the subjects in the south in March, 1959. Recently, it is the governor's official residence.

- Ban Sattha is the house that Songkhla people jointly built to be presented to General Prem Tinsulanon, the Privy Council and Statesman, during his position as the Prime Minister. The construction was finished in August 26th, 1991. Later, General Prem Tinsulanon has given Ban Sattha back to Songkhla people in 1996. At the same time, Songkhla Province built Kanchanapisek City Library at the foothill near Ban Sattha and is currently open for public uses. Ban Sattha is located on the hillside, surrounded by the coconut plantations. Tinsulanon Bridge located 3 kilometers away can be seen from here.

- Tummarong Museum (Pathummarong) is located at Jana Road near Songkhla National Museum which has been appointed as the former house of Vice Councilor Kun Vinit Tannakum (Bung Tinsulanon), the father of General Prem Tinsulanon. It was built as Thai Architectural style to duplicate the birth place of General Prem Tinsulanong, former Prime Minister and Statesman of Songkhla Province, in memorandum for his farther that was the warden of Songkhla Prison called “Patumarong”. This prison has been appointed as the old position of government officials at the Penitentiary Department since Phra Nakhon Si Ayutthaya was the capital together with the warden position was evidenced in the law of 3 marks and various public prosecutors. Patumarong position was used extensively until the announcement of Penitentiary Act, 1936 when this position was eliminated.

- Songkhla National Musuem is located at Vichienchom Road. It was built in Chinese architectural style over 100 years old. It was then the private house of Phra Soontharanuruk (Ned Na Songkhla), the assistant of Songkhla Government. It was built in 1878 and finished in 1994, and was used as the residence and work place of Phra Vichit Vorasart, special officer of Songkhla. Later Chao Phraya Yomraj (Pun Sukum) was also stayed there followed by the use as Nakhon Si Thammarat City Hall and being the main City Hall until 1853. In 1973, Silpakorn Department registered this building as ancient monument and later became the National Museum which was opening officially in 1983. The museum displays arts from the south. It is also the place to search for archeological knowledge as well as learning history, arts, racing and Chinese arts.

- Old city of Songkhla is the former building since early settlements of Songkhla Province at Nakhon Nok and Nakhon Nai Roads within the Songkhla Municipal area. It was built in Chinese and European styles ([www. Songkhlamun.org](http://www.Songkhlamun.org), November 1st, 2005).

2.8.8 Songkhla Province Development Vision:

Songkhla Governor defined the vision entitled “Songkhla 2007 as center for businesses, services and the southern education based on healthy living and happiness of the people”.

2.8.9 Strategic Provincial Development

First Strategy: The ability to compete in economy and solve poverty contains the following strategies:

- Developing basic structures in transportation capacity and communication network leading towards the south.

- Developing tourism and sports.

Second Strategy: Peaceful and desirable society contains the following strategy:

- Developing human resources as qualified citizen.

Third Strategy: Developing sustainable natural resources and environments to blend people's way of living contain the following strategy:

- Managing natural resources and environments in sustainable manners with people's involvement.

Fourth Strategy: Government works will be administered based on good governance and solving people's problems contain the following strategy:

- Developing the managements, services and solving people's problems (www.Songkhla.go.th, October 25th, 2005).

2.8.10 Strategies for Developing Songkhla as livable and enjoyable cities

Developments were carried out in 3 phases as follows:

First phase (2000-2001): Integrated city development is the starting period where the mixture of all concepts, development trends, including staffs improvement and operational mechanisms are being led to the development processes.

Second phase (2001-2002): Raising city fever and awareness by announcing vision and strategies through all channels such as, mass media, different rallies, including the stage at Songkhla Municipality and other divisions to motivate people of Songkhla to participate in the development.

Third phase (2002-2003): Building livable city through local force under the motto, "joint ideas, joint operation, and joint creation to build strong community". Songkhla Municipality has joined with all organizations and groups of people to create the network of development processes (www.Songkhlamun.org, November 1st, 2005).

Strategies for the development of the Songkhla Municipal area indicate that Songkhla Municipality is located in the local and physical areas suitable for developing into the tourist sites or recreation areas. It contains unique urban community together with developing policies of Songkhla Municipality, aiming for livable and enjoyable city. This is coincided with the project presented in the research of tendency towards the bicycle use and bicycle lanes suitable to benefit daily life and tourism in Songkhla Municipality, Songkhla Province.

Initial study results and relevant researches have given researchers knowledge and fundamental concepts for planning as well as designing the study in “Bicycle usage among the people, tourists and appropriated Bike Lanes in the Songkhla Municipal area”. The researcher planned the concepts for data collection, adapting and choosing design of field data collection appropriately and effectively, including observation of Bike Lanes as well as bicycle usage among the people and tourists in the area to match mostly with the demands of people and tourists.

CHAPTER III

RESEARCH METHODOLOGY

Bicycle use of residents and tourists in the Songkhla Municipal area: Suitable Bicycle Lanes and Patterns are conducted as a survey research through questionnaires and observations and in-depth interviews. These are used as tools for data collection. Guidelines have been set up for the study as follows:

- 3.1 Population and sampling participants
- 3.2 Research instruments
- 3.3 Data collection consisting of the following steps
- 3.4 Data analyses

3.1 Population and sampling participants

3.1.1 Population under the study is classified into 2 groups as follows:

3.1.1.1 Population from 24,197 households in Songkhla Municipality (Statistical Administrative of Songkhla Province, 2005).

3.1.1.2 Total 210,299 tourists who visited the Songkhla Municipal area annually (Statistical Tourism of Songkhla Province, 2004).

3.1.2 Composition of sampling participants under the study

Number of sampling groups for random sampling is based on time limitation in data collection, budget and satisfaction from analyses mainly with statistics. Therefore, quota sampling for 320 has been identified by dividing into 2 major groups as follows:

3.1.2.1 Population who lived in the Songkhla Municipal area with proper facilities for bicycle usages in traveling for 160 bikers.

3.1.2.2 Total 160 tourists who visited to the Songkhla Municipal area.

3.1.3 Random sampling

In this research, random sampling among quota sampling was done in the Songkhla Municipal area (Table 3.1), Songkhla Province through the application of multistage sampling.

3.1.3.1 Step 1

The researcher divided sampling clusters or areas through random lane survey to represent samples in the study area initially suitable for the development such as number of bicycles at each rack and bikers (primary field data survey), type of land use (Songkhla Municipal data), population characteristics (Songkhla Municipality) and important monuments, including tourist sites within the study area (Songkhla Municipal Area Tour Site Map). As can be seen, the secondary data used in the selection of initial areas are composed of the following:

- Lane 1: Kaoseng Road - Chalathat Road is the minor road in the city with heavy traffic next to the major road. It is mostly preferred by people and tourists for traveling because it can access through Kao Saeng Road and traveling sites, leading to Chalatat Beach and Samila Beach along the shorelines.

- Lane 2: Ratchdamnern Road - Lam Son On Road where traffic is quite heavy next to the major road. It is run passing significant monuments of Songkhla Municipality, i.e., Ratchamonkol Institute of Technology Southern Region, Songkhla court, Tinsulanon sport arena and Lam Son On Road which is also being the main road passing through tourist sites or Lam Son On Beach along the shorelines.

- Lane 3: Taleluang Road - Ramwiti Road is the main road passing through the city center in most areas with heavy traffic and important places and tourist sites of Songkhla Municipality, i.e., schools, markets, Tummarong Museum, Tang Khuan and Khao Noi mountains.

- Lane 4: Nakhon Nok Road - Prince Chumphon Monument is the minor road detached from the main road with heavy traffic and passed through important places of Songkhla Municipality, i.e., Songkhla National Museum, Pak Nam Lam Sai Fortress, Suan Song Tale and Krom Luang Chomporn Khetudomsak Monument, and old city community.

Consequently, random sampling was conducted among population in each road with accidental sampling. Residentes in a selected household were subjected for interviewing (willingly and cooperatively), and then, skipping 2 houses to interview the next house (alternating interview) until the results are met at the required numbers in each area.

3.1.3.2 Step 2

Accident sampling was used among tourists in each area along the designated lanes with important tourist sites of Songkhla Municipality in each lane as follows:

- Lane 1: Kaoseng Road - Chalathat Road

Interviews were conducted among tourists at Samila and Chalathat Beaches by using questionnaires.

- Lane 2: Ratchadamnern Road - Lam Son On Road

Interviews were conducted among tourists at Lam Son On Beach.

- Lane 3: Talae Luang Road - Ramvittae Road

Interviews were conducted among tourists at Kao Tang Kuan, Kao Noi.

- Lane 4: Nakorn Nok - Krom Luang Chomporn Khetudomsak

Interviews were conducted among tourists in the area of Krom Luang Chomporn Khetudomsak Monument.

Table 3.1 Sampling population for the study.

Location	Type				Total	
	population		tourist			
	Number	Percentage	Number	Percentage	Number	Percentage
1. Kaosaen Road- Chalatat Road	40	50.0	40	50.0	80	100.0
2. Ratchdamnern Road -Lam Son On Road	40	50.0	40	50.0	80	100.0
3. TalaeLuang Road- Ram Vittiee Road	40	50.0	40	50.0	80	100.0
4. Nakhon Nok Road- Krom Luang Chomphon Khetudomsak	40	50.0	40	50.0	80	100.0
Total	160	50.0	160	50.0	320	100.0

3.2 Research instruments

Instruments for this research are divided as follows:

3.2.1 Survey forms to survey characteristics of the area, i.e., structures and facilities for bicycle lanes.

3.2.2 Questionnaires used for surveying data in sampling group characteristics, behaviors and demands in bicycle usage among bikers for traveling in the study area and sampling tourists in the study area.

3.2.3 Observation form to observe biker's behavior for traveling and sampling tourists in the study area.

3.2.4 Interview form for in-depth interviews as data from other groups such as Songkhla Municipality, Office of Southern Tour Khet 1, Bicycle Association, Provincial Office of Construction and City Planning and Tour Entrepreneurs.

3.2.1 Instrument characteristics

3.2.1.1 There are 2 questionnaires for this research.

- First set questionnaires are prepared for bikers in the Songkhla Municipal area with 2 options: Choose only one answer and choose more than one answer. Questionnaires are designed for open and close ended to allow the respondents to express opinions other than choosing answers that already been provided. It is divided into 3 areas as follows:

- Section 1 is dealing with the questions on personal data of respondents such as age, gender, education and income.

- Section 2 is dealing with the questions on opinion in traveling behaviors and relevant components such as traveling lane, frequency use of the area and service, environment surroundings of the bicycle lane and bicycle parking.

- Section 3 is dealing with opinion in attitude towards the use of bicycle in traveling

Data collection was done from February to March 2006.

- Second set questionnaires are prepared for tourists in the Songkhla Municipal area with 2 choices: Choose only one answer and choose more than one answer. Questionnaires are designed for open and close ended to allow the

respondents to express opinion other than choosing answers that already been provided. It was divided into 3 areas as follows:

- Section 1 is dealing with the questions on personal data of respondents such as age, gender, education and income.

- Section 2 is dealing with the questions on opinion in traveling behaviors and relevant components such as traveling lane, frequency use of the area and service, environment surroundings of the bicycle lane and components of bicycle station

- Section 3 is dealing with opinion in attitude towards the use of bicycle in traveling among tourists.

Data collection was done from February to March 2006.

3.2.1.2 Recording observation and surveying

Non-participant observation and form for counting numbers of moving vehicles of people and tourists who used the designated lanes. It was done as Random Sampling in the lane that people prefer to use in traveling which passed through the Songkhla Municipal area and tourist sites.

- Observation and survey methods: Observation in the volume of vehicle through survey with manual counts (Table 3.2).

- Identify road span to survey data by selecting roads at the intersection close to the counting area. Vehicle counter must be concerned about his safety. The researcher defined position for counting as follows:

- First lane: Kaoseng Road - Chalathat Road

Observation point for moving vehicles at Chalatat Road

- Second lane: Ratchadamnern Road - Lam Son On Road

Observation point for moving vehicles at Samila Beach

- Third lane: Taleluang Road - Ramwithi Road

Observation point for moving vehicles across Ratchachonnanee Nursing College

- Fourth lane: Nakhon Nayok Road - Krom Luang Chomphon Khetudomsak

Observation point for moving vehicles at Sapsin Market

Table 3.2 Vehicle counting form and frequency in road usage.

Day	Time	Type Transport			
		Bike	Motor Bike	Four Wheelers	Over Four Wheelers Truck
Morning	7.30-8.30.00				
	9.00-10.00				
Afternoon	16.00-17.00				
	17.00-18.00				

- Recording day-month-year day, day of the week, beginning-ending the count, climate during the counting period
- Sketching pictures in the survey area and point of survey, and position obstructed objects including measurements of road width, walkway and position obstructed objects.
- Counting pass-by vehicle on the road with system counting that designated counting days on Monday, Wednesday, Friday, Saturday and Sunday. It is divided into 6 periods per day, 3 periods for rush and normal hours a part. Counting is separated into 15 minutes each period and continues until completion as required.
- Separating data of vehicles running on the road:
 - Bike
 - Motor Bike
 - Four Wheelers
 - Over Four Wheelers Truck

Eventually, numbers of recording vehicle were taken for analyses to find out the mean of bicycle volumes per hour in each area.

- Survey tools
 - Recording table, paper, pen or pencil
 - Timing clock
 - Measuring tapes
 - Camera or video

3.2.1.3 In-depth Interview was done with the following groups:

- Songkhla Municipality was interviewed to learn about the development in

various areas as related to the development in basic structures, improvement of landscapes and tourism promotion within the Songkhla Municipal area and opinion towards lane managements for traveling and tourism promotion within the Songkhla Municipal area.

3.2.2 Testing Instrument's Effectiveness

3.2.2.1 The researcher designed questionnaires, observation and interview forms to be presented to Thesis advisors for verification and correcting contents and words appropriation as well as wordings and questions clarity. Consequently, questionnaires were taken for Pre-test with samples and derived questionnaires have been subjected for effectiveness of instruments.

3.2.2.2 The researcher made correction in the questionnaires, and observation and interview forms that have already been improved to collect data further.

3.3 Data collection consisting of the following steps

3.3.1 The researcher had applied the improved questionnaires and observation forms with samples for research data collection at the study area (Table 3.3).

3.3.2 The researcher applied questionnaires among samples consisting of population and sampling tourists and people in the area until completion of the number samples required.

3.4 Data analysis

Collected data were arranged in order and coded for results compilation with the application of SPSS for Windows based on the following criteria for scoring.

Table 3.3 Data collection methods.

Variable	Data Collection Method			
	Questionnaire		Document	Observation
	Population	Tourist		
1. Physical and Policy				
1.1 Fundamental Infrastructures and facilities			X	X
1.2 Bicycle using policy			X	
2. Attributes	X	X		
2.1 Gender	X	X		
2.2 Age	X	X		
2.3 Domicile	X	X		
2.4 Occupation	X	X		
2.5 Educational level	X	X		
2.6 Income	X	X		
3. Behavior				
3.1 Experiences in using bicycle	X	X		
3.2 Traveling experiences	X	X		
3.3 Reasons for using bicycle	X	X		
3.4 Traveling distance	X	X		
3.5 Obstacles in using bicycle	X	X		
3.6 Bicycle need	X	X		
3.7 Tendency for using bicycle	X	X		
3.8 Bicycle traffic				X
3.9 Study area suitability	X	X		
3.10 Preferred bicycle pattern	X	X		
3.11 Traveling pattern	X	X		
4. Tendency toward using bicycle(Attitude)				
4.1 Convenience/ Flexibility	X	X		
4.2 Safety	X	X		

Table 3 Data collection methods (Continued).

4.2.1 Life safety	X	X		
4.2.2 Assets safety	X	X		
4.3 Expenses	X	X		
4.4 Transportation	X	X		
4.5 Health/ Recreation	X	X		
4.6 Environment	X	X		
4.7 Parking	X	X		
4.8 Maintenance	X	X		

3.4.1 Measuring bike traffic

Traveling volume of bicycle in each lane has become indicator for measuring bike traveling in the study area. In this research, the researcher conducted the survey by Manual Counts through observation and recording of bicycle volume passing through 4 identified lanes. Observation was set for 1 week by dividing time span in the survey into 6 spans per day: morning from 7.30 A.M to 9.00 A.M and 10.00 A.M to 11.00 A.M, afternoon from 12.00 P.M to 13.00 P.M and 14.00 P.M to 15.00 P.M, and evening from 15.30 P.M to 17.00 P.M and 17.00 P.M to 18.30 P.M. The numbers of recording bicycle were taken to calculate for average bicycle in hourly rate in the area. Areas used in finding bicycle volume are as follows:

- First lane: Kao San Road - Chalatat Road in front of Chalatat Beach
- Second lane: Ratchadamngen Road - Laem Son On Road at Samila Beach
- Third lane: Tae Lae Luang Road - Ram Vittee Road in front of Nursing College
- Fourth lane: Nakorn Nok Road - Krom Luang Chumporn Khetudomsak at Supsin Market

3.4.2 Attitude measures towards bicycle usage

Referring to the study of tendency towards the use of bicycle in traveling, it was measured by relevant attitudes, including 9 subtopics consisting of conveniences, speed, safety, economy, traffic, health recreation, environment, social and value. Attitude measurement was done with Rating Scale of Likert with 5 alternatives to

choose from: extremely agree, mostly agree, and fairly agree, least agree and disagree. There are 2 methods for scoring: positive statement yielded scores of 5,4,3,2 and 0 respectively. Later, total scores 320 sets of attitude measurement from sample groups in bicycle usage are divided into 3 groups: low, medium and high levels based on measurement for group divisions as follows:

- Attitude Level Low = Average 1-1.3 point
- Attitude Level Moderate = Average 1.4-3.7 point
- Attitude Level High = Average 3.8-5.0 point

3.4.3 Appropriate lane analyses for bicycle lanes

In order to specify appropriate bicycle lanes for the study area, appropriated lanes would be analyzed by giving scores to relevant variables which consist of bicycle trip distribution, road and sidewalk conditions by specifying details for scoring these variables as follows:

3.4.3.1 Present road condition

Normally, road condition has been judged from 2 minor variables, current road level and width which would reflect its capability to support the demands of bicycle travelers. The main road which is usually wide would be able to support such demands while narrow road is less supported. Scoring criteria for bicycle lanes based on road level and width are being specified as follows:

- Road types
 - Major Road = 3 points
 - Minor Road = 2 points
 - Small Road/Alley = 1 point
- Road Width
 - More than 9.0 meters = 3 points
 - At 6-8 meters = 2 points
 - Less than 6.0 meters = 1 point

3.4.3.2 Sidewalk condition

Sidewalk conditions could be judged from 4 minor variables which consist of: sidewalk width, peddler and street stalls, tree ridges for shade and vacant areas near the sidewalk. The width of the sidewalk would affect the use of the sidewalk area for

bicycle lanes. Bicycle lanes, wide sidewalks should be suitable for more areas adjustment on the sidewalk.

According to the setting vendor stall on the sidewalk, it may be crucial because the setback would give negative impact towards the area used for making bicycle lanes. Regarding to the shading area near the edge of the road, it should be sent positive impacts towards the use of bicycles for traveling. With the empty lots near the sidewalk, it should affect potential in the development of bicycle lanes. Consideration to sidewalk, criteria for scoring suitability in setting up bicycle lanes are designated as follows:

- Sidewalk Width
 - From 3-4 meters = 3 points
 - From 1-3 meters = 2 points
 - None = 1 point
- Setting up hawkers and stalls on sidewalk
 - Setting up hawkers = 2 point
 - None = 1 point
- Trees shading
 - None = 1 point
 - Trees shading = 2 point
- Empty lots at sidewalk
 - None = 1 point
 - Empty lots at sidewalk = 1 point

3.4.3.3 Land Utilization

- Residencies/ Dormitories
 - None = 1 point
 - Residencies/ Dormitories = 2 point
- Educational places
 - None = 1 point
 - Educational places = 1 point
- Stores/Markets
 - None = 1 point
 - Stores/Markets = 1 point

- Public parks/ Sport Arena
 - None = 1 point
 - Public parks/ Sport Arena = 1 point
- Bicycle Lane
 - None = 1 point
 - Bicycle Lane = 2 point

Analyzed suitable lanes for setting up bicycle lanes within the study area must consider total scores of each factor in each area as follows. In each lane, the highest total points are equaled to 26 points and the lowest total points at 11 points. The researcher divided suitability in 3 levels by dividing bicycle lanes into 3 levels as follows:

- Total 21-25 points = mostly suitable
- Total 16-20 points = fairly suitable
- Total 11-15 points = marginally suitable

Data from questionnaires and observation forms for traveling and touring in the Songkhla Municipal area have been taken for synthesis to define potential of bicycle lanes, bicycle parking and bicycle station.

Data derived from the survey with questionnaires in this research was analyzed with Statistical Program SPSS.

Analyses of Personal Data are used by Statistical Descriptive, i.e., Frequency, Percentage, Arithmetic Mean and Standard Deviation: S.D.

CHAPTER IV

RESEARCH RESULTS

Referring to the study of bicycle lanes for daily life and traveling in the Songkhla Municipal area, the researcher collected data under the previous studies. Questionnaires, surveys, observations, interviews are prepared for data analyses from samples within the study area. Study results consist of the following details:

- General conditions of the current study in this area to reveal physical characteristics and traffic volumes of within the study area are covered by 4 areas as follows:

1. Kaoseng-Chalathat Roads
2. Ratchadamnoen-Laem Son On Roads
3. Thaleluang-Ramwithi Roads
4. Nakhon Nok-Prince Chumphon Monument Roads

These should affect opportunity and limitation in using bicycles for traveling or touring to the areas.

- Behaviors, attitudes, traveling types, tendencies and setbacks from the bicycle use, including analyses of traveling behaviors of other vehicle users will point out tendencies for the bicycle use in traveling inside the study area.

- Behaviors, attitudes, and tendencies of tourists towards traveling with bicycles inside the study area will reflect the tendencies and promote traveling with bicycles within the Songkhla Municipal area.

According to the opinion in appropriated bike lanes for each road, it was collected not only from people and tourists, but also from questioning the administrators and officers of Songkhla Municipality who are responsible for administering and developing the Songkhla Municipal area.

4.1 Bicycle use among local people

4.1.1 Sampling population characteristics of bicycle users

Table 4.1 reveals the following data: 41.5 % are female samples and 58.5 % are male samples; 46.2 % are 15-25 years old and 25.0 % are 26-35 years old, 23.1 % are 36-45 years old, and over 46 years old consist of 5.8 %.

Regarding to occupation, there are following data: 34.6 % are students and undergraduates, 25.0% are vendors, 25.0% are company's employees, 9.6% work for government or State enterprises, 5.8% are housewives and househusbands.

Regarding to residency, there are following data: 30.2 % stayed from 1-10 years, 20.4% stayed 11-20 years, 17.2% stayed 21-30 years, 24.5% stayed 31-40 years, 3.8% stayed over 41 years.

Regarding to educational level, there are following data: 36.8 % are studying for Bachelor Degree, 36.8 are in Vocational schools, and 26.3% are in secondary schools.

Most samples or 39.4% are graduated in Bachelor Degree, 33.3% graduated with Vocational Certificate, 12.1% in Primary schools, 9.1% passed Secondary School, and higher than Bachelor Degree are 6.1 %.

Regarding to monthly incomes, there are following data: 28.3 % earned 5,000-7,000 Baht, 26.4 % earned 2,500-5,000 Baht, 18.9% having income over 10,000 Baht, 15.1% earned 7,500-10,000 Baht, 11.3% earned less than 2,500 Baht.

4.1.2 Sample population characteristics of former bicycle user samples (see Table 4.1)

Samples 68.1 % are male samples and 31.9 % female samples; 41.3 % are 15-25 years old and 20.7 % are 26-35 years old, 22.8 % are 36-45 years old and over 46 years old consist of 15.2 %.

Regarding to occupation, there are following data: 34.0 % are students and undergraduates, 21.3% are vendors, 17.0% are company employees, 18.1% work for government or State enterprises, 9.6% were housewives and househusbands.

Regarding to residency, there are following data: 40.9 % stayed from 1-10 years, 20.4% stayed 11-20 years, 17.2% stayed 21-30 years, 11.8% stayed 31-40 years, 9.7% stayed over 41 years.

Regarding to educational level, there are following data: 48.3 % are studying for Bachelor Degree, 41.4 are in Vocational schools, and 6.9% are in Secondary schools.

Most samples or 35.8% graduated with Vocational Certificate, 26.9% completed in Bachelor Degree, 17.9% passed Secondary schools, 11.9% having Primary schools, and higher than Bachelor Degree are 3.0 %.

Regarding to monthly income, there are following data: 36.6 % earned 2,500-5,000 Baht, 20.4% having income over 10,000 Baht, 17.2 % earned 5,000-7,000 Baht, 16.1% earned 7,500-10,000 Baht, 9.7% earned less than 2,500 Baht.

According to the results, males prefer more use of bicycles than females. The group prefers the bicycle uses for traveling in the study area particularly for adolescents aging between 15-25 years old.

The bicycle users are post-graduated students. The bicycle use for traveling is not only limited to less educated group but also widely preferred among high educated group. Referring to income of sampling bikers, a result indicates that most of them earned monthly incomes between 5,000 and 7,500 Baht.

Regarding to samples of former bicycle users, the results indicate that most samples are males than females aged between 15-25 years old. Bicycle users are post-graduated students. This group of the bicycle users mostly earned incomes from 2,500 to 5,000 Baht monthly which may be obtained from their parents.

In addition, both groups contain similar features as well as having similar habit, opinion or attitude in various areas, including traveling habit.

4.1.3 Behavior and traveling type of sampling bicycle users

4.1.2.1 Behaviors and traveling types of sampling bicycle users

The study reveals the following data in the bicycle use (Table 4.2): 15.1 % for exercise, 10.7 % for shopping or going to the market, 3.1% for going to school, 2.5% for going to work and 1.9% for the others.

Table 4.1 Samples characteristics.

Characteristics	Population Characteristics			
	Former users		Current users	
	(Number)	(Percentage)	(Number)	(Percentage)
Gender				
Male	64	68.1	22	41.5
Female	30	31.9	31	58.5
Age				
15-25 years	38	41.3	24	46.2
26-35 years	19	20.7	13	25.0
36-45 years	21	22.8	12	23.1
46-55 years	9	9.8	3	5.8
Over 56 years	5	5.4	1	1.9
Max=69 Min=15 SD=12.298 Mean=31.61				
Regarding residency				
1-10 year	38	40.9	16	30.2
11-20 year	19	20.4	16	30.2
21-30 year	16	17.2	13	24.5
31-40 year	11	11.8	6	11.3
41-50 year	7	7.5	2	3.8
51 year up	2	2.2	00	00
Max=55 Min=1 SD=13.298 Mean=18.65				
Occupation				
Company Employees/ Work for hire	16	17.0	13	25.0
Government official/ State Enterprises Employees	17	18.1	5	9.6
Housewife /househusband	9	9.6	3	5.8
Student/Undergraduate	32	34.0	18	34.6
Vendors	20	21.3	13	25.0
Educational Level (Current)				
Secondary	2	6.9	5	26.3
Vocational	12	41.4	7	36.8
Bachelor	14	48.3	7	36.8
Post graduated	1	3.4	00	00

Table 4.1 Samples characteristics (Continued).

Educational Level (Completed)				
Primary	8	11.9	4	12.1
Secondary	12	17.9	3	9.1
Vocational	24	35.8	11	33.3
Bachelor	18	26.9	13	39.4
Post graduated	2	3.0	00	00
Incomes				
Less than 2,500 Baht	9	9.7	6	11.3
2,500-5,000 Baht	34	36.6	14	26.4
5,000-7,500 Baht	16	17.2	15	28.3
7,500-10,000 Baht	15	16.1	8	15.1
Over 10,000 Baht	19	20.4	10	18.9

Referring to reasons for the bicycle use, data reveal that 15.0 % for reducing expenses, 10.0 % for convenience, 3.8 % for energy savings and environmental conservation.

Regarding to frequency of bicycle use, mostly 10.6 % used daily, 8.1 % used 1-2 day weekly, 6.3% used 3-4 days weekly, 3.1% used 41 days on holidays, and 1.3 % used for other reasons.

Most bicycle users 7.5 % spent 10-15 minutes each trip traveled by bicycles to the destination, 5.0 % spent indefinite traveling time, 3.8% spent about 25-30 minutes traveling time.

Most important problems regarding to the bicycle use within the study area are caused by the following: 18.1 % resulted from traffic congestion, 4.4% from climate, heat and rainfall, 4.4 % resulted from road conditions, bright light and accidents, 3.8% in life safety, 1.9 % bicycles are stolen.

Regarding to demand for setting up bicycle lanes in the study area: 29.4 % satisfy and want to use bicycles in the area, only are uncertain.

In opinion regarding to numbers of future bicycle users: 21.9 % agreed with more bicycle users, 6.9% agreed with less bicycle users and 4.4% are uncertain.

According to the design of bicycle lanes, results indicate that 24.4 % wanted Bike Path due to high safety, 6.9% disagreed because of unlimited and sidewalk areas and 1.9% disagreed because of bicycle obstructions.

Most samples, 22.5 % agreed with divided lanes or Bike Lanes because of safety, only 0.6%disagreed with the design because of safety concerned. The groups for inadequate area and sidewalk, 3.8% and 6.3 % agreed with blocking pedestrians.

Only small number of samples 1.9% agreed with Bike Routes to be used with other vehicles as currently done whilst 26.3% disagreed because of safety concerned, and 5.0% disliked the bicycle obstructions.

According to opinion in suitable bicycle types, most samples 21.9% agreed with the Second type of burglary prevention that could lock some parts such as car structures, front wheels, rear wheels, and suitable for parking in a long period of time as well as convenient to park in small areas. In addition, 9.4% agreed with the Third type because of convenience and saving spaces but the setback is in the high risk of equipments being pried. 1.9 % realized that the First type of prevention should reduce risk of burglary.

However, the price is rather high and inconvenience for use and suitable for long time parking.

Opinion regarding suitability in bicycle lanes of each route in the study area is presented as follows: First route, Kaoseng-Chalathat Roads, samples at 30.0% agreed with suitability for bicycle lanes because of beautiful sceneries. It locates important tourist sites with traffic lights. Only 3.1% who have been disagreed because of narrow roads in some areas and obstructed objects. Meanwhile, the Second route, Ratchadamnoen Nok-Lam Son On Roads, most samples 26.3% agreed with beautiful sceneries and traffic lights with many recreation areas but 6.9% disagreed because of too many stores and other vehicles parking in the area. The Third route, Thaleluang-Ramwithi Roads, 11.9% agreed and 21.3% disagreed because of unsafe areas and heavy traffic. The Fourth route, Nakhon Nok-Prince Chumphon Monument Roads, 18.1% agreed because of being public parks with wide roads and traffic lights whilst 15.0 disagreed because of narrow roads at Nakhon Nok which will be difficult to make any improvement.

4.1.2.2 Behavior and traveling design of former bicycle user samples (Table 4.2)

Samples 22.4 % used the bicycle for going exercise, 16.3 % used the bicycle for shopping and going to the market, 11.6% used the bicycle for going to educational institutions/schools, and 10.2 % used the bicycle for other purposes.

Main reasons for selecting bicycle for traveling include cost-savings 34.7%, convenience for use 12.2%, for energy savings and environmental conservation 10.9%.

Samples 42.9% traveled with the bicycle 1-2 days a week, 8.2% occasionally used, whilst 4.8% used the bicycle only on the holidays, and 3.4 % used the bicycle 3-4 days a week.

Samples 19.0 % spent 10-15 minutes riding bicycles to the destination, 12.9% spent 25-30 minutes, and 10.2% traveled with identified time and 6.1 % spent 15-20 minutes.

The most important problems 34.0% for traveling within the study area are resulted from vehicles on the road, 17.7% for climate, heat and rainfall.

Samples at 56.9% wanted to use bicycle in the area, 3.8% objected to the idea, and 6.3% are uncertain.

In opinion regarding to numbers of future bicycle users, 33.8 % agreed with more bicycle users, 9.4% agreed with less bicycle users, and 23.8% are uncertain.

In conclusion, behavior characteristics and traveling design of former and current bicycle users show the use for going exercise in the public park area or city garden. For shopping of housewives and househusbands, they used the bicycles for going to the store in front of the alley or fresh food markets or flea market on Sunday which is located at the clock tower on Ramwithi Road. Bicycle was also being used for traveling to schools by students or undergraduates. Cost-savings factors have contributed to decisions-making as well. Bikers prefer to use bicycles for traveling daily. On the contrary, former bikers occasionally used the bicycles. Each trip is lasted 25-30 minutes and frequent users for 10-15 minutes. The main problems in traveling with bicycle are resulted from unsafe riding on the road. Next problems are road surface and bicycle theft. These problems affect the volume of bicycle use for traveling inside the study area and having tendency for more bicycle use.

Table 4.2 Traveling behavior and traveling type.

Traveling Behavior and Traveling Type	Type			
	Former users		Current users	
	(Number)	(Percentage)	(Number)	(Percentage)
Purposes for Bicycle Use				
Going to School	17	11.6	5	3.4
Working	3	2.0	4	2.7
Going Shopping/Market	24	16.3	17	11.6
Connecting with other Public Transportation	1	0.7	0	0
Going Exercise	33	22.4	24	16.3
Visiting Relatives	1	0.7	0	0
Mixed Reasons	15	10.2	3	2.0
Total	94	63.9	53	36.1
Important reasons for the bicycle use				
Cost-savings	51	34.7	24	16.3
Fast	4	2.7	2	1.4
Convenience	18	12.2	16	10.9
Energy savings/Environmental Conservation	16	10.9	6	4.1
Safety	2	1.4	1	0.7
Others	3	2.0	4	2.7
Total	94	63.9	53	36.1
Frequency in the bicycle use				
Hardly	63	42.9	13	8.8
1-2 days weekly	12	8.2	10	6.8
Holidays	7	4.8	5	3.4
3-4 days weekly	5	3.4	6	4.1
Only Monday-Friday	2	1.4	2	1.4
Daily	5	3.4	17	11.6
Total	94	63.9	53	36.1
Time spent for each trip				
Under10 minutes	9	6.1	3	1.9
10-15 minutes	28	19.0	8	5.0
15-20 minutes	9	6.1	8	5.0

Table 4.2 Traveling behavior and traveling type (Continued).

20-25 minutes	9	6.1	5	3.1
25-30 minutes	19	12.9	12	7.5
30-40 minutes	3	2.0	5	3.1
Over 40 minutes	2	1.4	6	3.8
Uncertain	15	10.2	6	3.8
Total	94	63.9	53	36.1
Setbacks and problems in the bicycle use				
Automobile traffic on the road	50	34.0	29	19.7
Hot weather/rainfall/air pollution	26	17.7	7	4.8
Road surface / Bright light	6	4.1	7	4.8
Accident/ life safety	6	4.1	6	4.1
Bicycle stealing	6	4.1	3	2.0
Other problems	0	0	1	0.7
Total	94	63.9	53	36.1
Demand for bicycle lanes				
Yes	91	56.9	47	29.4
NO	6	3.8	0	0
Uncertain	10	6.3	6	3.8
Total	107	66.9	53	36.1
Deciding to use if there are bicycle lanes in the area				
Yes	54	33.8	35	21.9
No	15	9.4	11	6.9
Uncertain	38	23.8	7	4.4
Total	107	66.9	53	36.1

4.2 Tourists bicycle use

4.2.1 Tourists characteristics:

Results reveal the following: there are more females (63.8%) than males (36.2%), 54.4% are aged 15-25 years, 25.6% are aged 26-25 years, 11.3% are aged 46-55, 85.0% lived in the south, 8.1% lived in the area and adjacent area in the central part, 3.8% lived in the north, 3.1 % lived in the northeastern part.

Occupation: results reveal the following: 36.9 % are students/undergraduates, 30.6 % are company employees/work for hire, 16.3% are government officials/state enterprise employees.

Most tourists 18.1 % are studying for Bachelor Degree, 6.3% in Secondary schools, 4.4 % at Vocational schools.

Most tourists 41.9 % completed Bachelor Degree, 13.8 % completed Vocational schools, 8.8% completed Secondary schools.

Most tourists 23.8 % earned 5,000-7,500 Baht monthly, 22.5% earned more than 10,000 Baht monthly, 21.9 % earned 2,500-5,000 Baht.

In conclusion, tourists who came to visit the Songkhla Municipal area mostly are more females than males.

Referring to Table 4.3, most of tourists are aged 15-25 years with various occupations such as: undergraduates, government officials, vendors and the others; educational levels, most tourists are studying and graduated with Bachelor Degree and earned between 2,500 -5,000 Baht monthly.

4.2.2 Behavior and traveling types among people in the study area

According to the study for traveling behavior and traveling type of tourists, results indicated that 97.5% visited the area whilst 2.5% never visited the Songkhla Municipal area.

Results also reveal the following: most tourists 88.7% came to the Songkhla Municipal area for recreation, 4.4 % came to study, 1.9% visited relatives,1.3% came for business, 48.8% came with friends, 40.0% came with family, 5.6 came alone, others 5.6%,56.9% came in group of 1-5 persons, 30.0 % came in group of 6-10 persons, 8.1% came in group 16-20 persons, 2.5 % came in group of 20 persons.

Most tourists 63.8% came to the Songkhla Municipal area in private automobiles, 15.0% drove motorcycles, public transportation 12.5 %, 6.3% came by hired cars, and 1.3% came by boats.

Most tourists 76.3% decided not to stay overnight whilst 23.8 stayed over night. Tourists 45.6% spent half day in the Songkhla Municipal area, 32.5 % spent whole day, 18.1% stayed 2-4 hours, and 3.8 % spent less than 2 hours.

Table 4.3 Sampling tourists characteristics.

Characteristics	Tourists Characteristics	
	Number (N=160)	Percentage
Gender		
Male	58	36.3
Female	102	63.8
Age		
15-25 years	87	54.4
26-35 years	41	25.6
36-45 years	12	7.5
46-55 years	18	11.3
Over 56 years	2	1.3
Max=58 Min=16Years SD=10.432 Mean=28.85		
Occupation		
Company Employees/ Work for hire	49	30.6
Government official/ State Enterprises Employees	26	16.3
Housewife/househusband	12	7.5
Student/Undergraduate	59	36.9
Vendors	14	8.8
Educational Level (Current)		
Primary	1	0.6
Secondary	10	6.3
Vocational	7	4.4
Bachelor	29	18.1
Post graduated	3	1.9
Educational Level (Completed)		
Primary	5	3.1
Secondary	14	8.8
Vocational	22	13.8
Bachelor	67	41.9
Post graduated	2	1.3
Incomes per month		
Less than 2,500 baht	17	10.6
2,500-5,000 baht	35	21.9

Table 4.3 Sampling tourists characteristics (Continued).

5,000-7,500 baht	38	23.8
7,500-10,000 baht	34	21.3
Over 10,000 baht	36	22.4

Tourist sites arranged by average scores are as follows: 4.70 points for Samila Peninsula as being well known tourist site and symbol of Songkhla, 2.70 points for Khao Tung Kuan, 2.68 points for Laem Son On, 2.35 points for Khao Kaoseng, and 1.98 for the old city.

Most tourists 65.6% came by private automobile, 18.8% traveled by Motorcycle, 9.4% came by bus, 5.0% rented the car, 1.3% came by tricycles. Results also indicate that most tourists 75.6% never rode bicycles for traveling, and 24.4% used to ride the bicycles in the study area.

Recommended areas for improvement by tourists are as follows: 35.0% on beach because some beach areas are not beautiful enough to suit for tourism, 33.8% on traffic conditions, 11.9% on tourist sites, 8.8% store conditions, 5.0 for air pollution. Most samples at 87.5% agreed with the bicycle use, 5.6 disagreed, and 6.9 % uncertain.

In conclusion, regarding to behavior and traveling types of the tourists in the study area (Table 4.4), most tourists visited the Songkhla Municipal area for recreation. They came to the area in group with friends and families in 1-5 persons a group. Tourists prefer private automobiles and decide not to stay over night because most of them live in the vicinities. They spent half day or whole day there. Most tourists prefer Samila Beach and Khao Tung Kuan and travel mostly in private automobiles and some with motorcycle.

Table 4.4 Travel behavior and traveling type.

Traveling Behavior and Traveling Type	Number (N=160)	Percentage
Traveling Experiences		
Yes	156	97.5
No	4	2.5
Motivation		
Recreation	142	88.7
Relatives	3	1.9
Business	2	1.3
Study	6	3.8
Others	7	4.4
Traveling Participants		
Family/relatives	64	40.0
Friends	78	48.8
Alone	9	5.6
Others	9	5.6
Numbers of tourists		
1-5 persons	91	56.9
6-10 persons	48	30.0
11-15 persons	4	2.5
16-20 persons	13	8.1
Over 21 persons	4	2.5
Max=89 persons Min=1 person SD=10.19 Mean= 7.729		
Traveling Vehicles		
Private automobile	102	63.8
Rent vehicles	10	6.3
Public Transportation	20	12.5
Bus	1	0.6
Train	1	0.6
Boat	2	1.3
Motorcycle	21	15.0
Accommodations		
Stay over	38	23.8
Never Stay	122	76.3

Table 4.4 Travel behavior and traveling type (Continued).

Time spent each Trip		
Less than 2 hours	6	3.8
2-4 hours	29	18.1
Half day	73	45.6
All day	52	32.5
Preferred tour site (Average Score)	Mean	
Laem Samila	4.70	
Khao Tung Kuan	2.70	
Laem Son On	2.68	
Khao Kaoseng	2.36	
Old City	1.98	
Vehicles used for traveling in Songkhla Municipality		
Private Automobile	105	65.6
Rent Automobile	8	5.0
Bus	15	9.4
Tricycle	2	1.3
Motorcycle	30	18.8
Experiences in riding Bicycle		
Yes	39	24.4
No	121	75.6
Improving environment		
Traffic	54	33.8
Beaches	56	35.0
Stores	14	8.8
Health Garden	4	2.5
Government Office	2	1.3
Air Pollution	8	5.0
Tour Site	19	11.9
Others	3	1.9
Demand in the bicycle use		
Agree	140	87.5
Disagree	9	5.6
Uncertain	11	6.9

4.3 People's attitudes in the bicycle use for traveling in the study area

4.3.1 Attitudes of bike's users in the bicycle use for traveling

According to the study of the bicycle users in traveling, it could be analyzed from indicators of attitudes of bikers through classification of attitude level towards the use of bicycle based on opinions of samples, ranging from the highest to the lowest (scores 5, 4, 3, 2, and 1 points, respectively). Later, average point of samples towards attitudes are taken for statistical calculation (Table 4.5)

4.3.1.1 Convenience and flexibility: 14.4% agreed with the use of bicycle because convenience and flexibility can go to places without worrying about traffic congestion and only in short distance.

4.3.1.2 Life safety: Results indicate the bicycle users in the area: 18.8 % agreed that traveling in the area has little safety, 15.6% agreed that assets safety are at low level because of social problems due to poverty which also created more crimes in the present society and traffic law violations.

4.3.1.3 Reducing Expenses: samples 18.8% agreed with the use of bicycle because of cost-savings in traveling expenses and only small maintenance cost.

4.3.1.4 Shared Road Way: samples 11.9% moderately agreed with shared road ways with other vehicles because of inconvenience and limitation in facilities.

4.3.1.5 Health and Hygiene: samples 16.3% highly agreed with the use of bicycles because bicycles lead to good health and spirit of bikers. It is also a good way to exercise.

4.3.1.6 Environmental Conservation from the bicycle use in the area: samples 15.6% highly agreed with the use of bicycles because of benefits towards energy and environmental conservation because bicycles do not need fuel which may cause pollution.

4.3.1.7 Bike Rack: samples 13.8% highly agreed with the use of bicycles because it is convenient to find parking space than the others.

4.3.1.8 Bicycle Maintenance: samples 16.4% highly agreed with the advantage or benefit from the use of bicycles because of low maintenance cost and easily to find parts in comparison to other vehicles.

Table 4.5 Attitude in the bicycle use of former bicycle users.

Bicycle Use more or less benefits	Highly	High	Moderate	Low	Least	Average
1. Convenience/flexibility/traveling quickly (percent)	7 4.4	23 14.4	18 11.3	5 3.1	0 0	3.60
2. Safe from road accident (percent)	2 1.3	9 5.6	12 7.5	30 18.8	0 0	2.68
3. Safe from bike stealers (percent)	2 1.3	9 5.6	14 8.8	25 15.6	3 1.9	2.66
4. Save traveling cost (percent)	30 18.8	14 8.8	9 5.6	0 0	0 0	4.40
5. Right to use road together with other vehicles (percent)	5 3.1	16 10.0	19 11.9	13 8.1	0 0	3.25
6. Health benefits (percent)	23 14.4	26 16.3	3 1.9	1 0.6	0 0	4.34
7. Environmental protection from noise and air pollution (percent)	25 15.6	23 14.4	2 1.3	3 1.9	0 0	4.32
8. Easier to find parking space than motor cycle and automobile (percent)	20 12.5	22 13.8	6 3.8	5 3.1	0 0	4.08
9. Lower maintenance cost than other type (percent)	26 16.4	21 13.2	6 3.8	0 0	0 0	4.38

In conclusion, the study of attitude in traveling with bicycles based on various indicators as mentioned previously can be concluded as follows:

Most samples view the bicycle use with convenience and fast for traveling but slightly unsafe. Attitude in economics, results indicate that the bicycle use in traveling provide most benefits in cost-savings. In transportation, most samples agreed that they prefer sharing road ways with other vehicles at medium level. Moreover, most samples correspond to the most benefits in health and environment and energy conservation. There are ample parking areas for the bicycle in comparison with other vehicles, including the highest satisfactory level in low expenses.

It can be seen that bikers have positive attitude towards the use of bicycle in all areas. After considering average of attitude, results indicate the following attitude scores: 4.40 points for cost-savings, 4.38 points for maintenance, 4.32 points for

environment, 4.08 points for convenience, 3.60 points for convenience, shared road ways for 3.25 points, and 2.68 for life safety, and 2.66 for assets safety.

4.3.2 Attitude of former bicycle users towards the bicycle use

The study of attitude of former bicycle users towards the bicycle use could be analyzed from the indicators by identifying attitude level in many areas towards the bicycle use in scoring based on samples opinion from the highest to the lowest (Table 4.6).

Convenience and flexibility in the bicycle use: Results indicate that most samples 26.3 % agreed with the flexibility of the bicycle use because it is named as vehicle with convenience.

Regarding to safety in traveling with bicycles in the study area, results indicate that most samples 33.1% agreed with low safety level in the bicycle use, whilst 28.8% agreed with assets safety.

Referring to saving in traveling expenses from traveling with the bicycles, results indicate that samples 41.3 % agreed with most savings from the bicycle use, because it is vehicle with convenience.

For rights to share road ways with other vehicles: Results indicate that most samples 26.9 % moderately agreed with the shared road ways. This is due to the slow moving bicycles leading to accidents.

According to health and hygiene from the use of bicycle, results indicate that most samples 33.8 % agreed with most health and spirit benefits because it was another ways for exercise.

Attitude in environmental conservation towards the use of bicycle within the study area, results indicate that samples 39.4 % highly agreed with the use of bicycles to conserve energy and environment because it is the vehicle operated without fuel and pollution free.

Bicycle Rack, results indicate that samples 28.8 % highly agreed with the bicycle use because it is convenient to find parking areas even in the small space.

Bicycle Maintenance, results indicate that samples 38.4 % highly agreed with low cost of maintenance and easy to find parts.

Table 4.6 Attitude of former bike users in the bicycle use.

Bicycle Use more or less benefits	Highly	High	Moderate	Low	Least	Average
1. Convenience/flexibility/traveling quickly (percent)	12 7.5	42 26.3	38 23.8	13 8.1	2 1.3	3.46
2. Safe from road accident (percent)	1 0.6	19 11.9	33 20.6	53 33.1	1 0.6	2.68
3. Safe from bike stealers (percent)	1 0.6	22 13.8	36 22.5	46 28.8	2 1.3	2.76
4. Save traveling cost (percent)	66 41.3	25 15.6	14 8.8	2 1.3	0 0	4.45
5. Rights to use road together with other vehicles (percent)	8 5.0	23 14.4	43 26.9	33 20.6	0 0	3.06
6. Health benefits (percent)	54 33.8	44 27.5	6 3.8	2 1.3	1 0.6	4.38
7. Environmental protection from noise and air pollutions (percent)	63 39.4	35 21.9	7 4.4	2 1.3	0 0	4.49
8. Easier to find parking space than motorcycles and automobiles (percent)	46 28.8	35 21.9	22 13.8	4 2.5	0 0	4.15
9. Lower maintenance cost than other types (percent)	61 38.4	32 20.1	12 7.5	1 0.6	0 0	4.40

In conclusion, former bicycle users highly agreed that the bicycle use could make traveling fast and flexible. For safety of the bicycle's users and their assets, they correspond to the safety at low level. Regarding to economics, the bicycle use could save big expenses whilst the rights to shared roadway, they agree in moderate level. For health concerned, riding the bicycle has given the most benefits and hygienes and also benefit environmental and energy conservations. Regarding to the bicycle rack, it is convenient to find out parking spaces, including high satisfaction in maintenance expenses of bicycles.

Attitude towards the bicycle use is positive in all areas. After considering average value of samples attitudes, results indicate the following: 4.49 points for energy and environmental conservations, 4.45 points for cost-savings, 4.40 points for

maintenance, 4.38 points for the study, 1.9% visited relatives, 1.3% for business, 48.8% came with friends, 40.0 came with family, 5.6 came alone, others 5.6%, 56.9% came in group of 1-5 persons, 30.0 % came in group of 6-10 persons, 8.1% came in group 16-20 persons, 2.5 % came in group of 20 persons.

According to health and hygiene, they receive 4.38 points, parking 4.15 points, conveniences and facts 3.46 points, shared rights with other owners 3.06 points, safety towards assets 2.76 points, and safety on the road 2.68 points.

4.3.3 Attitude towards the bicycle use among tourists

In the study of tourist's attitude towards the bicycle use, indicators are being used to analyze the attitude of samples towards the use of bicycle in many areas by identifying attitude level depended on opinions classified from the highest to the lowest levels (Table 4.7).

Convenience and flexible in the bicycle: it is derived from 41.9 % of sampling tourists because they could travel everywhere.

Safety from accidents in the bicycle use for traveling: results indicate that 46.9% of samples are moderately safe. In the asset safety and burglary, 48.1 % of samples agreed that safety is at moderate level.

Bicycle shared road ways: most samples 36.3 % agreed that they only receive moderate rights to share road ways with the other vehicles.

Health benefit from the use of bicycle: results indicate that most samples 41.9% agreed highly with the benefits of bicycles to body and spirit of drivers.

Energy and environmental conservation: results indicate that most samples 50.6% highly agreed with the benefits of bicycles used because where there is no fuel required.

Results indicate that 50.6 % agreed that the use of bicycle provides better environment and money-saving because of fuel price.

For bicycle, finding indicated that most samples 41.9% agreed highly with the benefit of bicycle to body and soul of the drivers.

Table 4.7 Tourists attitude towards the use of bicycle.

Bicycle Use more or less benefits	Highly	High	Moderate	Low	Least	Average
1. Convenience/flexibility/traveling quickly (percent)	20 12.5	67 41.9	62 38.8	11 6.9	0 0	3.6
2. Safe from road accident (percent)	16 10.0	54 33.8	75 46.9	14 8.8	1 0.6	3.43
3. Safe from bike stealers (percent)	9 5.6	47 29.4	77 48.1	24 15.0	3 1.9	3.23
4. Save traveling cost (percent)	67 41.9	44 27.5	46 28.8	3 1.9	0 0	4.08
5. Rights to use road together with other vehicles (percent)	14 8.8	57 35.6	58 36.3	28 17.5	3 1.9	3.31
6. Health benefits (percent)	67 41.9	65 40.6	26 16.3	2 1.3	0 0	4.23
7. Environmental protection from noise and air pollutions (percent)	81 50.6	49 30.6	26 16.3	4 2.5	0 0	4.29
8. Easier to find parking space than motorcycles and automobiles (percent)	64 40.0	68 42.5	26 16.3	2 1.3	0 0	4.21
9. Lower maintenance cost than other types (percent)	77 48.1	52 32.5	29 18.1	1 0.6	1 0.6	4.26

Results indicate that group of tourists has extremely high attitudes because of convenient parking and easily to find space to park as well as low maintenance cost of bicycles. Results also indicate that most samples 41.9% highly agreed with the benefits of bicycles to body and spirit of the drivers.

Most samples 48.1 % highly recognize the cost-savings in bicycle management e.g. lower maintenance cost as compared to other vehicles. In conclusion, most tourists agreed with convenience and flexibility in traveling in high level. For safety in life and assets, finding safety is at moderate level whilst they realize the cost-saving in traveling expenses. The rights to shared road ways with other types of vehicles, results indicate at moderate level. Furthermore, most bicycle

users agreed that bicycle has provided most health and hygiene benefits as well as providing energy and environmental conservations. It is extremely convenient to park, and maintenance cost is low leading to its highest level.

Attitude in the bicycle use of the former bicycle users went to the positive direction in all areas. After considering average attitude of samples, results indicate the score of 4.29 points for energy and environmental conservations, maintenance cost at 4.26 points, health at 4.23 points, parking space at 4.21 points, savings cost at 4.08 points, convenience and fast at 3.60 points, safety on the road at 3.43 points, shared road ways with other vehicles 3.31 points, and assets safety at 3.23 points.

After comparison of attitude results towards the use of bicycle among people and tourists, results indicate that most samples have good or positive attitude towards the bicycle use for traveling in all areas and agreed in the use of bicycle in cost savings, less maintenance cost, healthy bikers, environmental preservation, ample parking spaces and ability to share road with other vehicles. According to safety in life and assets, results indicate that former bikers and current bicycle users agreed that the use of bicycle on the road has low safety. On the contrary, tourists have good attitude and believe that the use of bicycles contains safety. Perhaps, it may be resulted from tourists renting bicycles for use only short time to travel to important tourist sites which mostly keep good and tidy road conditions which present safety image for the bicycle use.

4.4 General characteristics of the Songkhla Municipal area

This study covers 9.27 square kilometers and contains different physical features depended on community locations. In order to understand easily and clearly identified aspects of the area, the researcher divided the area into 4 parts (Figure 4.1) based on communication routes as follows: Kaoseng-Chalathat Roads, Ratchadamnoen-Laem Son On Roads, Thalaeluang-Ramwithi Roads and Nakhon Nok-Prince Chumphon Monument.

General conditions of the study area are composed of land use, road features and facilities such as, road width, sidewalk width, bicycle racks and connecting points with public transportation. In general conditions of bicycle use, research results would

reflect the potential and physical limitation if the bicycle would be used in the area which should lead to recommendation for improving suitable bicycle lanes in each area.

4.4.1 Kaoseng-Chalathat Roads

4.4.1.1 General conditions

At Kaoseng Road, there is Kaoseng Community as the place of residence and fresh sea food market. In the back of this community, there are a small hill, scenic point and tourist sites. The outstanding symbol is the spectacular stone on the top of the hill called Hin Hua Nai Rang (Figure 4.2). This is the recreation area for people to enjoy and see the beautiful sceneries. The small fishing boats along the shore on the eastern side can be seen from this area. Generally, the area surrounded by Kaoseng Road is the beginning of important journey because one could ride a bicycle to the market for exercise.

At Chalathat Road (Figure 4.3), there is the use of land in the open area for recreation and enjoyment as well as environmental preservation. There are diversified methods to attract people to participate in all activities such as Chalathat Beach, recreation field, and exhibition court. The eastern side of Chalathat Road is the Institutional Education, Government offices, hotels and sea food business so that tourists could taste fresh sea food at Cahalathat Beach. This is a good area for activities because of good quality environment.

4.4.1.2 Road characteristics and facilities for bicycle use

Kaoseng Road is the road with 4 lanes and 6 meters in width for the total 12 meters. There is no specific lane for the bicycle so far. At the beach, there is a sidewalk 2 meters wide (Figure 4.4), but no specific bicycle lanes. Presently, the bicycle users must share road ways with other vehicles on the Road. Areas on both sides of the road locate vendor stalls sparsely.

Chalathat Road is the minor road next to Kaoseng Road. Such road is asphaltic road with 4 lanes and 6 meters in width for the total 12 meters. There is specific lane for the bicycle. At the beach, there is a sidewalk 2 meters wide. On the other side there are ample spaces for parking. Beach has the walking path but not extending to walkway.

Traffic congestions came from motorcycle and 4 wheels automobiles. The traffic is heavy in the morning (7.30-8.30 A.M) and gradually subsided at noon and late afternoon, and should be heavy again in the evening (16.00-18.00 P.M). Traffic volume is average daily at 2,841 car/day for route 1, and motorcycles at 35.25 motorcycles/day (Table 4.8).

Physical problem in the bicycle use at Kaoseng-Chalathat Roads is inconvenience at the intersection, elevated area between road and sidewalk without entrance and exit path for bicycle, including inconvenience in bringing bicycle to the opposite side because of traffic congestion. Furthermore, this area has problems with proper place to park in which the loss of bicycles is possible.

4.4.2 Ratchadamnoen-Laem Son On Roads

4.4.2.1 General conditions

Ratchadamnoen Road is located in the area of government offices such as Songkhla Municipal Office, Songkhla Provincial District Office as well as Educational Institution such as Rachamongkol Institute of Technology Southern Campus, school building, student dormitories, food stores and groceries stores. Land use for such purposes is originated from Higher Learning Institution as the point of destination inside the study area, traveling from the dormitory to the learning place or traveling inside the faculties are not too far from each other. Traveling can be done conveniently by foot or bicycle. Therefore, it is often seen that undergraduates who live at the dormitories prefer to ride bicycles to class, including the bikers who ride the bicycles for exercise or travel to the central sport arena (Figure 4.5).

The Laem Son On area is being designated as the recreation area and important tourist sites for people and tourists. The area has wide varieties of activities such as viewing sceneries at Laem Son On, Laem Samila, Khao Tung Kuan, and recreation field for people and tourists, entertaining place, art court, souvenirs shops including food stores, which are available for people and tourists. Therefore, it is suitable for being the destination for bicycle activities.

Table 4.8 Traffic density in different times at Kaoseng- Chalathat Roads.

Road 1. Kaoseng-Chalathat Roads						
Day	Time	Vehicle Type				
	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
Monday March 13, 2006 Clear weather and rather hot	7.30-8.30.00	5	575	625	3	1,208
	9.00-10.00	4	330	470	6	810
	16.00-17.00	8	465	500	3	976
	17.00-18.00	28	530	460	2	1,020
	Total	45	1,900	2,055	14	4,014
	PCU (Passenger Car Unit)		9	570	2,055	28
Wednesday, March 15, 2006 Clear weather and rather hot	7.30-8.30.00	6	600	635	3	1,244
	9.00-10.00	7	450	475	10	942
	16.00-17.00	8	466	525	6	1,005
	17.00-18.00	30	630	500	7	1,167
	Total	51	2,146	2,135	26	4,358
PCU (Passenger Car Unit)		102	644	2,135	52	2,933
Friday, March 17, 2006 , extremely hot	7.30-8.30.00	2	802	875	3	1,682
	9.00-10.00	3	325	545	3	876
	16.00-17.00	8	378	540	9	935
	17.00-18.00	9	544	505	5	1,063
	Total	22	2,049	2,465	11	4,547
PCU (Passenger Car Unit)		4	615	2,465	22	3,106
Sunday March 19, 2006 Gloomy weather with slight rain	7.30-8.30.00	7	700	540	6	1,253
	9.00-10.00	2	395	398	4	799
	16.00-17.00	6	472	665	3	1,146
	17.00-18.00	8	380	436	2	826
	Total	23	1,947	2,039	15	4,024
PCU (Passenger Car Unit)		5	584	2,039	30	2,658
Average traffic daily ADT = $\frac{11,365}{4 \text{ days}}$ = 2,841 vehicles/day						
Average bicycle use $\frac{141}{4 \text{ day}}$ = 36 vehicles/day						

Remarks: PCU (Passenger Car Unit) is defined as counting unit of vehicle when comparing with passenger car such as, 6 wheelers is equaled to 2 PCU. By average, motorcycle is equaled to 0.3 PCU and Bicycle is equaled to 0.2 PCU (Office of Maintenance and Work Safety: Department of Highway

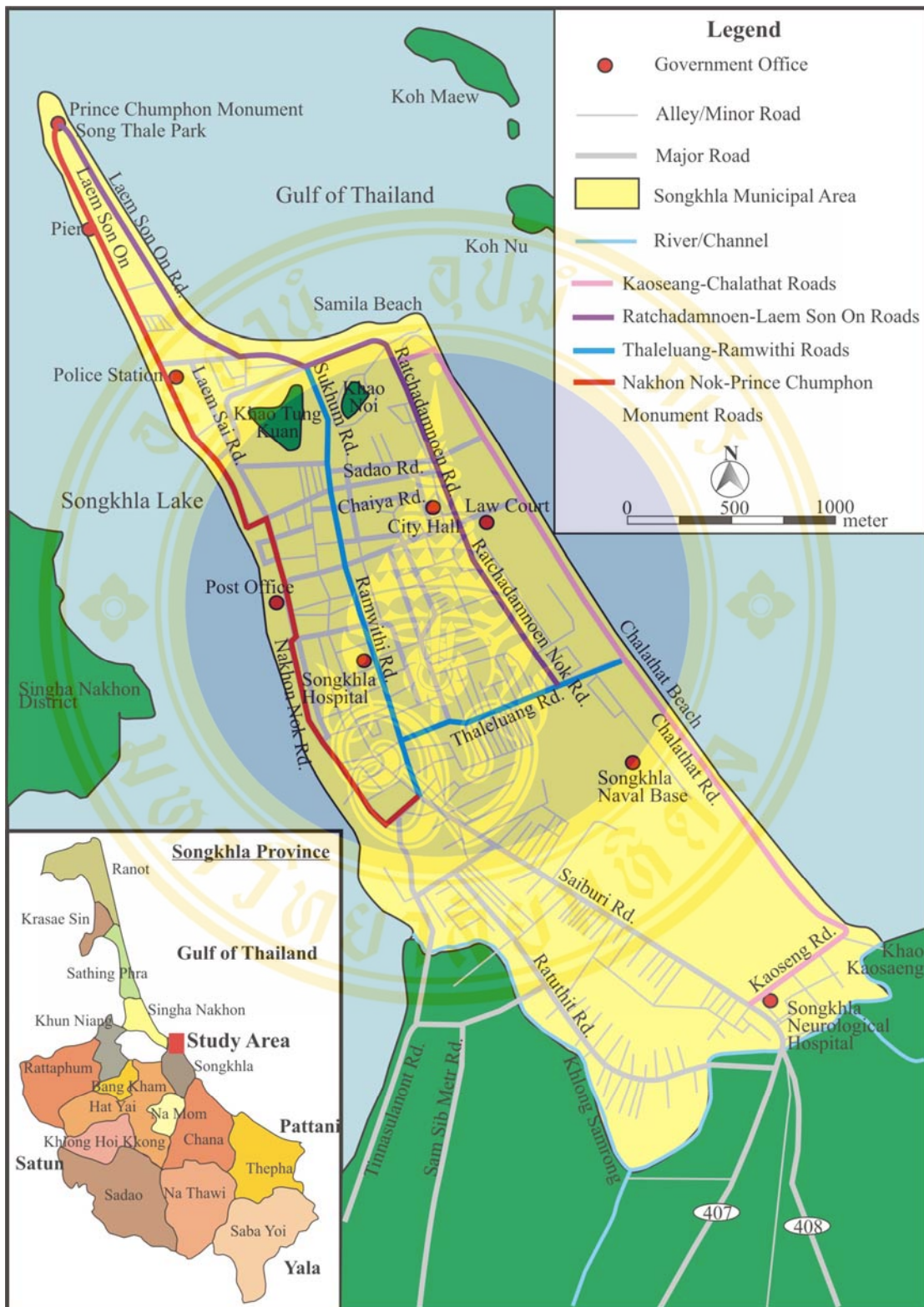


Figure 4.1 General characteristics of the study area.



Figure 4.2 Areas at Kaoseng Beach and Hin Hua Nai Rang, Kaoseng Road.



Figure 4.3 Sidewalk conditions and roads at Chalathat Beach and Chalathat Road.



Figure 4.4 Road conditions and sidewalks at Kaoseng Road.

4.4.2.2 Road features and facilities for bicycle use

Most areas at Ratchadamnoen Road allow the use of bicycle along with other vehicles on the road. It is 4 traffic lanes with 9 meters width in each direction with the total 18 meters. There are some islands in the middle of the road about 3 meters wide and sidewalk estimated 3-3.5 meters in width with good conditions (Figure 4.6).

However, one of few setbacks that may prevent it from being bicycle lane area is lacking road connection without step up and down between sidewalk and road.

Area at Laem Son On is 4 traffic lanes with 7 meters width in each direction with the total 14 meters. There are sidewalks estimated 2.5-3 meters wide and divided into bicycle lanes estimated 1.5 meters. In some spans, the bicycle lanes are divided into main routes estimated 3 meters wide but are unable to be perfect network (Figures 4.7 and 4.8).

Traffic volume at Ratchadamnoen-Laem Son On Roads are congested during the morning hours (7.30A.M-8.30 A.M.) and evening hours (16.00P.M-18.00 P.M.) when people travel to and from destinations in daily life such as traveling to school, study or trading. Results indicate that the use of bicycle has increased during Friday evening and holidays with average traffic volume of 49.75 cars per day for recreation and exercise and resting along tourist sites and public parks. Traffic volume average daily for this route is 1,343 cars per day (Table 4.9). Main problems from the use of bicycle for traveling at Ratchadamnoen Road are involved with risk of accidents at the intersection and inadequate spaces for the bicycle to park. Bicycle users must

leave their bicycles in some areas leading to the risk of bicycle losses, especially at the dormitories. In Laem Son On Road, there are disconnected bicycle lanes in some parts without symbols or signs to designate as bicycle lanes which create unsafe areas for the bicycle users and pedestrians. At the same time, inadequate parking spaces for bicycles at the tourist places have created risk of bicycle losses among the bicycle's users.

Table 4.9 Traffic congestion in different periods at Ratchadamnoen-Laem Son On Roads.

Road 2. Ratchadamnoen-Laem Son On Roads						
Day	Time	Vehicle Type				
	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
Monday March 13, 2006 Clear weather and rather hot	7.30-8.30.00	11	215	228	4	458
	9.00-10.00	2	138	213	5	358
	16.00-17.00	23	159	155	2	339
	17.00-18.00	22	160	150	2	334
	Total	58	672	746	13	1,489
	PCU (Passenger Car Unit)		12	201	746	26
Wednesday, March 15, 2006 Clear weather and rather hot	7.30-8.30.00	13	220	320	5	558
	9.00-10.00	5	145	250	7	407
	16.00-17.00	22	163	166	3	354
	17.00-18.00	25	175	153	2	355
	Total	65	703	889	17	1,674
PCU (Passenger Car Unit)		13	211	889	34	1,147
Friday, March 17, 2006 , extremely hot	7.30-8.30.00	5	308	280	4	597
	9.00-10.00	0	215	290	7	512
	16.00-17.00	5	247	230	7	489
	17.00-18.00	18	394	344	3	759
	Total	28	1164	1,144	21	2,357
PCU (Passenger Car Unit)		6	349	1,144	42	1,541
Sunday March 19, 2006 Gloomy weather with slight rain	7.30-8.30.00	15	193	205	4	417
	9.00-10.00	9	228	285	3	525
	16.00-17.00	7	364	441	12	824

Table 4.9 Traffic congestion in different periods at Ratchadamnoen-Laem Son On Roads (Continued).

	17.00-18.00	17	360	370	3	750
	Total	48	1,145	1,301	22	2,516
PCU (Passenger Car Unit)		10	343	1,301	44	1,698
Average traffic daily ADT		<u>5,371</u>	= 1,343 vehicles/day			
		4 day				
Average bicycle use		<u>199</u>	= 50 vehicles/day			
		4 day				

Remarks: - PCU (Passenger Car Unit) is defined as counting unit of vehicle when comparing with passenger car such as, 6 wheelers is equaled to 2PCU. By average, motorcycle is equaled to 0.3 PCU and Bicycle is equaled to 0.2 PCU (Office of Maintenance and Work Safety: Department of Highway rural)



Figure 4.5: Bicycle use among people and tourists at Ratchadamnoen Road.



Figure 4.6 Sidewalk conditions and Rachadamnoen Road.



Figure 4.7 Bicycle renting store at Samila Beach, Laem Son On Road.



Figure 4.8 Sidewalk conditions and bike lanes at Laem Son On Road.

4.4.3 Thaleluang-Ramwithi Roads

4.4.3.1 General conditions

Thaleluang road is located in the place of residence, trading and institution such as Polytechnique College. Bicycle users in this area, excluding undergraduates for going to study, are groups of people who are living in the area and used bicycle for short distance traveling or going out for shopping.

Ramwithi Road and surrounding areas are located in the place of residence and educational institution such as Songkhla Vocational College, Songkhla Kindergarten and government offices, for examples, Songkhla Hospital, Songkhla Provincial office. Bicycle users in this area, apart from being undergraduates for going to study, are groups of people who are living in the area and used bicycles for short distance traveling or going out for shopping. The area has turned into financial

and shopping areas, and crowded places of residences. This area is also the origin of important routes for education based on types of land use.

4.4.3.2 Road features and facilities for bicycle use

Thaleluang Road is the minor road with 2 traffic lanes and the width in each direction is estimated at 3.5 meters, totaling 7 meters. Both sides of the road are divided into parking areas for automobiles and bicycles, 2 meters wide each side (Figure 4.9) with walkway estimated 1.5 meters. This route have vehicles traveling all day. Many food vendors set up their stalls at night (Figure 4.10). Because this road is business section, parking along both sides has been done constantly. Problems conditions and limitations would affect the design for suitable bicycle lanes in the area.

Ramwithi Road is the main road where the bicycle users passed by most of the times. Road is made into 6 traffic lanes with the width on each side at 12 meters, totaling 24 meters. There are islands in the middle of the road 3 meters wide with sidewalk 3.5-4 meters in width with good conditions (Figure 4.11). Although this is the route that people preferred most (Figure 4.12), it usually has problems in traffic flexibility because there are heavy traffic and cars frequently parked at both sides. In addition, there are buses passing through the area (Songkhla-Hat Yai and Ranot-Songkhla) including jitney buses and regular vans.

Results from the survey of traffic congestion at Thaleluang-Ramwithi Roads suggest the density of bicycles and 4 wheelers. The traffic volume is heavy in the morning (7.30A.M-8.30 A.M.) and gradually reduced to noon, and evening (16.00P.M-18.00 P.M). Average daily traffic at Thaleluang-Ramwithi Roads is 3,538 cars/day. It is the route with the heaviest traffic in the study area. According to traffic volume per day, it is 71.5 cars per day which can be considered as the most traffic density in the area (Table 4.10).

Physical problems for the bicycle use in the area are resulted from traffic congestion in the main road, especially in rush hours. During morning and evening rush hours, automobiles volume are quite heavy resulting in unsafe or inconvenience in the bicycle use. Moreover, inadequate parking space is another important problem. Currently, most bicycles park on the sidewalk or underneath the crossing bridges which may be stolen easily.



Figure 4.9 Road conditions and sidewalks at Thaleluang Road.



Figure 4.10 Bicycle uses and parking areas at Thaleluang Road.

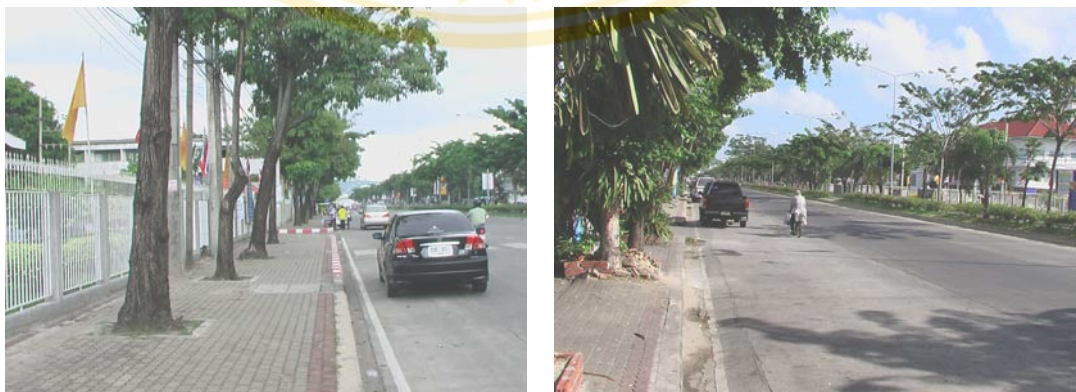


Figure 4.11 Road conditions and sidewalks at Ramwithi Road.



Figure 4.12 Shared Bike Lanes at the fresh food market, Ramwithi Road.

4.4.4 Area at Nakhon Nok-Prince Chumphon Monument

4.4.4.1 General conditions

Nakhon Nok Road, having the old historic places, is located in areas of commercial buildings and restaurants including food stores from land use. Therefore, this area is both the beginning of the trip and destination of the area.

At Prince Chumphon Monument area, the road consists of food stores, recreation areas, entertainment and tourist sites with places for conducting activities such as Prince Chumphon Monument area, rest area, exercise place and mini-shop. There are also places for entertainment activities.

4.4.4.2 Road conditions and facilities for bicycle use

Nakhon Nok Road has 2 traffic lanes with the width is estimated at 7 meters (one way). There is no sidewalk, rather narrow with constructions next to the edge of the road (Figures 4.13 and 4.14). Area around Prince Chumphon Monument Road has 4 traffic lanes with the width 7 meters in each direction, totaling 14 meters. Sidewalk is estimated 2.5 meters and there is island in the middle of the road estimated 3 meters wide (Figures 4.15 and 4.16). Bicycle lanes are present in some parts at 3 meters wide (Figure 4.16) without networks and transparent symbols.

Traffic congestion at Nakhon Nok Road-Prince Chumphon Monument reveals that the congestion is caused by bicycle and 4 wheelers. The traffic volume is heavy in the morning (7.30A.M-8.30 A.M.) and gradually increased at 10:00 A.M. The most heavy traffic is in the evening (17:00-18.00 P.M.) because of returning people from

offices. Average traffic is 1,984 cars/day and average used 69 cars per day (Table 4.11).

Physical problems in the bicycle use at Nakhon Nok Road are the risk of having accidents on the road because of narrow roads and inadequate parking spaces. Bikers must park at different places which may be stolen.

At Prince Chumphon Monument, there are some disconnected bicycle lanes available without symbols or signs especially for bicycle lanes; no parking spaces are present at the tourist sites.

In general, road conditions and road characteristics are in good conditions with 2-6 traffic lanes and width in each direction is 3.5-12 meters. Some parts is one way road with sidewalk estimated 2-4 meters in width (Table 4.12) and others have bicycle lanes. Traffic is congested with heavy traffic in the morning and evening. Thaleluang Road-Ramwithi Roads have the most density averaging 3,538 cars/day. Results indicate that Ratchadamnoen Road-Laem Son On Roads and Nakorn Nok-Prince Chumphon Monument Roads have the most bicycle use during Friday evening or holidays in low volume compared with other vehicles.

Table 4.10 Traffic congestion in different periods at Thaleluang-Ramwithi Roads.

Road 3. Thaleluang Road-Ramwithi Roads						
Day	Time	Vehicle Type				
	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
Monday March 13, 2006 Clear weather and rather hot	7.30-8.30.00	35	855	685	50	1,625
	9.00-10.00	16	772	635	42	1,465
	16.00-17.00	14	329	328	14	685
	17.00-18.00	13	320	327	13	673
	Total	78	2,276	1,975	119	4,448
PCU (Passenger Car Unit)		16	683	1,975	238	2,912
Wednesday, March 15, 2006 Clear weather and rather hot	7.30-8.30.00	8	725	625	40	1,398
	9.00-10.00	10	652	800	68	1,530
	16.00-17.00	14	657	522	25	1,218
	17.00-18.00	25	880	650	19	1,574

Table 4.10 Traffic congestion in different periods at Thaleluang-Ramwithi Roads (Continued).

	Total	57	2,914	2,597	152	5,720
PCU (Passenger Car Unit)		11	874	2,597	304	3,786
Friday, March 17, 2006 , extremely hot	7.30-8.30.00	14	894	723	35	1,666
	9.00-10.00	16	833	863	58	1,770
	16.00-17.00	14	757	623	30	1,424
	17.00-18.00	23	883	627	23	1,556
	Total	67	2,687	2,836	146	5,736
PCU (Passenger Car Unit)		13	806	2,836	292	3,947
Sunday March 19, 2006 Gloomy weather with slight rain	7.30-8.30.00	22	990	732	17	1,761
	9.00-10.00	25	935	670	15	1,645
	16.00-17.00	20	583	450	21	1,074
	17.00-18.00	17	678	548	13	1,256
	Total	84	3,186	2,400	66	5,736
PCU (Passenger Car Unit)		17	956	2,400	132	3,505
Average traffic daily ADT =			<u>14,150</u>	=	3,538	vehicles/day
			4 day			
Average bicycle use			<u>286</u>	=	72	vehicles/day
			4 day			

Remarks: - PCU (Passenger Car Unit) is defined as counting unit of vehicle when comparing with passenger car such as, 6 wheelers is equaled to 2PCU. By average, motorcycle is equaled to 0.3 PCU and Bicycle is equaled to 0.2 PCU (Office of Maintenance and Work Safety: Department of Highway rural)



Figure 4.13 Road condition and traffic on Nakhon Nok Road.



Figure 4.14 Architecture and old building at Nakhon Nok Road



Figure 4.15 Road condition and current bike lanes at Prince Chumphon Monument



Figure 4.16 Prince Chumphon tourist site and Recreational Park

Table 4.11 Traffic congestion in different periods at Nakhon Nok-Prince Chumphon Monument Roads.

Road 4. Nakhon Nok-Prince Chumphon Monument Roads						
Day	Time	Vehicle Type				
Monday March 13, 2006 Clear weather and rather hot	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
	7.30-8.30.00	18	489	305	10	822
	9.00-10.00	18	504	478	8	1,008
	16.00-17.00	13	478	287	7	785
	17.00-18.00	24	515	252	2	793
	Total	73	1,986	1,322	27	3,408
PCU (Passenger Car Unit)		15	596	1,322	54	1,987
Wednesday, March 15, 2006 Clear weather and rather hot	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
	7.30-8.30.00	15	380	295	17	707
	9.00-10.00	13	498	478	8	997
	16.00-17.00	9	450	245	12	716
	17.00-18.00	27	499	232	4	762
	Total	64	1,827	1,250	41	3,182
PCU (Passenger Car Unit)		13	548	1,250	82	1,893
Friday, March 17, 2006 , extremely hot	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
	7.30-8.30.00	18	400	295	15	728
	9.00-10.00	15	505	477	10	1,007
	16.00-17.00	12	478	288	9	787
	17.00-18.00	25	515	252	3	795
	Total	70	1,898	1,312	37	3,317
PCU (Passenger Car Unit)		14	569	1,312	74	1,969
Sunday March 19, 2006 Gloomy weather with slight rain	Time	Bicycle	Motorcycle	4 Wheels Bus	Over 4 wheelers	Total
	7.30-8.30.00	16	525	369	10	920
	9.00-10.00	10	453	425	20	908
	16.00-17.00	20	366	255	6	647
	17.00-18.00	23	582	362	5	972
	Total	69	1,926	1,411	41	3,447
PCU (Passenger Car Unit)		14	578	1411	82	2,085

Table 4.11 Traffic congestion in different periods at Nakhon Nok-Prince Chumphon Monument Roads (Continued).

Average traffic daily ADT	=	$\frac{7,934}{4 \text{ day}}$	=	1,984 vehicles/day
Average bicycle use		$\frac{276}{4 \text{ day}}$	=	69 vehicles/day

Remarks: - PCU (Passenger Car Unit) is defined as counting unit of vehicle when comparing with passenger car such as, 6 wheelers is equaled to 2PCU. By average, motorcycle is equaled to 0.3 PCU and Bicycle is equaled to 0.2 PCU (Office of Maintenance and Work Safety: Department of Highway rural)

Table 4.12 Summarized general condition of sidewalk condition in the study area.

Area	Educational route	Land use and important monuments along both sides of the road	Sidewalk features and Bicycle lanes	Setbacks and limitations for bicycle lanes
1. Kaoseng-Chalathat Roads	Kaoseng Road	Market, store, shelters, tour sites	-4traffic lanes 12 meters wide -2 meters sidewalk	-narrow road / no shoulder -lacking space to park -accident from automobile on the road -stores, stalls and cart obstruction
	Chalathat Road	Entertaining place, recreational field, resting place, restaurants, educational institution, hotels	4traffic lanes 12 meters wide -2 meters sidewalk	-narrow road -risk of having accident on the road -lacking parking space -risk of bicycle loss

Table 4.12 Summarized general condition of sidewalk condition in the study area (Continued).

2. Ratchadamnoen-Laem Son On Roads	Ratchadamnoen Road	Educational institution,	6 traffic lanes 18meters wide -3to 3.5 meters sidewalk -island 3 meters wide	-risk of accident at the intersection -lacking parking space -risk of bicycle loss
	Laem Son On Road	Stores, restaurants, recreations, entertaining place	4traffic lanes 12 meters wide -2.5to 3 meters sidewalk -1.5-3 meters bicycle lanes	-lacking parking space -unclear symbolic sign and conveniences -not enough light -without mass transportation
3.Thaleluang-Ramwithi Roads	Thaleluang Road	Stores, shelters, dormitory, restaurants	2 traffic lanes 7meters wide -1.5 meters sidewalk -island 4meters wide	lacking parking space -risk of accident -heavy traffic -invading sidewalk and road -sidewalk obstruction
	Ramwithi Road	Stores, restaurant, market, educational institution, government officials, transportation depot	6 traffic lanes 24 meters wide -3.5to 4 meters sidewalk -island 3 meters wide	-Risk accident from heavy traffic -risk of accident at intersection -lacking parking space -risk of bicycle theft

Table 4.12 Summarized general condition of sidewalk condition in the study area (Continued).

4. Nakhon Nok-Prince Chumphon Monument	Nakhon Nok Road	Community, stores, foods stores	-2 traffic lanes 14meters wide -no sidewalk	-narrow road -risk of accident on the road -lacking parking space -risk of bicycle theft
	Prince Chumphon Monument area	Stores, restaurants, recreations, entertaining place	4traffic lanes 14meters wide -2.5meters sidewalk -island 3 meters wide -3 meters bicycle lanes	-lacking parking space - unclear symbolic sign and conveniences -not enough light at night -no mass transportation

4.5 Bike Path assessment and appropriated design

4.5.1 Bicycle route suitability evaluation from physical surveys

According to the physical surveys, the evaluation of suitable bicycle lanes from roads, sidewalks and road use in both sides (Table 4.13) as well as interviewing Songkhla Municipal Officers in making bicycle lanes in each road (Table 4.14), results reveal the suitability of bicycle lanes in daily lives. Touring in the Songkhla Municipal area is as follows:

4.5.1.1 Kaoseng-Chalathat Roads is the minor road 6 meters wide in each direction. Sidewalk is estimated 2 meters with obstructed objects because people live in that area including some food stores. Road on the side of Chalathat Beach has long ridge of pine trees and many recreation facilities including the rest areas for enjoyment. Traffic is light and suitable for bicycle lanes along the beach. Across from the beach is the government offices and automobile parking areas with uneven sidewalks.

4.5.1.2 Ratchadamnoen Nok-Lam Son On Roads are classified as both major and minor roads having width of 6-9 meters. Sidewalk is estimated 2.5 meters and Bike lane is 1.5 meters. Bike path is 3 meters wide without obstructed objects. This route has rows of pine trees along the shore with many recreation activities as well as light traffic. Therefore, this road is suitable for bicycle lanes.

4.5.1.3 Thaleluang-Ramwithi Roads: It is the minor road with rather narrow sidewalk and is the place of residences, stores, markets without having trees and heavy traffic. Therefore, it has moderate suitability for having bicycle lanes. Based on personal interviews, Thaleluang Road is moderately suitable for being the bicycle lanes.

Ramwithi Road is the main road with the width of 12 meters in each direction. Sidewalk is estimated at 3.54 meters wide even though there are shelters, food stores, government offices and trees along the way with traffic congestion. Accordingly, this road is highly suitable for bicycle lanes.

4.5.1.4 Nakhon Nok-Prince Chumphon Monument Road: Due to physical features of both roads are much different from each other, Nakhon Nok Road is the minor road with 7 meters in width (One way) with no sidewalk and narrow roads having shelters, markets, restaurants including obstructed objects and heavy traffic congestion. Based on the interviews, Nakhon Nok Road is unsuitable for bicycle lanes. As for road leading to Prince Chumphon Monument, it is the minor road with 7 meters in width and sidewalk is 2.5 meters wide. Some parts are separated from the main sidewalk or being Bike Path with 3 meters wide. Sidewalk is rather wide without obstructions containing pine trees along both sides. There are places for various recreation activities and rest areas along the ways with light traffic. Therefore, this road is quite suitable for bicycle lanes.

Results of the study in physical features of each road and evaluation in bicycle lanes for daily life, tourism and recreation are summarized as follows:

- Road with high suitability such as Chalathat, Ratchadamnoen, Laem Son On and Prince Chumphon Monument (western side) Roads.
- Road with moderate suitability such as, Kaoseng, Ramwithi and Thaleluang Roads.
- Road with low suitability such as Nakhon Nok Road.

Table 4.13 Road potential for each route within the Songkhla Municipal area for bicycle lanes.

Route	Road		Sidewalk				Bicycle Route	Land Usage along the road			
	Road Level	Width (M.)	Width (M.)	Peddler/street stall	Trees Ridge/shade	Side Empty Lodge		Residential/Dormitory	Educational Place	Store/Market	Public Park/Sport
1. Kaoseng Road	Minor Road	12	2	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
2. Chalathat Road	Minor Road	12	2.5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Ratchadamnoon Road	Minor Road	18	3-3.5	Yes	Yes	No	No	Yes	Yes	Yes	Yes
4. Laem Son On Road	Main Road	14	2.5-3	Yes	Yes	Yes	Yes	No	No	Yes	Yes
5. Thaleluang Road	Minor Road	7	1.5	Yes	No	No	No	Yes	Yes	Yes	No
6. Ramwithi Road	Main Road	24	3.5-4	No	No	Yes	No	Yes	Yes	Yes	No
7. Nakhon Nok Road	Minor Road	7	No	Yes	No	No	No	Yes	No	Yes	No
8. Around Prince Chumphon Monument Road (Westside)	Minor Road	14	2.5	No	Yes	Yes	Yes	No	No	Yes	Yes

Source: Field Study March 2006

Table 4.14 Suitability level for setting up bicycle lanes within the study area.

Route	Road		Sidewalk			Bicycle Route	Land Usage along the road				Total Public Park/Sport	Suitability level
	Road Level	Width (M.)	Width (M.)	Peddler/street stall	Trees Ridge/shade		Side Empty Lodge	Residential/Dormit	Educational Place	Store/Market		

Table 4.14 Suitability level for setting up bicycle lanes within the study area
(Continued).

1	2	3	2	1	1	1	1	2	1	2	2	18	moderate suitability
2	2	3	2	2	2	2	2	2	2	2	2	23	high suitability
3	2	3	3	1	2	1	1	2	2	2	2	21	high suitability
4	3	3	3	1	2	2	2	1	1	2	2	22	high suitability
5	2	2	2	1	1	1	1	2	2	2	1	17	moderate suitability
6	3	3	3	1	1	1	1	2	2	2	1	20	moderate suitability
7	2	2	1	1	1	1	1	2	1	2	1	15	low suitability
8	2	3	2	2	2	2	2	1	1	2	2	21	high suitability

Source: Field Study March 2006

4.5.2 Assessment of appropriated Bike Path from locals

4.5.2.1 Assessment of appropriated Bike Path from current users (Table 4.15)

According to the design of bicycle lanes, results indicate that 24.4 % needed Bike Path due to high safety, 6.9% disagreed because of unlimited area and sidewalk area, and 1.9% disagreed because of bicycle obstructions.

Most samples, 22.5 % agreed with divided lanes or Bike Lane because of safety, only 0.6% disagreed with the design because of safety concerned. For groups for inadequate area and sidewalk, 3.8% and 6.3 % agreed with blocking pedestrians

Only small number of samples 1.9% agreed with Bike Route to be used with other vehicles as currently done whilst 26.3% disagreed because of safety concerned and 5.0% disliked the bicycle obstructions.

Based on opinions in suitable bicycle types, most samples 21.9% agreed with the Second type of burglary prevention that could lock some parts such as car structures, front wheels, rear wheels and suitable for parking in a long period of time as well as convenient to park in small areas. Next, 9.4% agreed with the Third type because of convenience and space savings, but the setback is in the high risk of equipment being pried. 1.9 % realized that the First type of prevention should be reduced risk of burglary.

However, the price is rather high and inconvenient for use and suitable for long time parking.

Opinions regarding to suitability in bicycle lanes of each route in the study area are presented as follows: The First route, Kaoseng-Chalathat Roads, samples at 30.0% agreed with suitability for bicycle lanes because of beautiful sceneries. It locates important tourist sites with light traffic. Only 3.1% who disagreed because of narrow roads in some areas and obstructed objects. Meanwhile the Second route, Ratchadamnoen Nok-Lam Son On Roads, most samples 26.3 agreed with beautiful sceneries and light traffic with many recreation areas, but 6.9% disagreed because of too many stores and other vehicles parking in the area. The Third route, Thaleluang-Ramwithi Roads, 11.9% agreed and 21.3% disagreed because of unsafe areas and heavy traffic. The Fourth route, Nakhon Nok-Prince Chumphon Monument Roads, 18.1% agreed because of being public parks with wide road and light traffic while 15.0% disagreed because of narrow road at Nakhon Nok which will be rather difficult to make any improvement.

4.5.2.2 Assessment of appropriated Bike Path from former users

Results from opinions in various appropriated Bike Paths in various designs (Table 4.15) indicate that samples 52.5% wanted specific route separated from Bike Path, and 13.1 % realized that road areas and sidewalks are inadequate, and 1.3% found bicycles obstructed automobiles and pedestrians.

Samples at 52.5% agreed with the route with drawing or separating areas for Bike Lane only, 1.3% disagreed because of not-safety, and 5.6 % realized that road areas and sidewalks are inadequate, and 7.5% found bicycles obstructed automobiles and pedestrians.

Samples at 5 % wanted to share Bike Route with other vehicles, but majority 53.8% disagreed because of unsafe, and 0.6 % realized that road areas and sidewalks are inadequate, and 7.5% found bicycles obstructed automobiles and pedestrians.

Samples at 36.2% agreed with the Second design to prevent sealing some parts by locking car structures, locking front wheels and rear wheels, quite suitable for parking for long period, 23.1 % in getting equipment steal with the Third design because of convenience and safe spaces, but more risks in getting equipment steal and 7.5% found the First design with highest safety but very expensive and inconvenience. However, it is suitable for parking for long time.

Suitability of bicycle lanes in the area, most samples agreed as follows: 63.1% agreed with the First route, Kaoseng-Chalathat Roads, and 3.8% disagreed. For the Second route, Ratchadamnoen-Laem Son On Roads, 92% agreed and 9.4% disagreed. The Third route, Thaleluang-Ramwithi Roads, 23.8% agreed and 43.1% disagreed. The Fourth route, Nakhon Nok-Prince Chumphon Monument Roads, 39.4% agreed and 27.5% disagreed.

The designs chosen mostly are Bike Lane and Bike Path because of high safety in the use of bicycle for traveling. Bicycle racks are the type with partial lock to prevent theft by locking bicycle frames, front wheels and rear wheels (Second type). It is designed for long time parking to meet safety level with convenience and flexibility for use as traveling vehicles.

Bike path suitable for the bicycle use such as Kaoseng-Chalathat Roads can lead to Kaoseng Market as well as connecting to Chalathat Road with lesser traffic. Landscape is also good and suitable for riding bicycle for exercise or recreation. Next suitable road is Ratchadamnoen-Laem Son On Roads because the road is the important tourist attraction. Traveling to the Educational Institution is in short distance and the road is running along the shore with beautiful sceneries and fresh air. It is the place for recreation, sport and various activities. Nakhon Nok-Prince Chumphon Monument Roads and Thaleluang-Ramwithi Roads are unsuitable for bicycle lanes because the roads are narrow without sidewalks. There is often traffic congestion, houses and trading areas which may create unsafely in the bicycle use.

Table 4.15 Opinions on Bike Path and design of Bike Lane of locals.

Design of Bike Lane	Population			
	Former users		Current users	
	(Number)	(Percentage)	(Number)	(Percentage)
Opinion on Bike Path				
1. Having Bike Path				
Agree	84	52.5	39	24.4
Disagree (Unsafe)	0	0	0	0
Disagree (Inadequate area)	21	13.1	13	6.9
Disagree (Obstructed bicycle)	2	1.3	3	1.9
2. Moderately agreed with having Bike Lane				
Agree	84	52.5	36	22.5
Disagree (Unsafe)	2	1.3	1	0.6
Disagree (Inadequate area)	9	5.6	6	3.8
Disagree (Obstructed bicycle)	12	7.5	10	6.3
3. Having used Bike Route together with sidewalk and automobile route				
Agree	8	5.0	3	1.9
Disagree (Unsafe)	86	53.8	42	26.3
Disagree (Inadequate area)	1	0.6	0	0
Disagree (Obstructed bicycle)	12	7.5	8	5.0
Proper parking space				
1. Bicycle is safe from bike stealer but rather expensive, suitable for long-term parking and collecting monthly or yearly parking fees				
	12	7.5	3	1.9
2. Preventing some burglary by locking bicycle frame front and rear wheels suitable for parking for long time, usually more expensive than type 3				
	58	36.2	35	21.9
3. Convenience to use and occupy only small space, inexpensive and risk from prying out equipments				
	37	23.1	15	9.4

Table 4.15 Opinions on Bike Path and design of Bike Lane of locals (Continued).

Opinion on bicycle lanes				
1.Kaoseng-Chalathat Roads				
Suitable	101	63.1	48	30.0
Unsuitable	6	3.8	5	3.1
2.Ratchadamnoen-Laem Son On Roads				
Suitable	92	57.5	42	26.3
Unsuitable	15	9.4	11	6.9
3. Thaleluang-Ramwithi Roads				
Suitable	38	23.8	19	11.9
Unsuitable	69	43.1	34	21.3
4. Nakhon Nok-Prince Chumphon Monument Roads				
Suitable	63	39.4	29	18.1
Unsuitable	44	27.5	24	15.0

4.5.3 Assessment of appropriated Bike Path from tourists in the area

Results from opinions on Bike Path in appropriated designs (Table 4.16) indicate that most samples or 81.3 % needed specific Bike Path and only small number or 1.3% agreed that it was not safe to use this type of Bike Path. Furthermore, 14.4% agreed of inadequate number of road areas and pavements, and 3.1% agreed with bicycle obstructions of automobiles and pedestrians.

Samples of 38.1% agreed with separated lines for Bike Lane and 40.6% disagreed with not-safety whilst 15.5% agreed with inadequate road areas and pavements, and 5.0 % agreed with bicycle obstructions of automobiles and pedestrians.

Samples of 13.8 % wanted to share the current bicycle use with other Bike Routes. Mostly or 80.0% disagreed with unsafely whilst 0.6% agreed with inadequate road areas and pavements, and 5.0 % agreed with bicycle obstructions of automobiles and pedestrians.

Opinions in appropriated bicycle rack, mostly or 62.5% agreed with the the Second type because it contains theft prevention equipments to lock bicycle frames, front and rear wheels. Next, 26.9% agreed with the Third type because of convenience

and less space but still easy to steal equipment, and 10.6% agreed with the First type because of extremely safety, but rather expensive and inconvenience which will be appropriated for long parking.

Regarding to opinions in appropriated Bike Lane in the area, mostly or 90.0% agreed with the First route, Kaoseng-Chalathat Roads, whilst 10% agreed with low suitability for Bike Lane. The Second route, Ratchadamnoen-Laem Son On Roads, 82.5% agreed with appropriated Bike Lane whilst 17.5% agreed with low suitability for Bike Lane. The Third Route, Thaleluang-Ramwithi Roads, 48.8% agreed with appropriated Bike Lane whilst 51.3% agreed with low suitability for Bike Lane. The Fourth route, Nakhon Nok-Prince Chumphon Monument Roads, 56.3% agreed with appropriated Bike Lane whilst 43.8% agreed with low suitability for Bike Lane.

Most tourists never used bicycle in this area and agreed with the use of bicycle for traveling provided that the bicycle area must be separated from sidewalk or completed with Bike paths and Bike lanes with bicycle rack type 2 or 3 that could lock the bicycle tightly and safely. According to the bicycle lanes, tourists agreed that Kaoseng-Chalathat Roads has the most suitability followed by Ratchadamnoen-Laem Son On and Nakhin Nok-Prince Chumphon Monument Roads.

Table 4.16 Opinions on Bike Path and design of Bike Lane among tourists.

Design of Bike Lane	Tourists	
	Number (N=160)	Percentage
Opinion on Bike Path		
1. Having Bike Path		
Agree	130	81.3
Disagree (Unsafe)	2	1.3
Disagree (Inadequate area)	23	14.4
Disagree (Obstructed bicycle)	5	3.1
2. Moderately agreed with having Bike Lane		
Agree	61	38.1
Disagree (Unsafe)	65	40.6
Disagree (Inadequate area)	25	15.6
Disagree(Obstructed bicycle)	8	5.0
	1	0.6

Table 4.16 Opinions on Bike Path and design of Bike Lane among tourists (Continued).

3. Having used Bike Route together with sidewalk and automobile route		
Agree	22	13.8
Disagree (Unsafe)	128	80.0
Disagree (Inadequate area)	1	0.6
Disagree (Obstructed bicycle)	9	5.6
Proper parking space		
1. Bicycle is safe from bike stealer but rather expensive, suitable for long-term parking and collecting monthly or yearly parking fees	17	10.6
2. Preventing some burglary by locking bicycle structure, front and rear wheels suitable for parking for long time, usually more expensive than	100	62.5
3. Convenience to use and occupy only small space, inexpensive and risk from prying out equipments	43	26.9
Opinion on bicycle lanes		
1.Kaoseng-Chalathat Roads		
Suitable	144	90.0
Unsuitable	16	10.0
2.Ratchadamnoen-Laem Son On Roads		
Suitable	132	82.5
Unsuitable	28	17.5
3. Thaleluang-Ramwithi Roads		
Suitable	78	48.8
Unsuitable	82	51.3
4. Nakhon Nok-Prince Chumphon Monument Roads		
Suitable	90	56.3
Unsuitable	70	43.8

4.5.4 Opinions of Songkhla Municipal Officers towards suitability of bicycle lanes and bicycle lane types

4.5.4.1 Opinions of Songkhla Municipal Officers towards suitability of bicycle lanes, results indicate details by each route as follows (Table 4.17):

- Highly suitable routes for bicycle lanes are Chalathat, Prince Chumphon Monument (Eastern side), Ratchadamnoen and Laem Son On Roads because of good sceneries and recreation areas located near the community with rather wide sidewalk and no obstructed objects.

- Highly suitable routes for bicycle lanes are Kaoseng, Ramwithi and Thaleluang Roads because some areas need to improve landscapes to match with activities. Some areas have merchandise stalls on the sidewalk to gather with heavy traffic congestion.

- Low suitable route for bicycle lanes is Nakhon Nok with rather narrow sidewalk with limited spaces to expand.

Table 4.17 Opinions of Songkhla Municipal Officers with suitability level for bicycle lanes in the study area.

Route	Songkhla Municipal Officers							
	Deputy Mayor	Engineers 8	Director of Technician	Architecture	Architecture	Architecture	Drawing	Total
Suitable of Bicycle Lanes								
1	Moderate	High	Moderate	High	Moderate	Moderate	Moderate	Moderate
2	High	High	High	High	High	High	High	High
3	High	High	High	Moderate	High	Moderate	High	High
4	High	High	High	Moderate	High	High	High	High
5	Moderate	Low	Moderate	Low	Moderate	Moderate	Low	Moderate
6	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Moderate
7	Low	Moderate	Low	Low	Low	Low	High	Low
8	High	High	High	High	High	High	High	High

Source: Field Study December 2006

4.5.4.2 Opinion of Songkhla Municipal Officers towards suitable bicycle lane types.

Opinions of concerned Songkhla Municipal Officers in the development of communication system towards suitable bicycle lane types in each route (Table 4.18) are summarized as follows:

- Bicycle lanes type 1: It is the Shared Road Way with highly suitable for Nakhon Nok Road because of its narrow traffic road without walkway with limited spaces for expansion.

- Bicycle lanes type 2: It is the Bike Lane that separated from automobile lanes. This type of bicycle lane is highly suitable for Kaoseng and Thaleluang Roads because of the width of sidewalk and road could be made into such bicycle lanes.

- Bicycle lanes type 3: It is the Sidewalk Bike lane which highly suitable for Chalathat, Ratchadamnoen and Ramwithi Roads because of the width of sidewalk does not have obstructions.

- Bicycle lanes type 4: It is the Bike Path highly suitable for Laem Son On and Prince Chumphon Monument Roads because of heavy bicycle volume and area on both sides of the road wide enough for being bicycle lanes.

Table 4.18 Opinions of Songkhla Municipal Officers with bicycle lanes suitable for each road in the study area.

Route	Songkhla Municipal Officers							Total
	Deputy Mayor	Engineer	Technician	Architect	Architect	Architect	Drawing	
bicycle lanes suitable for each road								
1. Kaoseng Road	2	2	2	3	3	4	2	type 2
2. Chalathat Road	3	3	3	2	2	3	4	type 3
3. Ratchadamnoen Road	3	2	3	3	2	3	3	type 3
4. Laem Son On Road	4	4	3	3	4	4	2	type 4
5. Thaleluang Road	2	2	2	3	2	3	3	type 2

Table 4.18 Opinions of Songkhla Municipal Officers with bicycle lanes suitable for each road in the study area (Continued).

6. Ramwithi Road	3	3	3	2	2	3	3	type 3
7. Nakhon Nok Road	1	1	1	1	1	1	1	type 1
8. Prince Chumphon Monument Road	4	4	4	3	3	4	3	type 4

Source: Field Study December 2006

In conclusion, results from observations, interviews and questionnaires among people and tourists, researchers and Municipal Officers indicate that they agreed with the Bike Path and Lane appropriated for each road in the Municipal area. The appropriated Bike Path for making Bike Lane has been arranged for the most to the least as follows: Chalathat, Ratchadamnoen, Laem Son On, Prince Chumphon Monument, Kaoseng, Ramwithi, Thaleluang and Nakhon Nok Roads.

Results from this study could be concluded that sampling groups agreed the same way in the appropriated design by having the Shared Roadway at Nakhon Nok Road. The area at Kaoseng and Thaleluang Roads should be made into the Bike Lane, Chalathat, Ratchadamnoen and Ramwithi Roads should have Sidewalks, Bike Ways, and area at Laem Son On and Prince Chumphon Monument Roads should be arranged for Bike Path for the route having heavy traffic and empty areas on the side.

CHAPTER V

CONCLUSIONS, DISCUSSIONS AND RECOMMENDATION

Results of the study of bicycle lanes for daily life and traveling in the Songkhla Municipal area among people and tourists to find suitability lanes that should benefit traveling and tourism within the Municipal area reveal the attitude of people and tourists who visited the Songkhla Municipal area. Regarding to samples of attitude, evaluation is made in the designs and suitable bicycle lanes to meet local people and tourists demand including guidelines and recommendations to benefit bicycle users in the Songkhla Municipal area.

5.1 Conclusion of research results

The study of bicycle use among people and tourists in the Songkhla Municipal area includes appropriated Bike Lane for traveling within the Songkhla Municipal area and appropriated Bike Lane through questionnaires, surveys and interviews. Results of the study indicate the attitude in the bicycle use among people in the study area and tourists who visited the Songkhla Municipal area. Assessment in design and appropriated Bike Lane based on attitude of people in the area and tourists has been done together with finding guidelines and making recommendations to benefit bicycle users within the Songkhla Municipal area as shown in the following areas:

5.1.1 Bicycle use of people in Songkhla Municipal area

Most people in the Songkhla Municipal area use bicycles mainly for traveling to facilities such as Public Park, Health Park and Beach. Some people use bicycles for grocery shopping, going to stores in front of the alley, fresh food markets whilst students ride bicycles to educational institutions. The main reason for the bicycle use is cost savings. People prefer traveling by bicycles daily. Major setback from the using bicycle for traveling is the danger from other vehicles on the roads.

Furthermore, there are more problems in rough surfaces of the roads and bicycle stealing. Therefore, people would like Bike Lane in the study area.

5.1.2 Bicycle use among tourists

Most tourists visited the Songkhla Municipal area for recreation as a group of friends and families. Tourists came to the area in private automobiles because most of them live in the adjacent districts or provinces. Most tourists spent half day in touring the Songkhla Municipal area. The most interesting sites are Samila Beach and Khao Tung Kuan. Tourists preferred to travel with private automobiles and motorcycles. Results indicate that most tourists never used bicycles to travel within the Songkhla Municipal area. Furthermore, tourists need more improvement in the surrounding areas of beaches and traffic within Songkhla Municipality and agree with Bike Path for touring the Songkhla Municipal area.

5.1.3 Attitude towards bicycle use among people and tourists for traveling in the study area

5.1.3.1 Attitude towards bicycle use among people

The tendency to use bicycles for traveling is based on Attitude Indicator of most people except for attitude in assets and life safety. In another words, they felt that the bicycle use has failed to provide safety whilst bikers are sharing roads with other vehicles including the high risk of bicycle stealing.

5.1.3.2 Attitude towards bicycle use among tourists

Results from the tendency to use bicycles for traveling among tourists based on Mean Attitude of sample groups indicate that most tourists express good attitude because they realize that bicycle use has provided convenience in traveling, life safety, and assets at moderate level as well as cost savings, and maintenance expenses. Furthermore, most tourists agree that traveling by bicycles has benefited health and hygiene for bikers including conserving energy and environment within the Songkhla Municipal area.

5.1.4 Appropriated bike lanes and designs

5.1.4.1 Selecting suitable bicycle lanes for bicycle lane networks

Physical characteristics of roads in this study suggest that current routes contain different limitations and potentials for improving routes to support traveling with bicycles.

The analyses in finding suitable routes consist of physical characteristics of each route, traffic volume and volume of bicycle use for traveling, land use design, questionnaires on people and tourists' opinions, and important monuments or recreation areas including the government offices.

Analysis results in suitable routes (Table 5.1) for bicycle lanes in the study area are in accordance with the set measures done within the area which are most suitable for being bicycle lane networks. The Chalathat, Ratchadamnoen, Laem Son On-Prince Chumphon Monument Roads, Kaoseng, Ramwithi, Thaleluang Roads are classified as moderate suitability. Road with low suitability is Nakhon Nok Road. The analysis results indicate that roads with high and moderate suitability are routes connected between residences and recreation areas, educational institutions and government offices. Moreover, there is the bicycle use for short distance traveling, from home to conduct business in the adjacent areas.

In conclusion, suitable bicycle lane is the bicycle lane that able to respond effectively to the demand of travelers within the area. It is the route connected between community residences and tourist sites, for exercises, food sources, and educational institutions and government offices with the main purposes of traveling with bicycles mainly at the recreation areas and food stores or markets. Therefore, bicycle lanes with suitable potentials for being bicycle networks (Figure 5.1) are composed of Chalathat, Ratchadamnoen, Laem Son On, Prince Chumphon Monument, Ramwithi, Kaoseng, Thaleluang and Nakhon Nok Roads, arranging suitability level from more to less. Based on this purpose, only the bicycle lane network is in major and minor roads but smaller roads or various alleys should be studied in more detail.

5.1.4.2 Guidelines for improvement and suitable bicycle lanes

According to the study of demand for bicycle lanes inside the study area, results indicate that most local people and tourists who visited the Songkhla Municipal area need bicycle lanes in the study area. Therefore, the researcher recommends guidelines for improving road conditions and designs of bicycle lanes suitable for the roads in each route (Figures 5.1 and 5.2) in the study area with 4 designs as follows:

- The First design: Shared Roadway is the bicycle lane suitable for Nakhon Nok Road because of its inability to expand the road surface and its one-way traffic. Improvements can be done in some parts of old road by increasing measures in limiting car speed and setting up symbols to warn shared roadway between bicycles and other vehicles.

- The Second design: Bike Lane is suitable for the area with high traffic and road width large enough to improve suitable bicycle lanes. Kaoseng and Thaleluang Roads are examples of suitable routes. Improvements can be done in various aspects i.e. in both sides and either side with enough width, or drawing lines, or permanent concrete dividers with enough spacing.

- The Third design: This can be carried out by preparing Sidewalk and Bikeway suitable for routes having wide sidewalk, and arranging public utility in order without obstructed objects for bicycles used in the area at Chalathat, Ratchadamnoen and Ramwithi Roads. Some parts of sidewalk must be adapted for use and are used in the outside area (further left) of both sides and either side with enough width, or drawing lines, or constructing permanent concrete dividers with enough spacing.

Table 5.1 Comparison in quality of each road for constructing bicycle lanes.

Road	Advantages in constructing Bicycle Lane	Limitation in constructing Bicycle Lane	Suggestions in constructing Bicycle Lane
- Laem Son On - Prince Chumphon Monument	-High safety in traveling due to distinctively separated bicycle lanes	-High cost of building and maintenance -Taking long time to build	-Separated clearly bicycle lanes from automobile route and sidewalk
- Chalathat - Ratchadamnoen - Ramwithi	-Having high safety in traveling -Having high flexibility in the bicycle use -Not too difficult to build -Relatively low spending budget and maintenance -Longer time frame for the use.	-Non smooth surface can cause setbacks while driving -May create conflict with pedestrian from drawing the separation lines	-Distinctively separated bicycle lanes - Improve some areas sidewalk to make Sidewalk Bikeway (Figure 5.2) by constructing bikeway outside the sidewalk

Table 5.1 Comparison in quality of each road for constructing bicycle lanes (Continued).

<ul style="list-style-type: none"> - Kaoseng - Thaleluang 	<ul style="list-style-type: none"> -having lowest spending budget 	<ul style="list-style-type: none"> -Having disadvantages for stores because parking is forbidden -Traveling lanes for automobile have been reduced and also decrease in flexibility 	<ul style="list-style-type: none"> - Distinctively separated bicycle lanes - Improve some areas of sidewalk by constructing concrete edge or drawing lines to separate bicycle lanes outside the sidewalk (Figure 5.2)
<p>Nakhon Nok</p>	<ul style="list-style-type: none"> -Save cost and low budget when compare to other types -built fast, less operational steps and maintenance cost compared to other forms of bicycle lanes 	<ul style="list-style-type: none"> -Low Safety -May create conflicts with other vehicles -Having lower flexibility than other type of design 	<ul style="list-style-type: none"> - Shared road way with other vehicles - Shared road way with other vehicles by making symbols to identify shared roadway for the safety of bicycles (Figure 5.2). It may be done together with the others by identifying the speed of other vehicles.

- The Fourth design: This design can be done by arranging area for Bike Path with heavy traffic congestion and the empty lots along the road. The area should be large enough and available for developing into the bicycle lanes such as Laem Son On and Prince Chumphon Monument Roads. This type of bicycle lane should have more convenience and safety for use than other types with the ability to support bicycles traveling in the long distance.

5.2 Discussions on research results

People prefer to travel within Songkhla Municipality by motorcycles and private automobiles because of convenience in traveling. Based on traveling with bicycles among people in the study area, results indicate the small use as compared to other vehicle. The analyses of studied data and the interviews of people in the area indicate that main reasons for unpopular use of bicycles in the area are resulted from



Figure 5.1 Map showing different roads in the Songkhla Municipal area and designs of appropriated Bike Lane

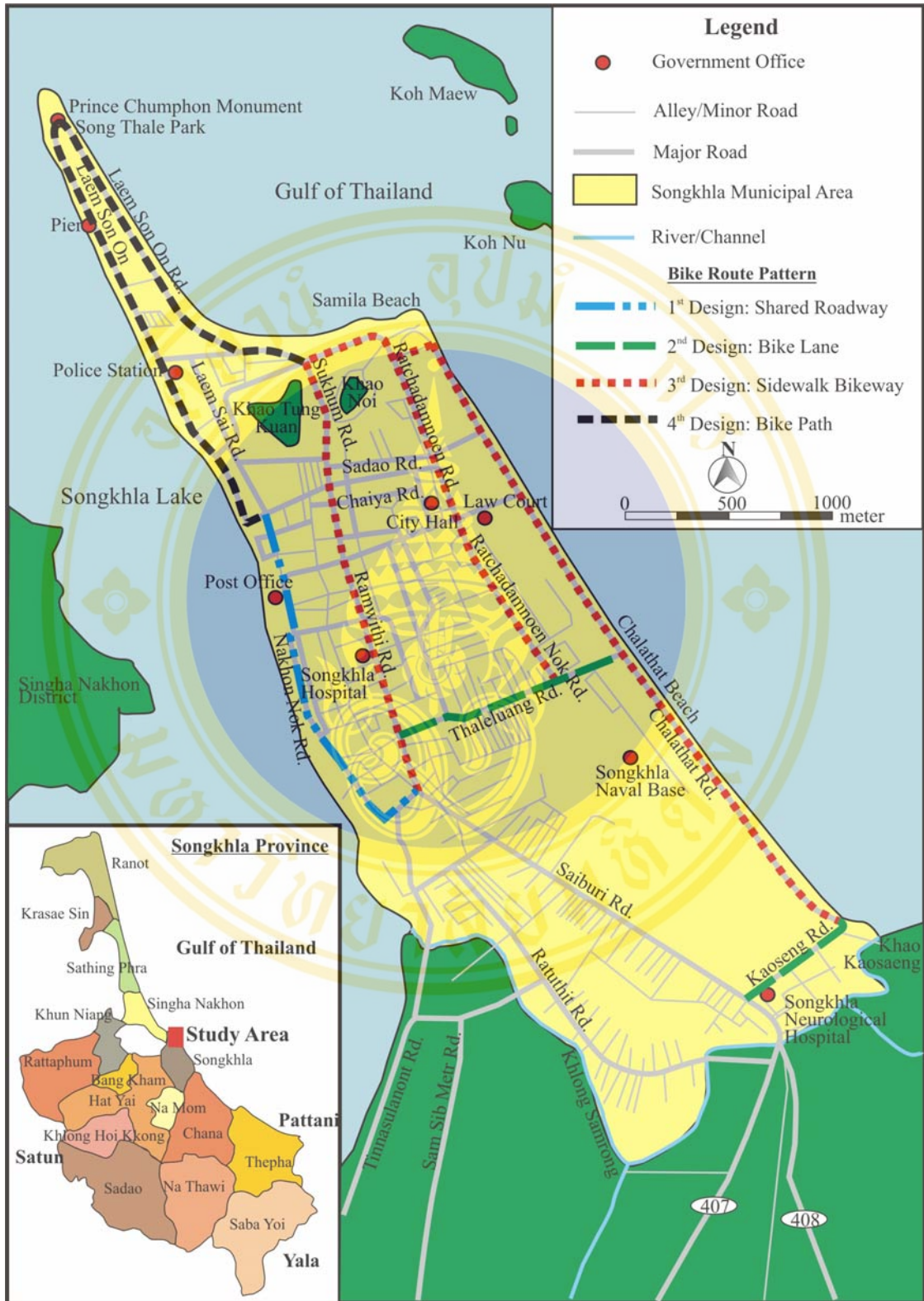


Figure 5.2 Map showing different roads in the Songkhla Municipal area and designs of appropriated Bike Lane for each road.

unsafe use of shared roads with other vehicles, and safety in assets as well as inadequate number of roads. Recently, the bicycle use would share road with automobiles and sidewalks or use for traveling within the alleys with light traffic. Some sample groups prefer the use of bicycles because of cost savings, high flexibility and convenience. Based on observations of traffic volume at the main road, results indicate that bicycles are being more used in the evening of regular days but heavily used in the evening of public holidays. The most preferred areas for bicycle use are at Chalathat Beach (Chalathat Road), Samila Beach (Laem Son On-Ratchadamnoen Roads) and Suan Song Thale (Laem Son On Road). Results of the study also indicate that people in the study area use bicycles for touring and recreation more than using bicycle for going to work, educational institutions and markets. Most samples need specific Bike Lane for safety. Referring to the bicycle use in large urban areas such as, Bangkok Metropolis, Chiang Mai, Ayutthaya, bicycles are encouraged to be used more within educational institutions or specific places than using on regular roads. This is due to traffic planning emphasized on road constructions to support the increasing number of automobiles which may be impossible to make way for the bicycles. Accordingly, bicycle users could easily get into the accidents as well as other people (Thongchai Pansawas and Pornchai Leelanupap, 1995 cited Hathairut Puangchai, 1998:34).

Bicycles are used for traveling in Thailand around important tourist sites, e.g., the islands of Phra Nakhon Si Ayutthaya where private and government shops are open for renting bicycles. Most tourists enjoy renting bicycles for sightseeing because they have more convenience than walking in long distance (Panayu Chairattananon, 2003).

Traveling behaviors of people with bicycles reveal that each country uses bicycles for different purposes based on many factors such as road condition, bicycle route, climate, terrain and value. Based on the study of the bicycle use in the countries with temperate climate such as Japan and the Netherlands, results indicate that people preferred to use bicycles in their daily life, especially for going to work or connecting with other public systems. This is much different from the bicycle use in the Songkhla Municipal area where people use for enjoyments and recreations.

Generally, results also indicate that in countries with hot climate, people prefer the bicycle use for going to work or running. Only some countries use bicycles for more going to work, running and schools than recreations or sports such as Laos, India and Vietnam (Muthita Pinsoonthorn, 1999:41). This is due to economic necessities and inefficient transportation systems (Hathairut Puangchai, 1998).

Results from the study for attitude among people and tourists indicate the tendency or attitude towards the bicycle use for traveling at good level as well as the study in different areas. In addition, people and tourists in the area have good attitude towards the bicycle use for traveling or touring in Nakhon Pathom Municipality (Boonnak Tilkul, 1984: 45). The bicycle use for daily life of people in Muang District Nakhon Nayok is accepted (Mayuree Patrachai, 1999). Moreover, there are the many studies on appropriated Bike Lane for touring Rattanakosin (Muthita Pinsoonthorn, 1999) and Bike Lane for promoting tourism within the island of Ayuttaya (Panayu Chairattananon, 2003) and the study in routes and bicycle usages in the Ratchasima Municipal area (Nittaya Padkao, 1999). However, most people prefer the bicycle use for traveling, sports and recreations (Mayuree Patrachai, 1999); Muthita Pinsoonthorn, 1999); (Panayu Chairattananon, 2003); (Nittaya Padkao 1999). This is similar to the Songkhla Municipal area where people and tourists used bicycle more for recreation and recreation than going to work and schools (Boonnak Tilkul, 1984: 45). Presently, people and tourists unanimously agreed that sharing roads with other vehicles has made it unsafe for bikers including too risk for bicycle losses. The bicycle use is intended for traveling and recreation which benefits biker's health including energy and environmental conservation within the Songkhla Municipal area.

Results from opinions of people and tourists as well as those of officers and observations in physical features of each road are analyzed and summarized for appropriate level of Bike Lane for making bicycle network such as Chalathat, Ratchadamnoen and Laem Son On-Prince Chumphon Monument Roads. Roads at moderate level are Kaoseng, Ramwithi and Thaleluang Roads. Results of analyses in the appropriate level of Bike Lane indicate that roads with the most appropriate and moderate levels are the routes linking between important recreations of Songkhla

Municipality. This is confirmed that people and tourists prefer to use bicycles more for traveling and recreation than going to work.

Results of the study and appropriate Bike Lane for tourism in other areas indicate that people and tourists agree that they need the Bike Lane with safety in riding as networks and able to access every point of that tourist sites (Muthita Pinsoonthorn 1999); (Panayu Chairattananon, 2003); (Nittaya Padkao 1999). In the study for appropriate route and Bike Lane in each area, people prefer to observe physical road conditions, traffic volume, questionnaires, and interviews of people and tourists.

Therefore, it is being selected as appropriate Bike Lane (Panayu Chairattananon, 2003) and (Nittaya Padkao 1999), except the study of planning appropriate Bike Lane within the Rattanakosin area (Muthita Pinsoonthorn, 1999) through the technical application of GIS.

Designing and improving road conditions of each road require the study in road and traffic engineering thoroughly. This study needs budgets and time frames to improve and categorize based on the importance of each road as well as appropriate design of Bike Lane. Because Songkhla Municipality is located in hot and humid areas the temperature is extremely hot during the day. According to observation of volume and use of bicycles among people and tourists, results indicate that they prefer to ride bicycles in the evening for traveling and recreation. Therefore, improving routes of Bike Lane should consider sceneries and shades for daytime. Trees producing shades should have thick leaves and tall trunk with long spreading branches such as Pradu and Indian almond.

However, results of the study in the bicycle use of the people and tourists in the Songkhla Municipal area are derived from the observation of the research, questionnaires and interviews of sample groups who identified important routes in the Songkhla Municipal area. Results from the study indicate that people and tourists in the Songkhla Municipal area rather agree but people in the area prefer to use bicycles more in traveling and recreation than tourists who came to visit by motorcycles and private automobiles. Therefore, random sampling should be done only with people who live in the Songkhla Municipal area through entire area which is formerly done

by specifying area and the study route as well as number of bikers and non-bikers in the same proportion.

Results of the study in routes and appropriate Bike Lane in the area which may be derived from appropriate routes arranged from the most to the least categories should bring about the changes and results of the study in every road within the Songkhla Municipal area. This method may be applied with further study of appropriate Bike Lane within other areas. Consequently, the number of random sampling may increase depended on number of population in the area. Furthermore, the study in road engineering must be increased as well as adapting the use of GIS in designing and improving appropriate Bicycle Lane.

5.3 Recommendations for bicycle use guidelines in the study area

5.3.1 Policies and promotion planning for the bicycle use

5.3.1.1 Songkhla Municipality should arrange various projects to promote bicycle lanes in the area.

- Publicity Project for the bicycle use in traveling in the Songkhla Municipal area.

- Project to rally and publicize for people and tourists to learn bicycle lanes, including preparation for manual to recommend bicycle lanes, locations of tourist sites, publicity locations and Information Center.

- Project activity in the bicycle use such as Staying healthy with bicycle, family exercise with bicycle, Songkhla Municipality tourism with bicycle, bicycle competition to build bonding in the community.

- Publicity project for other vehicle users to know the route with bicycle lanes through the symbolic signs on bicycle lanes in order to increase safety for the bicycle users.

5.3.1.2 Songkhla Provincial Police Station should arrange safety ride project as follows:

- Training traffic rules for the bicycle users such as hand signs and drivers manner to increase safety levels in sharing roadways with other vehicles.

- Rally for the use of safety gears such as safety helmets and proper dresses for riding bicycle to prevent danger from accidents on the road as well as recommending the bicycle users to install light equipments, reflective light, and signal bell for the safety in the bicycle use during the night time.

5.3.1.3 Private organization such as hotels, stores and educational institutions should participate in the plans or policies to promote the bicycle users in short distance route in the community for energy and environmental conservations in the Songkhla Municipal area. It also creates motivation among local people who live in that community to favor the bicycle use for short distance instead of automobiles.

5.3.2 Guidelines for improvement and suitable bicycle lanes

In the study of demands for bicycle lanes inside the study area, results indicate that most local people and tourists who visited the Songkhla Municipal area need bicycle lanes in the study area. Therefore, the researcher recommended guidelines for improving road conditions and designs of bicycle lanes suitable for the roads in each route (Figure 5.2 and 5.3) in the study area with 4 designs as follows:

- The First design: Shared Roadway is the bicycle lane suitable for Nakhon Nok Road because of its inability to expand the road surface and its one-way traffic. Improvements can be done in some parts of old road by increasing measures in limiting car speed and setting up symbols to warn shared roadway between bicycles and other vehicles.

- The Second design: Bike Lane is suitable for the area with high traffic and road width large enough to improve suitable bicycle lanes. Kaoseng and Thaleluang Roads are examples of suitable routes. Improvements can be done in various aspects i.e. in both sides and either side with enough width, or drawing lines, or permanent concrete dividers with enough spacing.

- The Third design: This can be carried out by preparing Sidewalk and Bikeway suitable for routes having wide sidewalk, and arranging public utility in order without obstructed objects for bicycles used in the area at Chalathat, Ratchadamnoen and Ramwithi Roads. Some parts of sidewalk must be adapted for use and are used in the outside area (further left) of both sides and either side with enough width, or drawing lines, or constructing permanent concrete dividers with enough spacing.

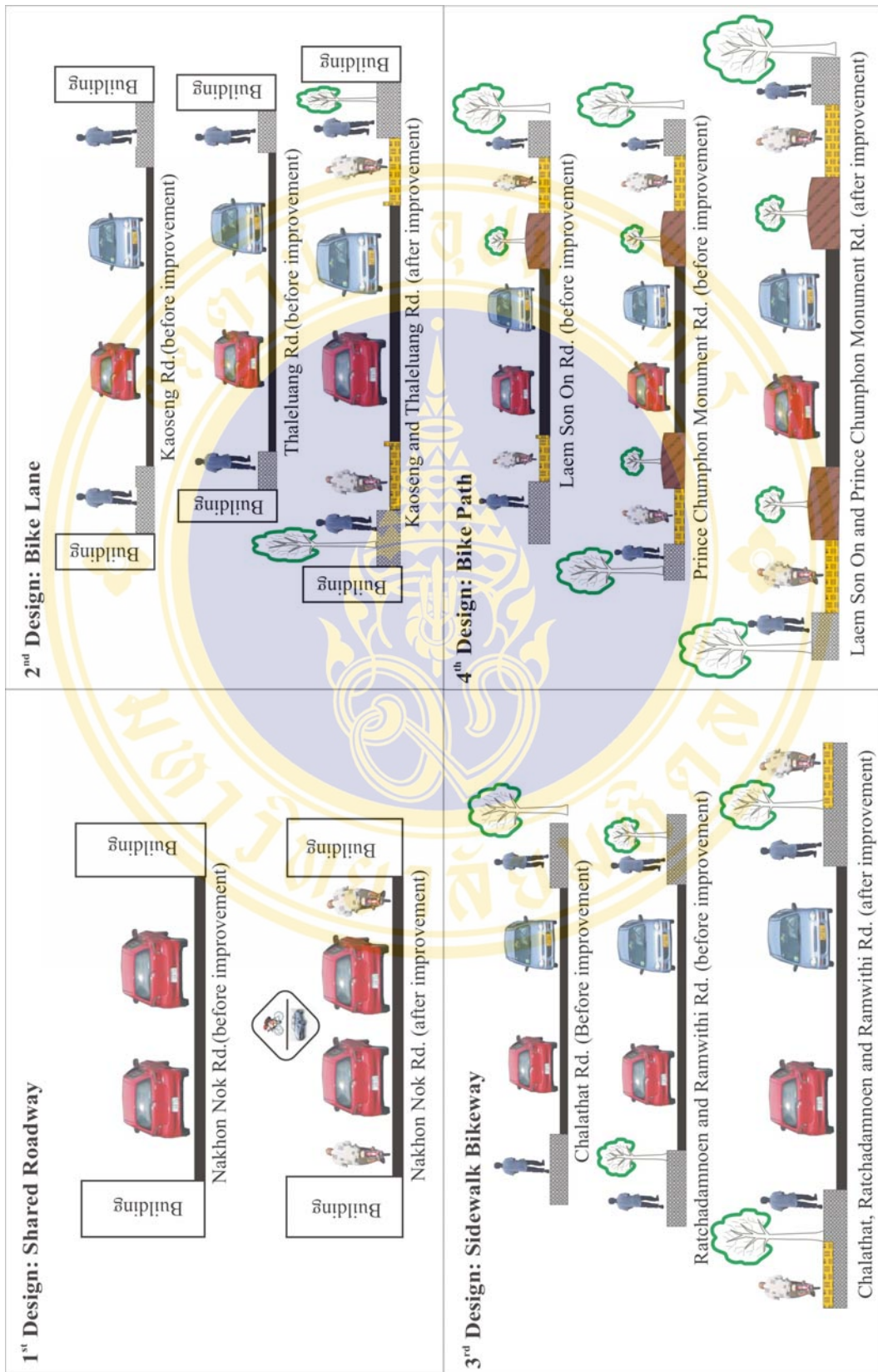


Figure 5.3 Lane's type and guidelines for improvement of bicycle lanes

- The Fourth design: This design can be done by arranging area for Bike Path with heavy traffic congestion and the empty lots along the road. The area should be large enough and available for developing into the bicycle lanes such as Laem Son On and Prince Chumphon Monument Roads. This type of bicycle lane should have more convenience and safety for use than other types with the ability to support bicycles traveling in the long distance.

5.4 Recommendations for Bicycle Use in the Study Area

5.4.1 Policies and planning to promote the bicycle use

5.4.1.1 Songkhla Municipality should arrange for various projects to promote the use of bicycles in the Songkhla Municipal area as follows:

- Publicity project for the use of bicycles to travel within the the Songkhla Municipal area

- Arranging for rally and publicity so that people and tourists may learn about Bike Lane as well as making manual to introduce Bike Lane, tourist site locations, publicity locations and information centers to provide information on Bike Lane and tourism.

- Arranging for activities regarding to the bicycle use in various projects such as healthy with bicycle, family exercise with bicycle, touring the Songkhla Municipal area with bicycles, bicycle tournament for community relations.

- Publicity project for other vehicle users to learn about Bike Lane through bicycle symbols so that they may watch out for bikers' safety.

5.4.1.2 Songkhla Provincial Police should arrange safe biking as follows:

-Basic traffic training for bikers such as hand signals and riding etiquette to increase safety while sharing roads with other vehicles.

- Rally for the use of safety equipments such as safety helmets, appropriate outfit for riding bicycles to prevent accidents on the roads including recommending bikers to install lighting equipments, reflective lights and warning bells for safety during night traveling.

5.4.1.3 Within the private organizations such as, hotels educational institutions, many entrepreneurs should participate in planning or promoting bicycle uses in short distance for traveling in the community. This idea is for conserving energy and

environment around the Songkha Municipal area as well as motivating people who are staying in that community to use bicycles for short distance traveling instead of using motor vehicles.

5.4.2 Recommendations for Physical Route Improvement

5.4.2.1 The Songkhla Municipal area should have ample spaces in crowded areas for parking bicycles such as commercial buildings, recreation areas, government offices, and bus stops. This must be done to change traveling system as well as increasing protection from the loss of bicycles together with setting up order in bicycle parking.

5.4.2.2 Educational Institutions or divisions located inside the community should provide lockers and shower rooms to service bikers and keep personal items. For examples, lockers for helmets and shoes should be available to motivate bikers to ride bicycle for short distance traveling instead of using more automobiles.

5.4.2.3 Songkhla Municipality should plant trees along both sides of the road to provide shades and relieve heat from the sun during the bicycle use including stalling electrical posts at the road sides or routes with heavy bicycle traffic to provide safety during the nighttime.

5.4.2.4 Songkhla Municipality should arrange signs to display bicycle lanes and shared roadways in the designated lanes. It should be the warning for other vehicles users to be more cautious.

5.4.2.5 Songkhla Municipality should arrange sidewalk surfaces for bicycle lanes by distinctly separating between bicycle lanes and pedestrian walkways such as using road shade with color or different symbols. Furthermore, bicycle lanes in various intersections should be identified with colors or symbols that could be seen clearly as the warning to other vehicle users. This may be the warning to bicycle users to be extra careful.

5.4.2.6 Songkhla Municipality should forbid obstructions of bicycle lanes. For examples, vendors 'stalls or items placing in front of the stores may obstruct bicycle lanes and put bicycle users in danger.

5.4.2.7 Provincial Police Station in Songkhla Province should provide warning signs for all hazardous areas for the bicycle use such as turning or curving areas.

Moreover, limited-speed signs and installed traffic signals on road surfaces and speed reduction barriers as small mounds on traffic surfaces in rough areas to warn fast driver for safety of bicycle and automobile users.

5.5 Recommendation for the further studies

The study in detail of bicycle lanes in the study areas is involved with the study of physical conditions to present guidelines including designs of bicycle lanes suitable with other routes in the study area as being reported in this study. In the next study, there should be the study in detail in Traffic Engineering and Route Engineering that related to the designs of the bicycle lanes such as the structures of bicycle lane surfaces, ramps, sidewalks including regulations in the designs and setting up symbols of bicycle lanes which should lead to concrete practices. Then, the bicycle use for daily life instead of the automobiles must be done with more safety and convenience than the present. Moreover, this should be another ways to rally for energy savings without any environmental effect.

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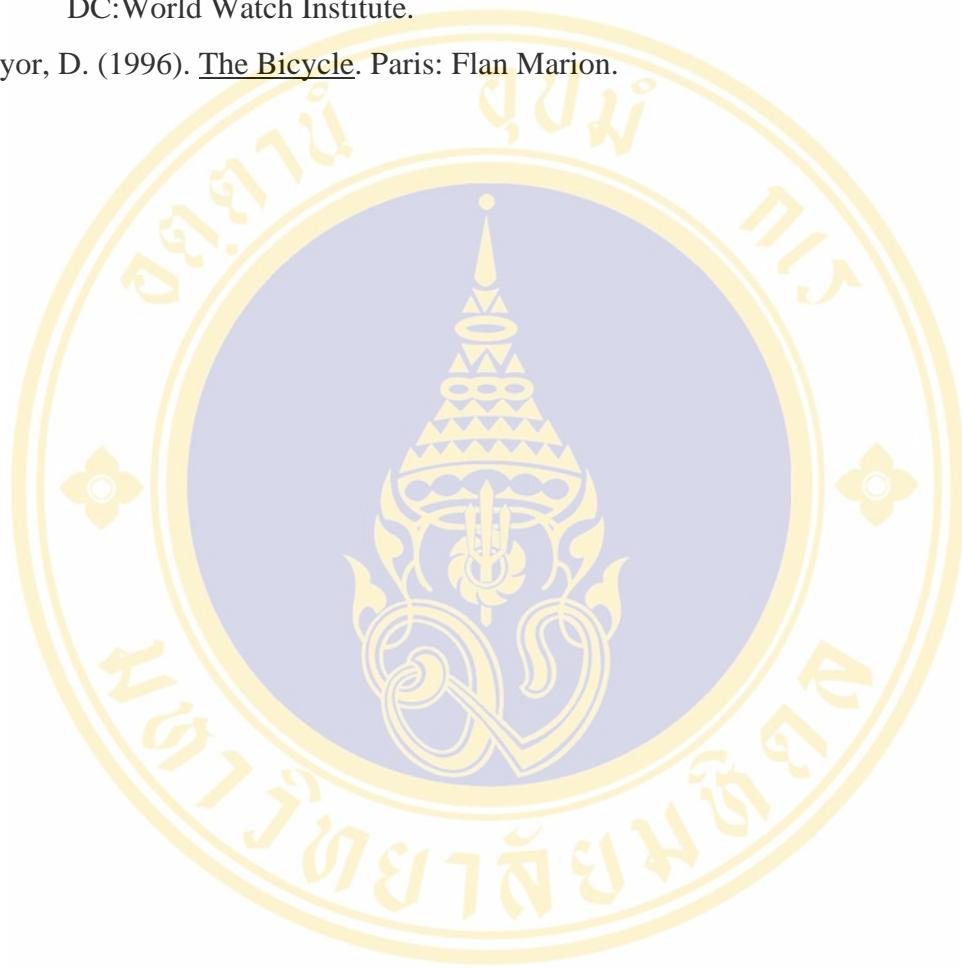
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คณะสิ่งแวดล้อมและทรัพยากรศาสตร์
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1 กุมภาพันธ์ 2549

เรื่อง ขอบความอนุเคราะห์ตอบแบบสอบถามเพื่อการวิจัย

เรียน ท่านผู้ตอบแบบสอบถาม

ข้าพเจ้านางสาวชมมาดา ศรีนวล นักศึกษาระดับปริญญาโท สาขาการวางแผนสิ่งแวดล้อม เพื่อพัฒนาชุมชนและชนบท คณะสิ่งแวดล้อมและทรัพยากรศาสตร์ มหาวิทยาลัยมหิดล ได้รับ อนุมัติจากมหา วิทยาลัยฯ ให้ดำเนินการวิจัยเรื่อง “การศึกษาการใช้จักรยานของประชาชนและ นักท่องเที่ยวในเขตเทศบาลนครสงขลา: เส้นทางจักรยาน และรูปแบบทางจักรยานที่เหมาะสม” เพื่อเป็นวิทยานิพนธ์

จึงใคร่ขอความอนุเคราะห์จากท่านในการตอบแบบสอบถาม ตามที่แนบ โดยทำ เครื่องหมาย ✓ ลงหน้าข้อที่ตรงกับความจริง หรือตรงกับความคิดเห็นของท่าน คำตอบที่ได้จะนำไป เขียนเป็นรายงานการวิจัยเสนอต่อมหาวิทยาลัยต่อไป

ขอขอบพระคุณในความอนุเคราะห์ของท่านเป็นอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ
ชมมาดา ศรีนวล

แบบสอบถามในการวิจัย (สำหรับประชาชน)

เรื่อง การใช้จักรยานของประชาชนและนักท่องเที่ยวในเขตเทศบาลนครสงขลา: เส้นทางจักรยานและรูปแบบทางจักรยานที่เหมาะสม

ส่วนที่ 1 : ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

1. เพศ 1) ชาย 2) หญิง
2. อายุ.....ปี
3. ระยะเวลาที่อาศัยอยู่ ณ ที่อยู่ปัจจุบัน ปี
4. อาชีพ

<input type="checkbox"/> 1) พนักงานบริษัท/ ลูกจ้าง	<input type="checkbox"/> 2) รับราชการ/ รัฐวิสาหกิจ
<input type="checkbox"/> 3) แม่บ้าน/ พ่อบ้าน	<input type="checkbox"/> 4) นักเรียน/นักศึกษา
<input type="checkbox"/> 5) อื่นๆ(ระบุ).....	
5. ระดับการศึกษาของท่าน

- จบการศึกษาระดับ	
<input type="checkbox"/> 1) ประถมศึกษา	<input type="checkbox"/> 2) มัธยมศึกษา
<input type="checkbox"/> 3) อาชีวศึกษา	<input type="checkbox"/> 4)ปริญญาตรี
<input type="checkbox"/> 5) สูงกว่าปริญญาตรี	<input type="checkbox"/> 6) อื่นๆ(ระบุ).....
- กำลังศึกษาอยู่ระดับ	
<input type="checkbox"/> 1) ประถมศึกษา	<input type="checkbox"/> 2) มัธยมศึกษา
<input type="checkbox"/> 3) อาชีวศึกษา	<input type="checkbox"/> 4) ปริญญาตรี
<input type="checkbox"/> 5) สูงกว่าปริญญาตรี	<input type="checkbox"/> 6) อื่นๆ(ระบุ).....
6. รายได้ต่อเดือนของท่าน (ในกรณีที่เป็น นศ./นร.ให้หมายความถึงรายได้รายเดือนจากผู้ปกครอง)

<input type="checkbox"/> 1) น้อยกว่า 2,500 บ.	<input type="checkbox"/> 2) 2,500-5,000 บ.
<input type="checkbox"/> 3) 5,000-7,500 บ.	<input type="checkbox"/> 4) 7,500-10,000 บ.
<input type="checkbox"/> 5) มากกว่า 10,000 บ. ขึ้นไป (ระบุ).....	

ส่วนที่ 2 : พฤติกรรมการเดินทาง และรูปแบบการเดินทาง

7. ประสบการณ์ในการใช้จักรยาน

<input type="checkbox"/> 1) เคย ปัจจุบันไม่ได้ใช้
<input type="checkbox"/> 2) เคย ปัจจุบันก็ยังใช้อยู่
<input type="checkbox"/> 3) ไม่เคย

8. วัตถุประสงค์หลักในการใช้จักรยานในการเดินทางของท่าน

(เลือกได้หลายข้อ โปรดเรียงลำดับ 1,2,3... ตามความสำคัญ)

- | | |
|---|--|
| <input type="checkbox"/> 1) ไปสถานศึกษา/โรงเรียน | <input type="checkbox"/> 2) ไปทำงาน |
| <input type="checkbox"/> 3) ไปซื้อของ/ไปตลาด | <input type="checkbox"/> 4) ไปเชื่อมต่อกับระบบขนส่งมวลชนระบบอื่น |
| <input type="checkbox"/> 5) ไปออกกำลังกาย..... | <input type="checkbox"/> 6) ไปเยี่ยมญาติพี่น้อง |
| <input type="checkbox"/> 7) ระบุไม่ได้แน่นอน ปนๆกัน | <input type="checkbox"/> 8) เหตุผลอื่นๆ..... |

9. เหตุผลสำคัญที่ท่านเลือกใช้จักรยานในการเดินทาง

(เลือกได้หลายข้อ โปรดเรียงลำดับ 1,2,3... ตามความสำคัญ)

- | | |
|---|--|
| <input type="checkbox"/> 1) ประหยัดค่าใช้จ่าย | <input type="checkbox"/> 2) ความรวดเร็ว |
| <input type="checkbox"/> 3) ความสะดวก | <input type="checkbox"/> 4) ประหยัดพลังงาน/อนุรักษ์สิ่งแวดล้อม |
| <input type="checkbox"/> 5) ความปลอดภัย | <input type="checkbox"/> 6) อื่นๆ(ระบุ)..... |

10. ความถี่ในการใช้จักรยานของท่าน

- | | |
|---|---|
| <input type="checkbox"/> 1) นานๆครั้ง | <input type="checkbox"/> 2) สัปดาห์ละ 1-2 วัน |
| <input type="checkbox"/> 3) ใช้เฉพาะวันหยุด | <input type="checkbox"/> 4) สัปดาห์ละ 3-4 วัน |
| <input type="checkbox"/> 5) ใช้เฉพาะวันจันทร์-ศุกร์ | <input type="checkbox"/> 6) ทุกวัน |

11. ท่านใช้เวลาสำหรับการเดินทางด้วยจักรยานในแต่ละครั้งหรือแต่ละเที่ยว (ไป- กลับ) ประมาณเท่าใด

- | | | |
|---|--|--|
| <input type="checkbox"/> 1) ไม่เกิน 10 นาที | <input type="checkbox"/> 2) 10-15 นาที | <input type="checkbox"/> 3) 15-20 นาที |
| <input type="checkbox"/> 4) 20-25 นาที | <input type="checkbox"/> 5) 25-30 นาที | <input type="checkbox"/> 6) 30-40 นาที |
| <input type="checkbox"/> 7) มากกว่า 40 นาทีขึ้นไป (ระบุ)..... | <input type="checkbox"/> 8) ไม่แน่นอน | |

12. การใช้จักรยานของท่านประสบปัญหาและอุปสรรคที่สำคัญในด้านใดบ้าง

- | | |
|---|---|
| <input type="checkbox"/> 1) การจราจรติดขัดบนท้องถนน | <input type="checkbox"/> 2) สภาพอากาศ /มลพิษอากาศ |
| <input type="checkbox"/> 3) สภาพผิวถนน/ ไฟส่องสว่าง | <input type="checkbox"/> 4) อุบัติเหตุ/ ความปลอดภัยของชีวิต |
| <input type="checkbox"/> 5) การลักขโมยจักรยาน | <input type="checkbox"/> 6) ปัญหาอื่นๆ (ระบุ) |

13. ท่านต้องการให้มีการจัดทำทางจักรยานในพื้นที่ในเขตเทศบาลนครสงขลาหรือไม่

- | |
|---|
| <input type="checkbox"/> 1) ต้องการ |
| <input type="checkbox"/> 2) ไม่ต้องการ (เพราะ)..... |
| <input type="checkbox"/> 3) ไม่แน่ใจ |

14. ท่านคิดว่าในระยะต่อไปจำนวนผู้ใช้จักรยานเดินทางในพื้นที่เขตเทศบาลนครสงขลาจะมีแนวโน้มเป็นเช่นไร

- 1) เพิ่มขึ้น เพราะ.....
- 2) ลดลง เพราะ
- 3) ไม่แน่ใจ

ส่วนที่ 3. ทศนคติต่อการใช้จักรยานเดินทาง

โปรดทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับความคิดเห็นของท่าน

การใช้จักรยานมีผลดี หรือประโยชน์มากน้อยเพียงใด ในประเด็น ดังต่อไปนี้	มากที่สุด	มาก	ปานกลาง	น้อย	ไม่เห็นด้วย
1. ความสะดวก/ความคล่องตัว/ความรวดเร็วในการเดินทาง					
2. ความปลอดภัยจากอุบัติเหตุบนท้องถนน					
3. ความปลอดภัยจากการถูกลักขโมยจักรยาน					
4. การประหยัดค่าใช้จ่ายในการเดินทาง					
5. การได้รับสิทธิในการใช้ถนนร่วมกับยานพาหนะอื่น					
6. มีประโยชน์ต่อสุขภาพ อนามัย					
7. ช่วยรักษาสีสิ่งแวดล้อมจากเสียงและอากาศเป็นพิษ					
8. หาที่จอดได้ง่ายกว่าจักรยานยนต์และรถยนต์					
9. ราคาถูกกว่าจักรยานยนต์และรถยนต์					
10. ไม่มีความเครียดในการขับขี่เหมือนรถยนต์					
11. ค่าซ่อม บำรุงรักษาน้อยกว่ารถประเภทอื่น					

รูปแบบเส้นทาง

15. ถ้าจะมีการส่งเสริมให้มีการใช้จักรยาน ตามถนน 4 สายในแผนที่เพื่อการเดินทางและท่องเที่ยว ท่านจะมีความคิดเห็นอย่างไร



เมื่อคำนึงถึงสภาพแวดล้อมโดยรวมในพื้นที่แล้ว ท่านคิดว่าเส้นทางต่อไปนี้มีความเหมาะสมในการใช้จักรยานหรือไม่

ก. ความคิดเห็นในการใช้ เส้นทางที่ 1 (ถนนเก่าแสน-ถนนชลาทัศน์)

มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- 1)เหมาะสม เพราะ.....
- 2)ไม่เหมาะสม เพราะ.....

ความคิดเห็นในการใช้ เส้นทางที่ 2 (ถนนราชดำเนิน-ถนนแหลมสนอ่อน)

มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- 1)เหมาะสม เพราะ.....
- 2)ไม่เหมาะสม เพราะ.....

ข. ความคิดเห็นในการใช้ เส้นทางที่ 3 (ถนนทะเลหลวง-ถนนรามวิถี)

มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- 1)เหมาะสม เพราะ.....
- 2)ไม่เหมาะสม เพราะ.....

ค. ความคิดเห็นในการใช้ เส้นทางที่ 4 (ถนนนครนอก-กรมหลวงชุมพรฯ)

มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- 1)เหมาะสม เพราะ.....
- 2)ไม่เหมาะสม เพราะ.....

นอกจากถนน4สายดังกล่าวท่านต้องการให้มีการส่งเสริมในถนนสายใดอีกบ้าง

.....

16. ถ้าจะมีการสร้างทางจักรยานในเขตเทศบาลนครสงขลาควรก่อสร้างตามรูปแบบใดจึงจะเหมาะสม



16.1 ท่านเห็นด้วยหรือไม่

เห็นด้วย แบบที่ 1 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

เห็นด้วย แบบที่ 2 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

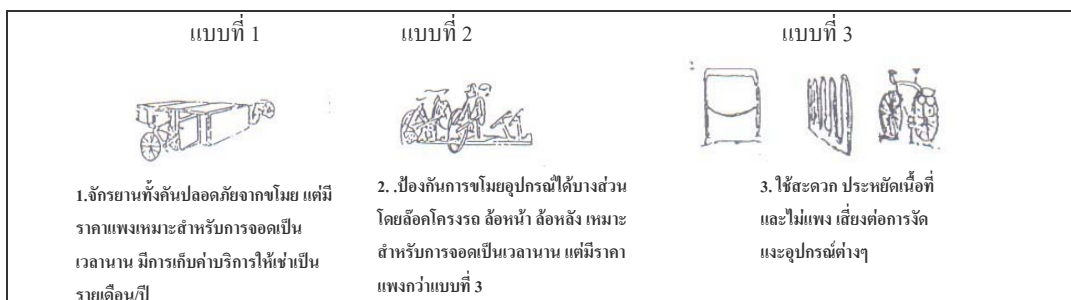
เห็นด้วย แบบที่ 3 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

เห็นด้วย แบบไหนก็ได้แล้วแต่ความเหมาะสม

17. สำหรับที่จอดจักรยาน ควรจะเป็นแบบใด.....(เลือกรูปประกอบ)



แบบสอบถามในการวิจัย (สำหรับนักท่องเที่ยว)

เรื่อง การใช้จักรยานของประชาชนและนักท่องเที่ยวในเขตเทศบาลนครสงขลา: เส้นทางจักรยานและรูปแบบทางจักรยานที่เหมาะสม

ส่วนที่ 1 : ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

1. เพศ 1)ชาย 2) หญิง
2. อายุ.....ปี
3. ภูมิลำเนาเดิมของท่าน (ระบุจังหวัด).....
4. อาชีพ

<input type="checkbox"/> 1) พนักงานบริษัท/ ลูกจ้าง	<input type="checkbox"/> 2) รับราชการ/ รัฐวิสาหกิจ
<input type="checkbox"/> 3) แม่บ้าน/ พ่อบ้าน	<input type="checkbox"/> 5) อื่นๆ(ระบุ).....
<input type="checkbox"/> 4) นักศึกษา/ นักเรียน	
5. ระดับการศึกษาของท่าน

<input type="checkbox"/> 1) ประถมศึกษา	<input type="checkbox"/> 2) มัธยมศึกษา
<input type="checkbox"/> 3) อาชีวศึกษา	<input type="checkbox"/> 4) ปริญญาตรี
<input type="checkbox"/> 5) สูงกว่าปริญญาตรี	<input type="checkbox"/> 6) อื่นๆ(ระบุ).....
6. รายได้ต่อเดือนของท่าน (ในกรณีที่เป็น นศ./นร. ให้หมายความถึงรายได้รายเดือนจากผู้ปกครอง)

<input type="checkbox"/> 1) น้อยกว่า 2,500 บ.	<input type="checkbox"/> 2) 2,500-5,000 บ.
<input type="checkbox"/> 3) 5,000-7,500 บ.	<input type="checkbox"/> 4) 7,500-10,000 บ.
<input type="checkbox"/> 5) มากกว่า 10,000 บ. ขึ้นไป (ระบุ).....	

ส่วนที่ 2 : พฤติกรรมการเดินทาง และรูปแบบเส้นทาง

7. ท่านเคยเดินทางมาท่องเที่ยวที่ เทศบาลนครสงขลามาก่อนหรือไม่

<input type="checkbox"/> 1) เคย.....ครั้ง	<input type="checkbox"/> 2) ไม่เคย
---	------------------------------------
8. ครั้งนี้ท่านเดินทางมาท่องเที่ยวที่เทศบาลนครสงขลาพร้อมกับใคร

<input type="checkbox"/> 1) ครอบครัว ญาติพี่น้อง	<input type="checkbox"/> 2) เพื่อน
<input type="checkbox"/> 3) อื่นๆ(ระบุ).....	<input type="checkbox"/> 4) มาโดยลำพัง
9. กลุ่มของท่านเดินทางมาที่เทศบาลนครสงขลาจำนวน..... คน

10. ท่านเดินทางมาที่เทศบาลนครสงขลาโดยยานพาหนะชนิดใด

- | | |
|--|--|
| <input type="checkbox"/> 1) รถยนต์ส่วนตัว | <input type="checkbox"/> 2) รถเช่าเหมา |
| <input type="checkbox"/> 3) รถโดยสารประจำทาง | <input type="checkbox"/> 4) รถบัสของบริษัทนำเที่ยว |
| <input type="checkbox"/> 5) รถไฟ | <input type="checkbox"/> 6) เรือ |
| <input type="checkbox"/> 7) รถมอเตอร์ไซด์ | <input type="checkbox"/> 8) อื่นๆ ระบุ..... |

11. ท่านพักผ่อนหรือไม่ เมื่อเดินทางมาเที่ยวที่เทศบาลนครสงขลา

- | | |
|--|--|
| <input type="checkbox"/> 1) พักค้างคืน จำนวน.....คืน | <input type="checkbox"/> 2) ไม่ค้างคืน |
|--|--|

12. ท่านใช้เวลาท่องเที่ยวภายในเทศบาลนครสงขลาประมาณเท่าใด

- | | |
|--|---|
| <input type="checkbox"/> 1) น้อยกว่า 2 ชั่วโมง | <input type="checkbox"/> 2) 2-4 ชั่วโมง |
| <input type="checkbox"/> 3) ครึ่งวัน | <input type="checkbox"/> 4) ทั้งวัน |

13. แหล่งท่องเที่ยวภายในเทศบาลนครสงขลาประเภทใดที่ท่านนิยมไปมากที่สุด (เรียงลำดับความนิยม โดยเขียนหมายเลข 1 ถึง 5 เมื่อ 1= นิยมมากที่สุด 2,3,4,5 รองลงมาตามลำดับ)

-หาดสมิหลา
-แหลมสนอ่อน
-เขาเก้าเส้ง
-เขาดังกวน
-พระตำหนักเขาน้อย
-พิพิธภัณฑ์สถานแห่งชาติ
-พิพิธภัณฑ์รามวงษ์
-ย่านเมืองเก่า
-อื่นๆ(ระบุ)

14. การเดินทางท่องเที่ยวภายในเขตเทศบาลนครสงขลาท่านใช้ยานพาหนะใดในการเดินทางไปยังแหล่งท่องเที่ยวต่างๆ (ตอบได้มากกว่า 1 ข้อ)

- | | |
|---|--|
| <input type="checkbox"/> 1) รถยนต์ส่วนตัว | <input type="checkbox"/> 2) รถเช่าเหมา |
| <input type="checkbox"/> 3) รถโดยสารประจำทาง | <input type="checkbox"/> 4) รถบัสของบริษัทนำเที่ยว |
| <input type="checkbox"/> 5) รถจักรยานสามล้อ/สามล้อเครื่อง | <input type="checkbox"/> 6) รถจักรยาน |
| <input type="checkbox"/> 7) รถมอเตอร์ไซด์ | <input type="checkbox"/> 8) อื่นๆ ระบุ..... |

15. ท่านเคยขี่จักรยานท่องเที่ยวภายในเขตเทศบาลนครสงขลาหรือไม่

- | | |
|---------------------------------|------------------------------------|
| <input type="checkbox"/> 1) เคย | <input type="checkbox"/> 2) ไม่เคย |
|---------------------------------|------------------------------------|

16. ท่านเห็นด้วยหรือไม่ในการใช้จักรยาน เพื่อให้นักท่องเที่ยวได้เข้าไปยังสถานที่ท่องเที่ยวต่างๆ
ภายในเขตเทศบาลนครสงขลา

1) เห็นด้วย

2) ไม่เห็นด้วย

3) ไม่แน่ใจ

ส่วนที่3. ทศนคติต่อการใช้จักรยานเดินทาง

โปรดทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับความคิดเห็นของท่าน

การใช้จักรยานมีผลดี หรือประโยชน์มากน้อยเพียงใด ในประเด็น ดังต่อไปนี้	มากที่สุด	มาก	ปาน กลาง	น้อย	ไม่เห็น ด้วย
1.ความสะดวก/ความคล่องตัว/ความรวดเร็วใน การเดินทาง					
2. ความปลอดภัยจากอุบัติเหตุบนท้องถนน					
3. ความปลอดภัยจากการถูกลักขโมยจักรยาน					
4. การประหยัดค่าใช้จ่ายในการเดินทาง					
5. การได้รับสิทธิในการใช้ถนนร่วมกับ ยานพาหนะอื่น					
6. มีประโยชน์ต่อสุขภาพ อนามัย					
7. ช่วยรักษาสีสิ่งแวดล้อมจากเสียงและอากาศเป็น พิษ					
8. หาที่จอดได้ง่ายกว่าจักรยานยนต์และรถยนต์					
9.ราคาถูกลงกว่าจักรยานยนต์และรถยนต์					
10.ไม่มีความเครียดในการขับขี่เหมือนรถยนต์					
11.ค่าซ่อม บำรุงรักษาน้อยกว่ารถประเภทอื่น					

7. ถ้าจะมีการส่งเสริมให้มีการใช้จักรยาน ตามถนน 4 สายในแผนที่เพื่อการเดินทางและท่องเที่ยว ท่านจะมีความคิดเห็นอย่างไร



เมื่อคำนึงถึงสภาพแวดล้อมโดยรวมในพื้นที่แล้ว ท่านคิดว่าเส้นทางต่อไปนี้มี ความเหมาะสมในการใช้จักรยานหรือไม่

ง. ความคิดเห็นในการใช้ เส้นทางที่ 1 (ถนนเก่าแสน-ถนนชลาทัศน์)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- เหมาะสม เพราะ.....
- ไม่เหมาะสม เพราะ.....

จ. ความคิดเห็นในการใช้ เส้นทางที่ 2 (ถนนราชดำเนิน-ถนนแหลมสนอ่อน)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- เหมาะสม เพราะ.....
- ไม่เหมาะสม เพราะ.....

ฉ. ความคิดเห็นในการใช้ เส้นทางที่ 3 (ถนนทะเลหลวง-ถนนรามวิถี)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- เหมาะสม เพราะ.....
- ไม่เหมาะสม เพราะ.....

ช. ความคิดเห็นในการใช้ เส้นทางที่ 4 (ถนนนครนอก-กรมหลวงชุมพรฯ)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)

- เหมาะสม เพราะ.....
- ไม่เหมาะสม เพราะ.....

นอกจากถนน 4 สายดังกล่าวท่านต้องการให้มีการส่งเสริมในถนนสายใดอีกบ้าง

.....

.....

.....

18.ถ้าจะมีการสร้างทางจักรยานในเขตเทศบาลนครสงขลาควรก่อสร้างตามรูปแบบใดจึงจะเหมาะสม(ดังรูป)



18.1 ท่านเห็นด้วยหรือไม่

เห็นด้วย แบบที่ 1 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

เห็นด้วย แบบที่ 2 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

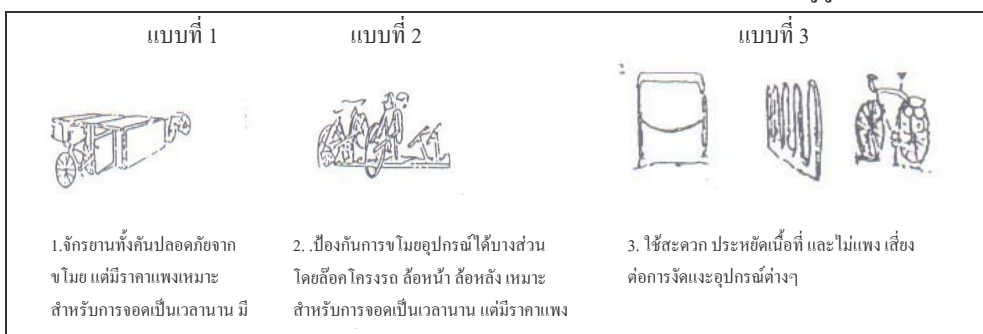
เห็นด้วย แบบที่ 3 เพราะ.....

เหตุผลที่ไม่เห็นด้วย

- 1. ไม่ปลอดภัยที่จะนำไปใช้
- 2. พื้นที่บนบาทวิถี/ถนนไม่พอ
- 3. จักรยานกีดขวางรถ/ คนเดินเท้า
- 4. สภาพแวดล้อมไม่เหมาะสม
- 5. อื่นๆระบุ.....

เห็นด้วย แบบไหนก็ได้แล้วแต่ความเหมาะสม

19. สำหรับที่จอดจักรยาน ควรจะเป็นแบบใด.....(เลือกรูปประกอบ)



แบบสอบถามในการวิจัย (สำหรับเจ้าหน้าที่เทศบาล)

1. ถ้าจะมีการส่งเสริมให้มีการใช้จักรยาน ตามถนน 4 สายในแผนที่เพื่อการเดินทางและท่องเที่ยว ท่านจะมีความคิดเห็นอย่างไร



1. ความคิดเห็นในการใช้ เส้นทางที่ 1 (ถนนเก้าแสน-ถนนชลาลัย)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)
 เหมาะสม เพราะ.....
 ไม่เหมาะสม เพราะ.....
2. ความคิดเห็นในการใช้ เส้นทางที่ 2 (ถนนราชดำเนิน-ถนนแหลมสนอ่อน)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)
 เหมาะสม เพราะ.....
 ไม่เหมาะสม เพราะ.....
3. ความคิดเห็นในการใช้ เส้นทางที่ 3 (ถนนทะเลหลวง-ถนนรามวิถี)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)
 เหมาะสม เพราะ.....
 ไม่เหมาะสม เพราะ.....
4. ความคิดเห็นในการใช้ เส้นทางที่ 4 (ถนนนครนอก-กรมหลวงชุมพรฯ)
มีความเหมาะสมในการใช้และจักรยานหรือไม่ (ดูแผนที่แสดงเส้นทางประกอบ)
 เหมาะสม เพราะ.....
 ไม่เหมาะสม เพราะ.....

ความคิดเห็นของเจ้าหน้าที่เทศบาลนครสงขลาเกี่ยวกับรูปแบบทางจักรยาน

รูปแบบที่ 1 ทางจักรยานร่วมกับทางรถยนต์ (Shared Roadway)



รูปแบบที่ 2 ช่องทางจักรยาน (Bike Lane)



รูปแบบที่ 3 ทางจักรยานบนทางเท้า (Sidewalk Bikeway)



รูปแบบที่ 4 ทางเฉพาะจักรยาน (Bike Path)



ในความคิดเห็นของท่าน ถนนแต่ละเส้นมีความเหมาะสมกับรูปแบบทางจักรยานแบบใด

ถนนเก้าเส้ง รูปแบบที่.....เพราะ.....

ถนนชลาทัศน์ รูปแบบที่.....เพราะ.....

ถนนราชดำเนิน รูปแบบที่.....เพราะ.....

ถนนแหลมสนอ่อน รูปแบบที่.....เพราะ.....

ถนนทะเลหลวง รูปแบบที่.....เพราะ.....

ถนนรามวิถี รูปแบบที่.....เพราะ.....


ถนนนครนอก รูปแบบที่.....เพราะ.....

ถนนบริเวณกรมหลวงชุมพรฯ รูปแบบที่.....เพราะ.....



ขอขอบพระคุณเป็นอย่างสูง
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