Visitor's familiarity with road network in a tourism town: A case study of Patong Beach, Phuket

Paper Identification number: SCS12-003
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Abstract

Familiarity with the urban road network not only reduces the uncertainty associated with route diversion but also abridges the traffic congestion, vehicle emission etc. Visitors who have high level of familiarity with the road network are supposed to be attaining well informed decision related to route selection, route guidance etc. Furthermore, it also helps them to react with the perceived condition avoiding the delay, travel time and travel cost. Thus the main purpose of this study is to determine the factors affecting the familiarity of the visitors in tourism town. For this, Patong Beach of Phuket, Thailand is selected as project study area where the researchers conducted an interview of more than 300 visitors (questionnaire survey). Similarly two models via Regression analysis and Multimodal logit are used to analyze the selected variables obtained from data collection. The result from the models shows that familiarity level depends upon the more numbers of days visitors staying in the tourism town, visitors using bus to travel, visitors residing in Thailand, Male, Young people travelling and occupation as Doctors & Engineers.

Keywords: Familiarity, Patong Beach, Visitors, Road network, Tourism

1. Introduction

Visitor's familiarity with the road network in a tourism town is an essential component in route-diversion and guidance. Visitors who have higher level of familiarity with the network layout are supposed to make well informed decision related to route selection, and other daily travel oriented decision (Srinivasan *et al*, 1994;Bonsall,1996). Familiarity with a destination has been treated as a one-dimensional which is operationalized as a combination of amount of information and previous experience, including multiple visits (SeyhmusBaloglu, 1999).

Baloglu in 2001 defined three types of familiarity as multidimensional. The first one was informational: the extent of source of information used, operationalized as single or multiple sources. The second was experiential: the extent of past experiences, operationalized as first-timer or repeater.The third type was self-rated: how familiar respondents thought themselves to be with a place. Prentice (2003) added a fourth type to this typology. This may be termed as educational: the extent of personal educational involvement with a place.

Tsippy Lotan,1995 presented a research about the effect of familiarity on route choice behavior in the presence of information. According

to the author, familiarity is a compound factor and encompasses interactions of personal characteristics with route and trip attributes. With this fact, familiarity can be divided into two group's viz. familiarity with road network and familiarity with the information system.

Figure no.1 shows the static level to knowledge of the network structure and infrastructure that includes knowledge of routes in the network, type of roads and available facilities. More dynamic familiarity with the network relates to knowledge of traffic conditions and network performance (e.g. traffic composition and density, and travel speeds). Finally, the utmost level of familiarity is achieved by actual experience, which combines static and dynamic knowledge.
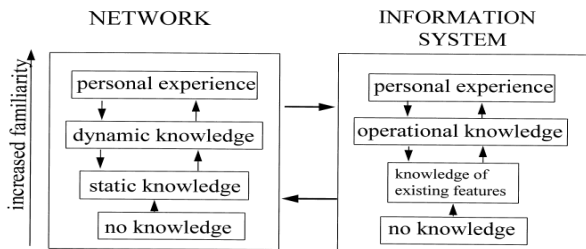
Fig. 1 The example of the figure in this paper

The importance of familiarity on modeling route choice behavior in the presence of information has been lately recognized by several researchers. Adler and McNally in 1994 investigated effect of familiarity on route choice behavior using FASTCARS driving simulators. Their results indicated a significant influence of familiarity on drivers' behavior and performance; however, some of the results are influenced by the use of a hypothetical network. Lotan in 1997 addressed the influence of network familiarity on driver's route choice behavior where familiar driver and unfamiliar driver exhibited different behavioral pattern. Most specifically, unfamiliar drivers showed a uniform distribution of alternative routes while familiar driver showed distinct preference among provided alternatives.

The relationship between familiarity and destination image is developed by destination familiarity index (composite of experiential and informational familiarity). The index can be used as a dependent or independent variable to examine the correlates with destination familiarity (Seyhmus Baloglu, 1999).

Benefit of visitors' familiarity can be explained in terms of the reduced traffic congestion and consequently reduced levels of vehicle emissions. Moreover familiarity with the urban network reduces the uncertainty associated with route diversion. Visitors having high level of familiarity are more likely to select efficient routes and are able to react the perceived conditions avoiding the delay, travel time and travel cost (Mohammad M Hamed). Therefore the main purpose of this study is to determine the factors affecting familiarity of the visitors in Tourism town.

Furthermore, it can be expected that this study have crucial benefits on the place like Patong beach where the chances of Tsunami are more likely to occur. Many foreigners lost their lives in such casualties with different degree of severity. Hence, this study not only avails to measure the degree of familiarity of the area but also provide the insight evacuation behavior.

2. Methodology and Findings

The project study area is the town of Patong on Phuket Island, Thailand. Patong is located in west coast and which is one of the most famous tourist places in Thailand. The town covered 16.4 square kilometers with a 3.5 kilometers long beach. The total population of Patong was 18,423 persons in April 2008. There was no report on the exact number of visitors of Patong city. However, as many as 4.7 million tourists were reported to visit Phuket in 2007, with 3.1 million foreigners and 1.5 million Thais.

The researchers conducted an interview of more than 300 local Thais and foreigners randomly selected from the Patong area both at the beach front as well as on the city road network. The questionnaire queried personal data of the respondents (including gender, age, physical condition, education, Thai language skill and the length of stay in Patong), their familiarity with the Patong area, and their regular mode of travel while in Patong. The final sample includes 306 respondents, consisting of 125 Thais and 182 foreigners. The distribution of characteristics of the sample, categorized by local Thais and foreigners are shown in Table 1.

Thai respondents consisted of slightly more male than female. Over 90 percent of Thai respondents were in the age group of 19 – 59 years old with very few teenagers and persons older than 60 years old. They were predominantly high-school graduates, followed by Bachelor degree holders and junior high-school graduates. Most of them rated

their Thai language skills as fluent and fair. Almost 80 percent of them stayed in Patong area for more than 1 year, while approximately 15 percent stayed in Patong less than 1 month. More than 80% of Thai respondents usually use private vehicle to travel in the Patong city area. The group of foreigner respondents comprises of 61.5 percent male and 38.5 percent female.

Table 1 The result of questioner survey

	Thai		Foreigners	
Total no. of sample	**125**		**182**	
Characteristics	**Number**	**%**	**Number**	**%**
Sex				
Female	58	46.4	70	38.5
Male	67	53.6	112	61.5
Age group				
<19 yrs.	7	5.6	7	3.8
19-29 yrs.	54	43.2	66	36.3
30-59 yrs.	62	49.6	92	50.5
>60 yrs.	2	1.6	17	9.3
Education				
Primary – Junior Hi school	33	26.6	6	3.4
Hi school/associate	53	42.7	79	44.1
Bachelor	37	29.8	65	36.3
Master – Ph.D.	1	0.8	29	16.2
Thai Language Skill				
None	0	0.0	146	80.2
Barely	9	7.2	27	14.8
Moderate	10	8.0	4	2.2
Fair	30	24.0	3	1.6
Fluent	76	60.8	2	1.1
No. of days in Patong in the past 5 years				
< 5 days	13	10.9	72	39.6
5 days – 1 month	4	3.4	70	38.5
1 month – 6 month	3	2.5	23	12.6
6 month – 1 year	6	5.0	11	6.0
> 1 year	93	78.2	6	3.3
Trip purpose to Patong Beach				
Tourism/recreation	9	7.2	163	91.1
Business	0	0.0	12	6.7
Residence	114	92.8	4	2.2
Countries of residence				
Thailand	125	100.0	0	0.0
Asia	0	0.0	23	12.6
Europe	0	0.0	115	63.2
United State	0	0.0	22	12.1
Others	0	0.0	22	12.1
Usual Mode of Travel				
Private car/motorcycle	102	82.3	20	11.0
Rental car/motorcycle	8	6.5	87	47.8
Bus/Songtaew	4	3.2	24	13.2
Motorcycle taxi	3	2.4	10	5.5
Others	7	5.6	41	22.5

Similarly to Thai samples, they were predominantly in the age group of 19- 59 years old but with almost 10 percent of persons older than 60 years old. Foreigners tend to receive a higher education than Thai counterparts as 36.3 percent finished their Bachelor degree, and 16.2 percent completed a post-graduate degree. Only 5 percent of foreigners claimed themselves as moderate to fluent Thai languages, while the majority of them barely had or did not have any Thai language skills. More than 90 percent of them visited Patong as tourists, while almost 80 percent stayed in Patong less than 1 month. Majority of the foreigner respondents were from Europe, and the rest were equally split among Asia, the United States, and others continent. Their modes of transport in Patong included a rental vehicle (47.8 percent), bus (13.2 percent), private vehicle (11 percent) and motorcycle taxi (5.5 percent).

The first model we use in our study is multiple regression analysis. It is a statistical technique that allows us to predict someone's score on one variable on the basis of their scores on several other variables. When using multiple regressions in psychology, many researchers use the term "independent variables" to identify those variables that they think will influence some other "dependent variable". We prefer to use the term "predictor variables" for those variables that may be useful in predicting the scores on another variable that we call the "criterion variable".

From a general form of a linear regression model

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + ... + \beta_k x_{ik} + \varepsilon_i$$
$$(i = 1,2, …, n ; n>k) \tag{1}$$

Where: Y is a dependent variable

X_i is an independent variables *1, 2,..., n.*

β_0 is a y-intercept of the regression equation.

$\beta_1 - \beta_n$ is the regression coefficient for the relevant independent variables.

The regression coefficient of model can be calculated by using the ordinary least square method. In linear regression, the parameter β_i is the slope of the regression line and it represents the expected change in *y* for a unite increase in x_i. While the parameter β_0 is represent the expected value of y when all x_i are zero. The process tries to find the best set of the coefficients that minimizes the sum of squared errors between the predicted output ($\hat{Y}_i$) and the desired output (Y_i), as shown in Equation (2).

$$\text{Min}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2 = \text{Min}\sum_{i=1}^{n}(Y_i - \beta_0 - \beta_1 X_{i1} - ... - \beta_{p-1} X_{i,p-1})^2 \tag{2}$$

Likewise as a second model of our study, the statistical analysis uses the following multi logit model, as three mutually exclusive categories of level of familiarity (unfamiliar, medium familiar and high familiar) are to be explained:

$$U(level.of.familiar) = e^{\beta_0 + \sum_{k=1}^{k} \beta_k X_{ik} + \varepsilon_i} \tag{3}$$

The β terms are the parameters to be estimated and measure the level of familiar variables 'X$_k$' on the above utility function. The subscript 'i' denotes a respondent, and the ε_i are random error terms.

The factors affecting familiarity can be Thai skill, number of day stay in town, occupations, nationality, age, vehicle used, purpose of stay, education. Gender, status etc. Out of these variables, we expect the variables of positive sign can be gender (male), age(less than 20 and more than 60), education (except junior high school), occupation (business owner, police army, doctors, engineers) , country (only Thailand) , Thai skill , number of days stay in Patong (3-4 months), vehicle used (private car and bus).

2.1 Regression Analysis

The multiple regression equation can be written as:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n \tag{4}$$

Thus, the level of familiarity model in this study is in the form of:

$$LV\_FAM = \beta_0 + \beta_1 \ln(NO\_DAY) + \beta_2(THAILAND) + \beta_3(BUS) \tag{5}$$

Where: NO_DAY is the number of day staying in Patong beach

LV_FAM is the familiarity of visitors in Patong Beach

THAILAND is the country of visitors (Dummy variable)

BUS is mode of transport

From the Table1, the enlisted regression coefficients of model in each independent variable

affect the level of familiarity in Patong beach. As the coefficient for Thailand is strongly significant, we can say people of Thai nationality are more familiar. Secondly the number of days staying in Patong beach influence the familiarity level as it has second highest significance level. Simply saying, familiarity increase as visitors spent long time in the area. Furthermore, visitors using bus only are familiar than using other types of vehicle as it has positive coefficient. If people travel by bus, they can see traffic sign, hoarding boards and perhaps can remember the route to where they are going (Both Static and dynamic). But when they travel by car they might be only familiar to the traffic condition and network performance (dynamic knowledge only).

Table 2 The result of regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t-statistic	p-value
	β	std. Error			
Constant	0.692	0.205	-	3.371	0.001
NO_DAY	0.002	0.001	0.193	2.928	0.004
THAILAND	4.538	0.723	0.411	6.277	0.000
BUS	1.031	0.469	0.144	2.201	0.029

$$LV\_FAM = 0.692 + 0.002\ln(NO\_DAY) + 4.538(THAILAND) + 1.031(BUS) \quad (6)$$

The the multicollinearity among the independent variables are very less. This implies that selection of independent variable for the given model is not related to each other and can say the model is good to ascertain its influence in familiarity.

2.2 Multi Logit analysis

The explanatory variables are classified into 2 type, including alternative-dummy variable (ASD) and alternative-specific constant (ASC). TH_skill (Thai skill) is ASD, 1 for they are none Thai skill and 0 for other. No_day (number of day stay in Patong beach area) is ASD, 1 for the stay less than two week and 0 for other. Dr_Engr (doctor or engineer) is ASD, 1 for they are doctor or engineer and 0 for other. Thai is ASD, 1 for they are Thai and 0 for
other. Male is ASD, 1 for they are male and 0 other. buses is ASD, 1 for they travel by bus and 0 for other. Lastly, young is ASD, 1 for young people and 0 for other.
Thus, the level of familiarity model in this study is in the form of:

$$U(unfamilir) = e^{\beta_0 + \beta_1(TH\_skill) + \beta_2(No\_day)} \quad (7)$$
$$U(median-familir) = e^{\beta_3 + \beta_4(Dr\_Engr) + \beta_5(Thai)} \quad (8)$$

$$U(high-familir) = e^{\beta_4(Dr\_Engr) + \beta_6(male) + \beta_7(young) + \beta_8(buses) + \beta_9(Thai)} \quad (9)$$

The positive parameter for all variables in different level of familiar with 90% confident is shown in three equations above. Table 4 shows the result indicating level of significant to their corresponding parameter. The utility of unfamiliar includes TH_skill and No_day as shown in equation (6).Thai language skill and number of days of traveler have high statistical significance to unfamiliarity which corresponds 97% confident. This shows those visitors lacking Thai language skill and staying less than 2 weeks are not familiar to the existing road network. If the visitors are well skilled in Thai language, they can interact with local people can get more information of the place by reading sign and hoarding board. Also staying more than 2 weeks can make them intimate with the route and places making them confident to travel alone without guidance. If visitor is Engineer or Doctor, level of familiarity slightly deviate towards higher level which can be justified by their 90% confident. It might be because they tempt to get more information during travel. Similarly we tested the familiarity level between male and female assuming that male are much more familiar than female. The result shows the assumption significant as well. It might be in the sense that usually male travel more than female. The age of the traveler is the best variable of the analysis because it strongly effect to the level of familiarity

with 99.99% confident and the coefficient is the highest among others. From this fact, young people of age 20-29 seems much more familiar than others and hence it looks practically alright as young people can perceive more information, analyze the situation quickly, can memorize the place where they have been in past.

It is interesting to note that the observed private car conditions turned out to be not significant. In the other world, when the tourist drives a car, it has no effect to level of familiarity whereas the buses possess high effect to level of familiar with 99% confident.

Table 3 The of logit model

Variable(X)	Parameter estimate β	Standard Error	Significance
Constant of familiar	3.5862	1.1594	0.0020
Constant of median-familiar	3.0620	1.0575	0.0038
Non-Thai skill	1.0111	0.4703	0.0316
Number of day less than 2 week	1.1937	0.5686	0.0358
Engineer or doctor	1.0903	0.6341	0.0855
Thai	1.4634	0.7924	0.0648
Male	1.6112	0.7806	0.0389
Young (20-29 years old)	2.1491	0.7440	0.0036
Buses	2.2204	0.8592	0.0098
Log-likelihood with constant only	-114.5249		
Log-likelihood with constant and 7 variables	-96.5386		
R-suq	0.5399		

$$U(unfamilir) = e^{3.5862+1.0111(TH\_skill)+1.1937(No\_day)} \quad (10)$$

$$U(median-familir) = e^{3.052+1.0903(Dr\_Engr)+1.4644(Thai)} \quad (11)$$

$$U(high-familir) = e^{1.0903(Dr\_Engr)+1.6112(male)+2.1491(young)+2.2204(buses)+1.4633(Thai)} \quad (12)$$

Where: TH_skill is the skill of Thai language (1 or 0)

No_day is number of day stay in Patong (1 or 0)

Dr_Engr is engineer or doctor (1 or 0)
Thai is Thai nationality (1 or 0)
Male (1 or 0)
Young is age of people (1 or 0)
Buses is travel by bus (1 or 0)

3. Conclusion

The study investigated about the familiarity level of visitors in Patong beach based on the two models. From regression analysis it is concluded that familiarity level depends on number of days stay, buses and Thailand. However the result from logit model we have three alternatives where factors affecting unfamiliarity are Non thai skill and No. of days staying in patong beach. Moreover factors affecting medium familiar are Engineer and Doctors & Thai people. Likewise factors that act

upon high familiarity are Male, young people, Buses, Thai people and Engineer & Doctors.
The similarity between two models can be expressed in terms of its common variables as Buses and Thai people with more number of days stay. Particularly, we can acknowledge these factors are the most dominating factors that affect the familiarity. Visitors from Thailand and use buses for travelling are much more familiar than others. Similarly if they are doctors and engineers or young people and male, familiarity level will be high as well. However, if visitors spend less time in the area and lacks Thai language skill, they are supposed to be unfamiliar to the area. There is a small variation in the result between two models which may be due to different methodology where the variables are weighted differently. Regression analysis follows normal distribution whereas logit model follows Gamble distribution where regression analysis model check the collinearity between variables by itself whereas in logit model we have to check the collinearity manually. But the small variation between the results seems less influencing as we have strong result from their similarity. This concludes that the models are appropriate to check the factors affecting the familiarity for the tourism area like Patong beach.

Table 4 Concluding

	Dependent variables	Independent variables
Regression Analysis	**Familiarity**	Number of days stay Buses Thailand
Discrete choice (Logit)	**Unfamiliar**	None Thai skills No.of days staying in Patong beach
	Medium familiar	Engineer or Doctors Thai people
	High Familiar	Male Engineer or Doctors Young people Buses Thai people

4. References

Literature review or word or sentence that duplicates from various sources must be referred to as denoting orderly italicized numerals with superscript above those words or sentences. References should be written in the following:

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