Spatial Analysis of Perceived Logistics and Traffic Impacts from Chinese tourist on Nimmanahaeminda Residents

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***Abstract*— This study aims to assess the perceived logistics and traffic impacts of Chinese tourists in Nimmanahaeminda, Chiang Mai, Thailand. However, As far as we concerns, the study that include spatial literature about evaluation on percerived impacts of locals has not been found. This paper, therefore, focus on the spatial analysis of residents' attitude about these issues by investigating each tract of Nimmanahaeminda's area. Quantum Geographic Information System (QGIS) was employed to illustrate the perception of residents on the logistics and traffic impact influenced by Chinese tourists. Moreover, this study also used Structural Equation Model (SEM) to estimate overall logistics and traffic impacts of the community in order to demonstrate the current situation for the government and other administrations to find the solution together.**

***Keywords*—** *Local Community, Logistics and Traffic impacts, Tourism Impacts, Urban Tourism, GIS, Heat map, Interpolation*

1. Introduction

According to the world report on road traffic injury prevention, more than 1.25 million people were killed by traffic accidents annually [60]. This mortality rate is as hight as HIV/AIDS mortality rate. It is very crucial to prevent the death that caused by road using. The original approach of prevention of these inimical accidents used to refer to behavioural protection such as wearing helmet and fasten the seatbelt. However, there are many other ways of preventions that could be a reasonable alternatives. One of them is urban design. The well-managed urban planning could be one of the most efficient solutions which is overlooked in several occasions. Economic growth with an increase in tourism promotion led to a great number of foreign tourists. Chinese tourists has become main foreign tourists nation since the country has become one of the most powerful economy in the world. It won the second largest economy in the world [9]. Growth of China economy led to growth in many industries. The excess of their basic consumptions contributed to other goods and service in luxury market and even on travelling. In 2012, Chinese became nation expenditure on tourism raised highest in the world.

However, overwhelming foreigner could lead to difficulties in terms of road using as the difference in traffic regualtions might cause some problem to road users. Current issues in the Nimmanaheaminda area concerns about many different issues such as traffic and parking congestions, public infrastructure, transportation, and road accidents.

In order to manage sustainable tourism, especially urban tourism, it is essential to concern about the wellbeing of residents who live in town and need to face with all tourism development. Major attention should be paid on residents' perceived impacts. However, there is few literatures on the impacts of tourism on community and its dwellers [39], especially focusing on the spatial information. Previous acknowledgements were criticized of being insufficient of attention to the residents evaluation toward the perception of the tourism impacts whether they consider them as negative or positive effect

This study, therefore, aims to study the logistics and traffic impacts of Nimmanaheaminda residents using both the quantitative perceived impacts and spatial data in order to see full view of the residents perception toward their location.

2. Methodological Approach

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The sample being analysed in this study was collected by a self-administrative questionnaire survey with local residents in Nimmanahaeminda area employing convenience sampling technique. Willingly randomised samples participated and responded to the questionnaires, giving their permission of information, latitude and longitude of location records. Data was collected during December 2015 - January 2016.

Heat map and interpolation feature in QGIS programme were employed in this study to visualise the qualitative data for better understanding of patterns of impacts in form of geographical map. Collected data with record of respondents' latitude and longitude were put in table (Comma Separated Values format: CSV). After that, data tables were imported into QGIS programme in coordinate reference system (CRS) that compatible with our base map of OpenStreet Map and Google Satellite. While Heat Map feature was used to illustrate concentration of respondents, interpolation feature showed the distribution of values of community's perceived Chinese impacts. Simultaneously, the confirmatory factor analysis (CFA) was used to analysed data of resident's perception on logistica and traffic impact in Nimmanahaeminda area.

3. Results

3.1 Decriptive data analysis of Logistics and Traffic impacts

Chinese tourists logistics and traffic impacts on the host community in the Nimmanheamin area details of measurement scales are reported in Table 1. The measurement scale contains 5 items representing perceptions of logistics and traffic impacts, asking respondents to reflect their perceived logistics and traffic impact of Chinese tourists through a 5 point Likert scale, (from 1: Strongly Disagree to 5: Strongly Agree).

According to the respondences in Table 1, the participants were likely to strongly agree to the impact of Logistic and Traffic impacts that Chinese tourrists have influence on traffic and parking congestion the most (M = 4.16, SD = 0.99) and have caused increase in traffic and road accidents (M = 4.03, SD = 1.05). However, most of them disagree on some statements that Chinese tourists have affected Public facility/Infrastructure like Roads, pavement, traffic network, civic centre, and other public facilities are kept at higher standard (M = 2.78, SD = 1.12) and better public transportation (M = 2.55, SD = 1.12).

Table 1. Chinese Tourist Perceived Logistics and Traffic Impact on Host Community Item Details

Chinese Tourist Logistic and Traffic Impacts Items		Mean (M)	Standard Deviation (SD)
LOG1:	Traffic and parking congestion	4.16	0.99
LOG2:	Public facility/Infrastructure like Roads, pavement, traffic network, civic centre, and other public facilities are kept at higher standard	2.78	1.12
LOG3:	Public transportation is better	2.55	1.12
LOG4:	Increased traffic and road accidents	4.03	1.05
LOG5:	Increased road maintenance and transportation system costs	3.32	1.04

3.2 Group Division of Respondents

The host samples can be categorised, by their distances away from the main road, into 2 group (see figure 1). Living or working under the area of median (146 metre) was regconised as "Close" group or group 1, which accounted for 101 person. if their loci is situated further than 146 metre from main road we considered to be the "Far" group, which accounted for 99 person.

Figure 1. Group Division of Residents

Source: Ellaborated using Google Map, 2016

The study found that the average distance for group 1 is 53.55 and for group 2 is 296.12 metre away from the middle of main Nimmanhaemin road. In terms of gender, for both groups, female outweighed male since they are preferable for commercial purpose of these area. The average age of group 1 is 32.25 and of group 2 is 29.62. Most of respondents in two groups said that their job or income have been influenced by Chinese tourists. All in all, in general, the proportion in comparative

relation of group 1 and group 2 are similar. This study, therefore, decided that it is appropriate for these two group for comparison.

Table 2. Characteristic of respondents for Group 1 and Group 2

Variables		Percentage (%) Group1 : Close	Percentage (%) Group2: Far
Gender			
	Male	18.81	30.3
	Female	81.19	69.7
Age (years)			
	Average Age (years)	31.93	29.32
Purpose of stay			
	To live only	5.94	15.15
	To work only	72.28	71.72
	To live and work	21.78	13.13
Duration in the area (years)			
	Average living duration	4.99	3.92
Education			
	High school graduates, no degree	3.96	9.09
	Collage	7.92	6.06
	Bachelor degree	78.22	73.74
	Master degree	9.9	11.11
Occupation			
	Students	4.95	5.05
	Business owner	36.63	29.29
	Employee/ Company's staff	46.53	58.59
	Government officer	4.95	3.03
	Self employed	1.98	3.03
	Other	4.95	1.01
Have your jobs/income been influenced by Chinese tourists			
	Yes	72.28	61.62
	No	27.72	38.38
Having Chinese relatives/friends			
	Yes	30.69	35.35
	No	69.31	64.65

3.3 Multivariate Analysis Using Heat maps

This study used heat map to illustrate the concentration of respondents in Nimmanaheaminda area. Figure 2 employed Heatmap feature and Openstreet map in QGIS to depicts the density of observed data. In Figure 2, blue tone represents density of Group 1 while orange tone represents density of Group 2.

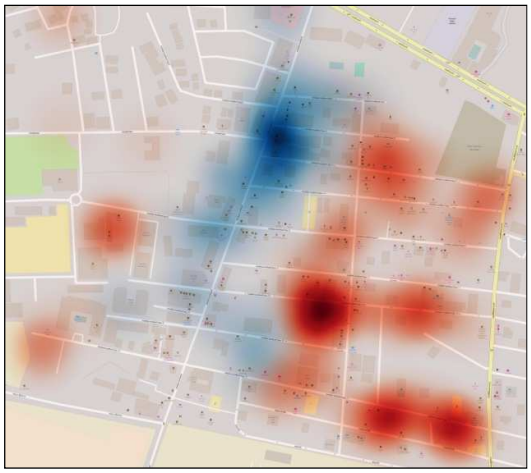

Figure 2. Heatmap of Respondent Density

Source: Ellaborated using heatmap feature and Openstreet map in QGIS, 2016

3.4 Interpolation

This study also employed Interpolation feature in QGIS programme in order to indicate the distribution of attribute values of percieved logistics and traffic impacts of host community in each location. In terms of logistic and traffic impacts, in this study, we focuses on five items includings; Traffic and parking congeation (LOG1), Public facility/infrastructure are kept at higher standard (LOG2), Public transportation is better (LOG3), Increase traffic and road accidents (LOG4), and Increase road maintenance and transportation system cost (LOG5). Overall, the logistics and traffic impacts were reflected in Figure 2 where the darker tone of green visualises the more positive logistics and traffic impacts and darker tone of red illustrates the worse impacts. we can see lots of orange areas gathered around the main road of Nimmanhaemin and somewhere on Soi 5 and 9 which reflected that the host community felt like they least received positive impact from the Chinese tourist arrivals. The reason for reflective orange tone on main street are traffic and parking congestion issues. Moreover, on the main street, especially from the alley Soi 17 side (bottom of the Figure 2) are more likely to have negative impacts of logistic and traffic issues due to frequent traffic and road accidents.

In addition, if we consider further, Figure 3 provides better understanding of each Group 1 and Group 2. For Group1 (Close), the more positive residents feel from logistics and traffic impacts come with the darker tone of green while darker

purple represents worse perception. For Group 2, blue represents the better percieved logistics and traffic impacts whereas red represents the opposite. The cause of red circle at the bottom left of Figure 3 might due to the fact that the residental buildings situated in that area which prefer well manage parking area and better flow of traffic and minimised road accidents. However, the purple on the main road may be influenced by lots of accidents as the more vihicle cause the more difficulty in turning into each alley and leads to road accident most of the time.

Figure 3. Interpolation of Overall Logistics and Traffic Impacts

Source: Ellaborated using interpolation feature and Openstreet map in QGIS, 2016

Figure 4. Interpolation of Logistics and Traffic Impacts for Group 1 and Group 2

Source: Ellaborated using interpolation feature and Openstreet map in QGIS, 2016

3.5 Confirmatory Factor Analysis: CFA for Chinese tourist impacts

Initially, in this study used confirmatory factor analysis (CFA) to assess the measurement model of the impacts, in order to investigate whether the observed data is coherent with the proposed model or not. The results of the initial CFA appeared that, initially, the CFA results were not acceptable due to the Comparative Fit Index: CFI value of 0.678 (CFI < 0.95) and Root Mean Square Error: RMSEA value of 0.125, while the acceptable of RMSEA should be less than 0.05 for good fit [62]. The fit indicators showed inadequate fit and imply that there should be a modification. According to unacceptable Std.all and P-value of each item, items Public facility/infrastructure are kept at higher standard (LOG2) and Public transportation is better (LOG3) were eliminated. After two items were eliminated, the CFA was analysed again. We found that this time CFI is acceptable with the value over 0.95 (0.987) and the RMSEA less than 0.05 (0.034), and all other items' Std.all and P-value are satisfied.

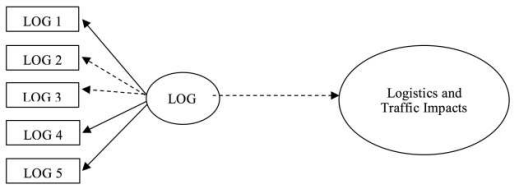

Figure 5. Final Revised CFI for Logistics and Traffic Impacts in Group 1 and Group 2

3.6 Weighted Mean Factor Loadings

By calculating weighted mean factor loading, the results showed that in Figure 6 the highest value of factor loading was traffic and parking congestion (LOG1) in comparison with all the others impacts, for both Group1 and Group 2. The findings in Table 3 also suggest that the most concerned impact for local communuty was was traffic and parking congestion with factor loading of 0.833 and 0.710 for Group 1 and Group 2 respectively.

Table 3. Characteristic of respondents for Group 1

and Group 2

Group 1 (Close)				
Latent Variables	**Factor Loading**	**Mean**	**Factor Loading* Mean**	**Weighted Factor Loading* Mean**
Logistic and Traffic Impacts				
Traffic and parking congestion (LOG1)	0.833	4.160	3.465	3.942
Increase traffic and road accidents (LOG4)	0.611	4.030	2.462	
Increase road maintenance and transportation system costs (LOG5)	0.378	3.320	1.255	

Group 2 (Far)				
Latent Variables	**Factor Loading**	**Mean**	**Factor Loading* Mean**	**Weighted Factor Loading* Mean**
Logistic and Traffic Impacts				
Traffic and parking congestion (LOG1)	0.710	4.160	2.954	3.872
Increase traffic and road accidents (LOG4)	0.648	4.030	2.611	
Increase road maintenance and transportation system costs (LOG5)	0.555	3.320	1.843	

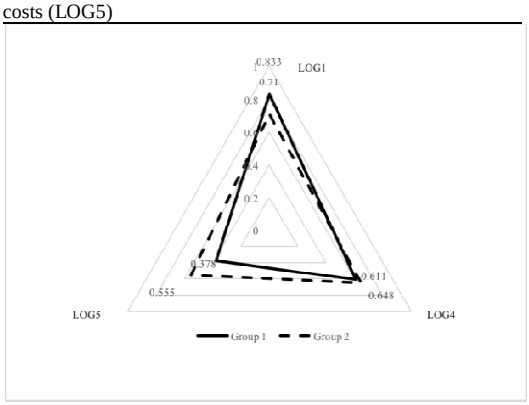

Figure 6. Weighted Mean Factor Loadings for Group 1 and Group 2

Source: Own Ellaboration, 2016

4 Conclusion and discussion

Finding of this study shows that overall logistics and traffic impacts in Nimmanaheaminda are mostly positive (Green area). Further results found that the host community perceived positive impacts from Chinese tourists in Nimmanahaeminda, especially in item LOG5 as they think that the government and community do not have to pay higher in road maintenance and transportation system cost as the amount of tourists went higher. However, there are lots of worse perception on logistics and traffic impacts on traffic juction as local people concern about the safty and convenience of road users. Further finding also suggests that the policy implications should be concerned and simultaneously ative the regulation relying on the most negative logistics and traffic impacts of traffic and parking congeation and increase traffic and road accidents in order to sustain tourism development that would not harm the safty of local road users in the future.

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