In Thailand, paratransit plays a role as the dominant transport mode in many urban areas. Specially, Songtaew or a modified pick-up truck taking passengers on the back with an overhead cage and two row seats in the back that can accommodate up to 20 passengers, operates as a main public transport mode in many medium-sized cities of Thailand. This mode is popular because it is more flexible and cheaper than other transport modes particular for students who have limitation on mode choice selection. However, the study on school trip have not yet well understood. Therefore, the main objective of this paper is to investigate user perception of Songtaew service focusing on examining the journey to school of the high school students in Khon Kaen City, the capital of the Northeast region. In the absence of statistics regarding school trip making in the city, a questionnaire survey has been undertaken to determine demographics, mode of travel to school, travel cost and duration, factors influencing transport modes of school travel and the student satisfaction with Songtaew service. Based on the analysis, the most of senior high school students who already have motorcycle license going to school by motorcycle. On the other hand, the junior high school students travel to school by taking Songtaew more than the other modes. For the student satisfaction with Songtaew service, the overall satisfaction reflects that generally all students who use Songtaew going to school are satisfied with Songtaew service. This study also recommend the future study more about the improvement of Songtaew regarding impact factors on their satisfaction, in order to maintain existing student users and attract new passengers. This improvement will make Khon Kaen City more sustainable and reduce the use of private vehicle especially motorcycle in the future.

Key Words: paratransit, Songtaew, school travel pattern, satisfaction, Khon Kaen, Thailand

1. INTRODUCTION

Currently, paratransit or informal public transport is a predominant urban public transport mode in developing countries\(^1\), \(^2\), \(^3\), \(^4\), especially in Thailand where has various types of paratransit such as motorcycle-taxi, Tuk-tuk, Songtaew, and Silor-lek. Specially, Songtaew or a modified pick-up truck taking passengers on the back with an overhead cage and two row seats in the back that can accommodate up to 18 passengers or more, operates as a main public transport mode in many medium-sized cities...
Studies regarding paratransit in Thailand are mainly concerned with issues such as the role of paratransit focusing on service characteristics, service quality and user satisfaction of the service specially in Bangkok area. This study is the first attempt to focus on the role of Songtaew service in the medium-sized cities in Thailand for identifying the user perception of Songtaew service which is popular mode in city and particular for students who have limitation on mode choice selection. However, the study on school trip pattern have not yet well understood \(^5\), \(^6\), \(^7\).

The main objective of this paper is to investigate the role of Songtaew service focusing on examining the users perception of the journey to school in the city. Therefore, this paper corroborates the authors’ hypothesis regarding the decision of selecting the transport mode for going to school that there is a significant difference decision among the students who have vehicle licenses such as motorcycle license about the school travel pattern in Khon Kaen City.

This paper begins by providing the background and motivation of the study, followed by some brief information about Songtaew in Khon Kaen, the research methodology, the data collection and the results. Finally, the paper concludes with the findings of the school travel pattern and the Songthaew satisfaction focusing on students’ perception.

2. BACKGROUND AND MOTIVATION

Songtaew in Thailand is modified from a pick-up or a larger truck with two rows of seats in the back carrying about 20 passengers. Presently, Songtaew provides passenger movement in both within towns and cities and for longer routes between towns and villages. Moreover, Songtaew is known as one of the major means of transportation in the urban areas and even in the rural areas in Thailand. This mode is popular in Thailand because of its intermediate size which can easily move around the area in the city. Furthermore, Songtaew is more flexible and cheaper than other transport modes in many cities of Thailand. The price is usually between 5 or 10 baht per journey. As a result of the large number of population in Thailand, the number of registered Songtaew has been increased substantially in many cities such as Nonthaburi, Hat Yai, Nakorn Ratchasima, Chiang Mai, Khon Kaen, Chonburi and Nakhon Si Thammarat.

In Bangkok, Songtaew is a ride-sharing pick-up truck because of the lack of the bus service along local street \(^9\) and plays an important role as a feeder of mass transit system especially the Metropolitan Rapid Transit (MRT) and the Bangkok Mass Transit System (BTS) \(^5\).

In cities especially in the regional capitals and medium-sized cities of Thailand Songtaew operates as a main urban public transport which is served areas along the main and local street with fixed route.

According to the future planning for urban public transportation in medium-sized cities of Thailand, Khon Kaen, Chiang Mai, and Nakorn Ratchasima are interested and in the process of BRT planning. The feasibility studies have been already studied in those cities, but only Khon Kaen City has been in the process of detail design \(^7\).

This research is focusing on the role of Songtaew in Khon Kean City where there are the studies only about the new transport mode, BRT, and the preparation progress of BRT is fastest among the other cities but the existing urban transport mode, Songtaew in Khon Kaen, has not been studied about the possibility of Songtaew service continuing in the future yet, especially the studies related to its role in Khon Kaen urban transport and its user perception \(^7\).

Moreover, according to the literature review, this study is the first attempt to use public perception focusing on students who are considered as the main user of Paratransit in many developing countries \(^4\), \(^9\), including Songtaew in Thailand to explore and investigate the role of the public transportation mode. Nevertheless, there is the lack of studying related to the user perception of Songtaew in Thailand.

Therefore, this study would be useful to Khon Kaen City for motivating Songtaew use in the future.
by exploring the current travel situation in Khon Kaen City and the current student perception who are the major Songtaew use of the city.

3. OVERVIEW OF SONGTAEW IN KHON KAEN

Based on the existing public transport information studied in 2013 by Jaensirisak, there are a total of 13 Songtaew service routes in Khon Kaen City which are operated by the private sector. This study can be summarized as follows: the average number of hours of work is 12 hours; the average fare is 5-10 Baht; Songtaew dispatch frequency is every 10 minutes; the average net income per day is 320 Baht; the average maintenance costs is 8,600 Baht per year; the average maintenance costs is 8,600 Baht per year; the highest expense on fuel is 500 Baht per day and the most frequent drop-off spot is Khon Kaen Bus Station7).

As shown in Table 1, Songtaew can accommodate up to 20 passengers on any trip. Furthermore, the travel time for one way trip is 50 minutes and the average route length of Songtaew operated in Khon Kaen City is 18 kilometers. Moreover, the daily hours of operation for all service routes of Songtaew are almost same. The number of service round per day is ranged from three trips per day to eight trips per day. The daily fuel costs is ranged from 300 to 500 Baht which most of the fuel used is diesel, CNG, and LPG, respectively. For the maintenance costs, it is shown that Songtaew’s maintenance costs for all service routes are ranged from 5,000 Baht to 9,600 Baht. Moreover, some cost elements such as routing costs, fuel costs, and maintenance costs are very wide range depending on the route length of each route.

In Khon Kaen City, there is one type of Songtaew which is modified from a pick-up truck such as Toyota Hilux, ISUZU D-MAX, ISUZU D-LUX, etc. which can accommodate more than 20 passengers and operates as a hail and ride service on fixed-route. Furthermore, based on the field survey in August 2015, there are a total of 19 Songtaew service routes in Khon Kaen City which are operated by the private sector and local government.

4. RESEARCH METHODS

A comprehensive field survey of students was carried out for investigating the school travel patterns and the satisfaction with Songtaew service of the high school students in Khon Kaen City.

To study the travel patterns and the satisfaction, we analyze results from a questionnaire survey which conducted among the junior and senior high school students in Khon Kaen City, in order to examine their school travel patterns and measure their satisfaction with the Songtaew service provided. The surveys were carried out on interviewing randomly selected students in high school where located in Khon Kaen City. Then data were analyzed through percentage, cross-tabulation, Chi-square statistical techniques and multiple regression analysis for testing the hypotheses and examining the school travel pattern and the Songtaew perception for the users and the non-users.

5. DATA COLLECTION

Students from high school both junior (13-15 years old) and senior (16-18 years old) high school students in Khon Kaen City were sampled as respondents in August 2015. They were asked personally by the surveyors at their schools.

The questionnaire items were devised into three components: (1) general information such as gender, age, occupation, driving license, car and motorcycle use, experience with Songtaew (ST), number of trip using Songtaew, and loyalty to keep using Songtaew in the future. (2) detailed information on the school travel patterns such as travel mode, travel time, location of departure and alighting of the public transport (Songtaew) as well as its route number, walking time from home to the bus stop, waiting time, in vehicle time, and transport cost, and (3) student satisfaction with Songtaew service relating to the factors which are availability, information, safety, cost, waiting time, in vehicle time, comfort, flexibility, and image of Songtaew were consisted in the final part of the questionnaire. These factors were measured in four-point Likert-type format from 1 (Very dissatisfied) to 4 (Very satisfied).

As shown in Table 2, the majority of respondents (n=202) is female (69.3%). Furthermore, the most of respondents are the senior high school students who have motorcycle driving license 20.3 % of the total number of them. However, among the total respondents there was 86.1 % who do not have driving license and this group is the dominant users who
select Songtaew as their urban transport mode for going to school.

For the characteristic about experience with Songtaew, it is shown that there are the respondents who use Songtaew 75.7% and the respondents who do not use this mode or the non-users 24.3%. Moreover, the non-users selects motorcycle as their transport mode because the most of them have motorcycle driving license and riding motorcycle is more convenient for them than using Songtaew then they prefer motorcycle more than Songtaew.

Considering about the loyalty users who want to keep using Songtaew in the future, it revealed that 78.4% of the user of Songtaew expressing their attitude toward still using Songtaew in the future even there will be a new transport mode like Bus Rapid Transit (BRT).

6. RESULTS
The results of this study are presented under two sub-headings: travel patterns; and satisfaction on Songtaew Service.

(1) Travel patterns of school trip
The school travel patterns, in terms of mode of transport, as shown in Fig.1 indicated that 72.28% of the high school students travel to school by Songtaew (the junior high school students 39.11% and the senior high school students 33.17%). The use of motorcycle accounted for just 11.88%, car 0.5% while those who are escorted to school by their parents were only 15.35%.

The large percentage of high school students that use Songtaew for going to school are due to various factors as shown in Table 3, they considered about the cost of travel, the service flexibility, and the service availability, respectively as the most important factors for using Songtaew. Conversely, the non-users considered about the safety in the vehicle, the convenient, and the service reliability, respectively.

For the average commuting time to school, the finding revealed that it was longer for Songtaew users (public transport users) than for private car users. It took Songtaew users about 40 minutes longer than private car users to get to school which took about 20 minutes.

These differences may be due to the fact that the Songtaew users have to take more time on walking to the bus stop, waiting for the Songtaew and taking the time in the vehicle. On the other hand, the private car users take time only in the vehicle from their home to school.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Statistics</th>
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<tbody>
<tr>
<td>1. Gender</td>
<td>Male (30.7%), Female (69.3%)</td>
</tr>
<tr>
<td>2. Age</td>
<td>&lt; 15-year-olds (39.1%), 15-20-year-olds (60.9%)</td>
</tr>
<tr>
<td>3. Occupation</td>
<td>Junior high school student (51%), Senior high school student (49%)</td>
</tr>
<tr>
<td>4. Driving license</td>
<td>None (86.1%), Motorcycle (11.9%), Car (0.5%), Both (1.5%)</td>
</tr>
<tr>
<td>5. Motorcycle (MC)</td>
<td>Do not drive MC (79.7%), drive MC (20.3%)</td>
</tr>
<tr>
<td>6. Car driving</td>
<td>Do not drive car (94.4%), drive car (5.6%)</td>
</tr>
<tr>
<td>7. Experience with</td>
<td>ST non-user (24.3%), ST user (75.7%)</td>
</tr>
<tr>
<td>8. Number of trip</td>
<td>&gt;3 days/weeks (87.6%), 1-2 days/weeks (4.6%), weekend or holiday (3.9%), few per month (1.3%)</td>
</tr>
<tr>
<td>9. The loyalty to keep</td>
<td>78.4%</td>
</tr>
</tbody>
</table>

The relationship between driving license holding and school travel mode selection was also examined. According to Fig.2 and Fig.3, they revealed that 86.1% of the high school student has no driving license. Because of this reason made them choose to use Songtaew travel to school more than 60%.

Only 1.49% of the students who have both motorcycle and car licenses. Although they have both driving licenses, but they still travel to school by Songtaew. Some of them claimed that Songtaew is cheaper and more flexible than the other modes.
Thus, they choose Songtaew as their main transport mode going to school everyday.

Furthermore, Chi-square analysis revealed that there is a significant difference for the transport mode selection among the students who have vehicle licenses especially motorcycle license, P-value < 0.05.

According to Fig.4, most of senior high school students who have motorcycle license going to school by motorcycle. On the other hand, the junior high school students have gone to school by taking Songtaew more than the other modes. Therefore, there is a totally difference in mode choice among the students who have motorcycle driving license and the students who do not have motorcycle driving license, younger than 15 years old.

(2) Satisfaction on Using Songtaew Service

This section, Table 4 and Table 5 list the three attributes users and non-users were most satisfied and least satisfied with Songtaew service. These were derived from the detailed important ratings of each attribute.

From the satisfaction survey results in Table 4 and Table 5, they revealed that the Songtaew users were most satisfied with the cost of travel, the flexibility of the service, and the comfort in the vehicle, respectively. It is not surprising that the users were generally satisfied with the fare of Songtaew, since it is cheaper than other modes (5-10 Baht per trip).

Moreover, the users were least satisfied with the waiting time for using service, the safety in the vehicle, especially about picking up the passengers more than the capacity, and the service information, respectively.

For the non-users satisfaction survey results, it is shown that the non-users were most satisfied with the cost of travel, the availability of the service, and the vehicle standard, respectively. Similarly, non-users were satisfied with the songtaew fare which is cheap for transport cost as well as the users. On the other hand, the non-users were least satisfied with the safety in the vehicle, the service reliability, and the service information, respectively.

The results of the non-users highlight that they were least satisfied with Songtaew safety, then this factor is most important to them for shifting the transport mode from private vehicle to Songtaew. Nevertheless, the safety issue is reported due to the reckless driving and picking up the passengers more than the vehicle capacity. Therefore, safety is the most important factor for the non-users who intend to decide to select Songtaew as their transport mode in the future. Furthermore, the result of multiple regression analysis in Table 6 and Table 7 showed the important factors influencing the overall trip satisfaction of Songtaew use in Khon Kaen City. By using stepwise method with PIN 0.25 and POUT 0.3, the best set of predictors was finally found. Moreover, regarding the previous studies examining trip satisfaction that also employed regression analysis display comparable adjusted R² values

The finding about the perception for the users in Table 6 indicated that the fare of Songtaew which is cheaper than other modes and the convenience of the service had a significant effect on the Songtaew user satisfaction. Turning to the perception for the non-users in Table 7, the result of multiple regression analysis also explained the factors influencing the comprehensive perception of Songtaew service.

The reliability of the service and the comfort of the service are the important factors which had a sig-
significant influence on their perception about Songtaew service in Khon Kaen City.

This indicated that non-users do not select Songtaew as their transport mode because of two important reasons which are (1) they cannot predict the total travel time since the waiting time is too long and there is no service time schedule and Songtaew seats are uncomfortable and they do not like to sit close to other users.

As a result of multiple regression analysis, it highlighted that the cost and the convenience have strongly a positive impact on the decision to commute by Songtaew for the users because most of them is the junior high school students who have no driving license especially motorcycle driving license. Thus, they have a limitation on mode choice, then they prefer Songtaew because it is cheaper than other modes.

On the other hand, the reliability and the comfort have strongly significant effect on the decision for not using Songtaew for the non-users. Most of the non-users, they prefer motorcycle for going to school because it is more comfortable than Songtaew and it took them about 10-20 minutes shorter than the users of Songtaew which make them can predict their travel time for going to school.

7. CONCLUSIONS

Based on the questionnaire survey, there are 19 routes were identified for respondents who are students using Songtaew travel to high schools in Khon Kaen City. The findings revealed that the present main modes of travel to school in Khon Kaen City are Songtaew, car, and motorcycle, respectively.

There are also exist significant difference in mode choice among the students who have driving licenses and the students who have no driving licenses, younger than 15 years old.

As a result, the most of senior high school students who already have motorcycle license going to school by motorcycle. On the other hand, the junior high school students travel to school by taking Songtaew more than the other modes.

The findings about the satisfaction also indicated that the students who use Songtaew for going to school in Khon Kaen City have different satisfaction among the students who always use Songtaew and the others who usually use motorcycle but sometimes using Songtaew regarding the characteristics of them such as gender, age and the status of holding the driving license.

The overall satisfaction reflects that generally all student users are satisfied with Songtaew service because of the the cheap fare and the convenience of the service. Moreover, the reliability and the comfort have strongly significant effect to the non-users on the decision for not using Songtaew.

According to the result, it is shown about the current travel situation in Khon Kaen City and the current people perception on Songtaew service which would be the good fundamental data for motivating Songtaew use in the future.

For the further work, it is necessary to better understand travelers’ behavior and improve its service for contributing to motivate modal shift by studying
more about the other groups of Songtaew users such as the workers. Moreover, the approach to be taken before considering modal shift is to identify their travel behavior through analysis of mode choice model to identify significant factors tending individuals to decide travel mode in Khon Kaen City.

These studies would be helpful for developing an appropriate policy relating to the improvement of Songtaew service, in order to maintain existing users and attract new passengers. This improvement will make Khon Kaen City more sustainable and reduce the use of private vehicle in the future.

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