Research Report 2009
Project No: A-08/003

ATRANS
ASIAN TRANSPORTATION RESEARCH SOCIETY

Empirical Study of Land Use / Transport Interaction In Bangkok

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CHAPTER I INTRODUCTION

Most of the cities in Thailand are now facing several urban problems such as traffic congestion, traffic safety, air pollution, social inequity, etc. Solutions to these are the policies that have goals to improve accessibility and the use of the space, increase the environment-friendly modes' share (public transport, cycling, walking), reduce congestion, improve safety, reduce air pollution, noise, and visual nuisance; while develop and maintain a wealthy and healthy urban economy, and ensure social equity and transport opportunities for all community sectors. Several projects are then planned and implemented such as highway construction, public transport improvement, etc.

That transportation and land use have closed relationship, i.e., transportation affects land use and land use affects transportation, has long been recognized by planners, economists, engineers, legislators, and politicians, perhaps for centuries. The traditional transportation modeling approach represents response of transportation to land use condition; but response of land-use to change in transportation is, however, not represented. In the other words, land use or land development is assumed to have no response to change in transportation condition. This is really not intuitive when railway alignment alternatives are considered with the same future land pattern; land use must be different with different railway corridors that potentially attract land developers. Our previous ATRANS special research project on mobility and accessibility showed that accessibility and mobility of the with and without project cases in year 2025 are quite different, as shown in Figure 1.1 and Figure 1.2 respectively, implying that transportation development has significant role on urban development.

a) Without Project (only present BTS & MRT) b) With Project (Full 290-km Railway Network)

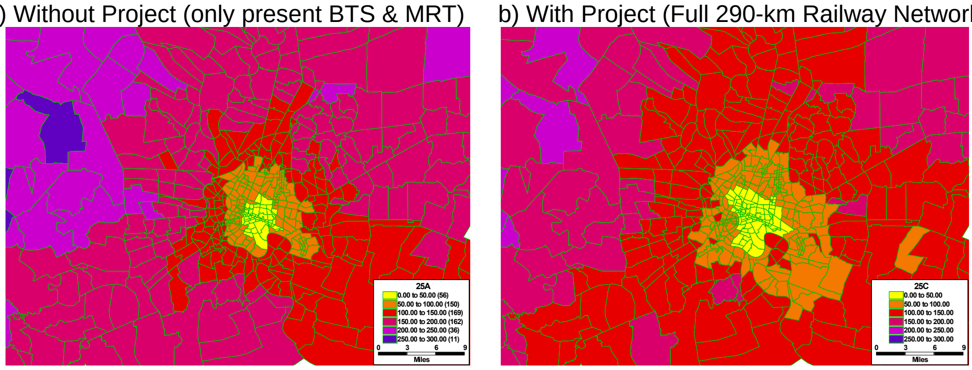

Figure 1.1 Improvement of Mobility

a) Without Project (only present BTS & MRT) b) With Project (Full 290-km Railway Network)

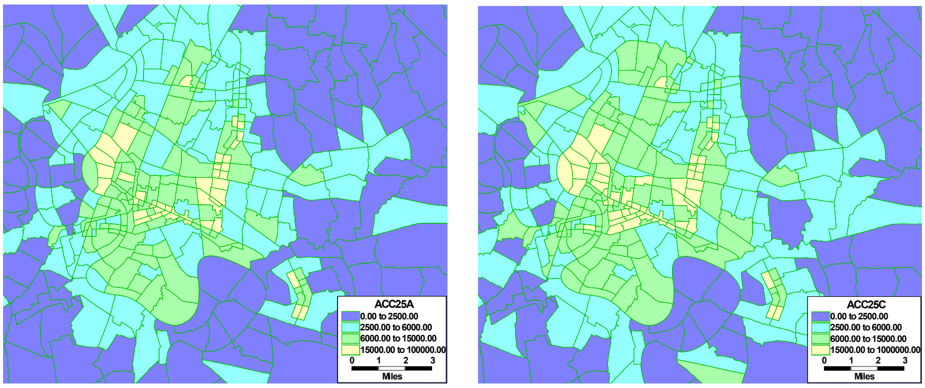

Figure 1.2 Improvement of Accessibility

In the past few years, mathematical approach has been employed such that several operational land use models exist in the world. However, these large-scale models are data-hungry and require extensive effort in the model development. Unfortunately, it is characteristic of developing countries including Thailand that such detailed data especially land use or land price data is not available. Lacking an idea to corporate land development impact into planning and evaluation of a transport project causes difficulty to accurately estimate its impact and benefits. This is obvious in the case of railway project where areas along the corridor are largely benefited by the increase in property value but pay nothing back to the railway developer. Therefore, it is necessary that planning and evaluation of transport project in Thailand need to be improved.

1.1 Objectives

The objectives are to observe the impact of transportation on land development and to determine the extent of the impact as well as its spatial variation in case studies in Bangkok.

1.2 Methodology

The study has been conducted through a series of activities as follows:

1.2.1 Literature Review

Review of the existing transport projects in Bangkok is conducted to identify the extent of land development impact consideration in the planning and evaluation process.

1.2.2 Data Collection

Various kinds of information are collected from various sources. Those data items include

- Appraised land value
- Real estate property by field survey
- Economic climate in the study area such as employment, income, etc.

1.2.3 Hedonic Studies

Hedonic study of property value is conducted. Among the hedonic models (Cervero and Duncan 2004; Linneker and Spence 1992; Tse 2002; Yiu and Wong 2005), there exist a few hedonic price models developed in Thailand. This is because the land price data is not available. In this study, two types of regression models are analyzed, namely, Ordinary Least Square regression (OLS) and Geometrically Weighted Regression (GWR). The model is expected to explicitly capture the spatial effects, if exist (Vichiensan et al. 2006). This tests the hypothesis that transport introduces significant benefit to the surrounding area.

1.2.4 Seminar

One-day seminar on land use/transportation interaction is organized in order to discuss on the present status of land use consideration in transportation as well as to identify the needs to achieve at integrated land use/transport planning from both academic and practical points of view.

1.3 Study Area

This study selected Asoke and Lat Phrao in Bangkok as study areas.

1.3.1 Asoke

Asoke study area covers the area within 1-km radius centered at Asoke station, as shown in Figure 1.3.

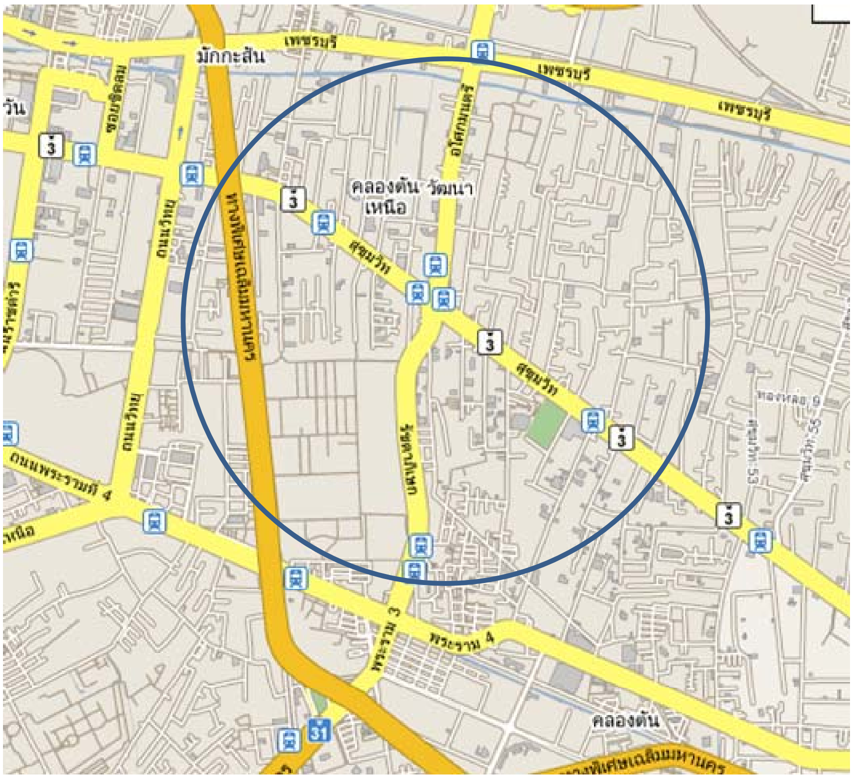

Figure 1.3 Asoke Study Area

1.3.2 Lat Phrao

The Lat Phrao study area, shown in Figure 1.4, is the area along 5-kilometer of Lat Phrao Road from Bang Kapi intersection. It is east-bounded by the Chalongrat Expressway.

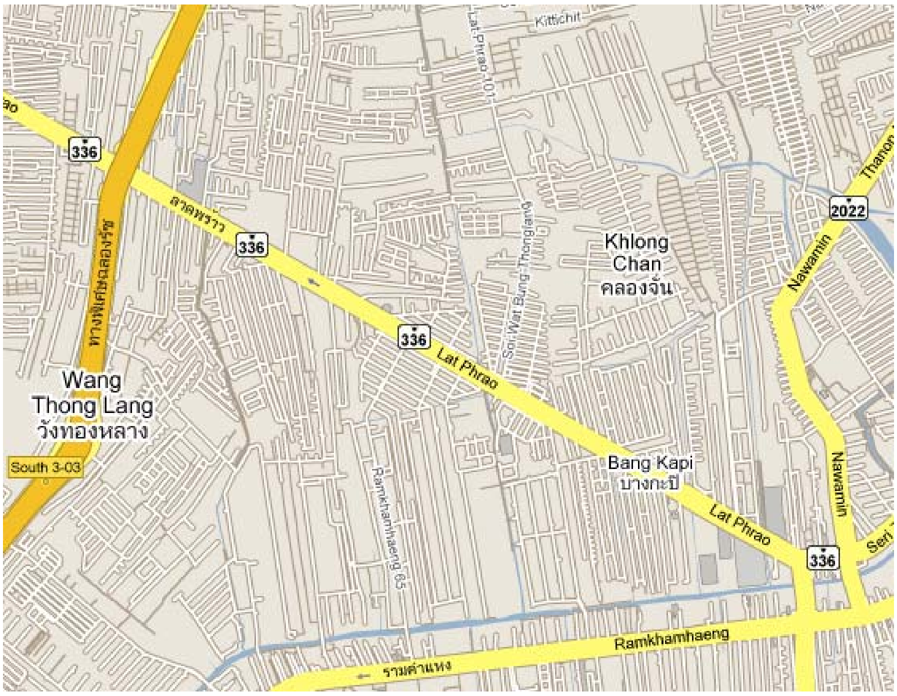

Figure 1.4 Lat Phrao Study Area

CHAPTER 2 DATA COLLECTION

2.1 Land Value

The study is relied on information and data from various sources. The information on land value is obtained from the four-year-period assessed land value reports, which were published by two agencies at different periods: Department of Land for the data from 1992 to 2003; and Treasury Department for the data from 2004 to 2011.

- 1992-1995 (published by Department of Lands)
- 1996-1999 (published by Department of Lands)
- 2000-2003 (published by Department of Lands)
- 2004-2007 (published by Treasury Department)
- 2008-2011 (published by Treasury Department)

Although the assessed land value is often lower than the market transaction price, it is used in this study because the market transaction price data is not consistent and reliable in Thailand.

2.2 Property Value

Following the local norm, those for sale are called condominium and those for rent are called apartment in this study. In the interview survey, three types of information is collected from each sample: the characteristics of the building such as age, storey, or total floorspace; the characteristics of the unit being advertised for sale or for rent such as price, floor location, or amenity; and the physical distance on street to major facilities, e.g., railway station, hospital, or education places. That is, the data attributes of interest are as follows:

- Name and Location
- Total usable area / Land area
- Typical unit size / Usable area
- Frontage
- Year built
- Year complete
- Age
- Rental
- Price
- Rent period
- Floor level

- No. of storey
- No. of unit
- No. of Bedroom
- No. of Bathroom
- Living room (Having / Not having)
- Dining room (Having / Not having)
- Kitchen (Having / Not having)
- Clear height
- Lift
- No. of parking space
- Parking fee
- Service fee
- Building management fee (Public area)
- Air condition rate charge
- Electricity cost
- Water supply cost
- Telephone availability
- Internet availability

In this study, GPS receiver is employed to recognize the current position and save for plotting the location in GIS as well as the surrounding establishment such as building, public facility, etc. The properties in the study area are observed and surveyed according to the standard survey sheet, written in Thai, as shown in Figure 2.1.

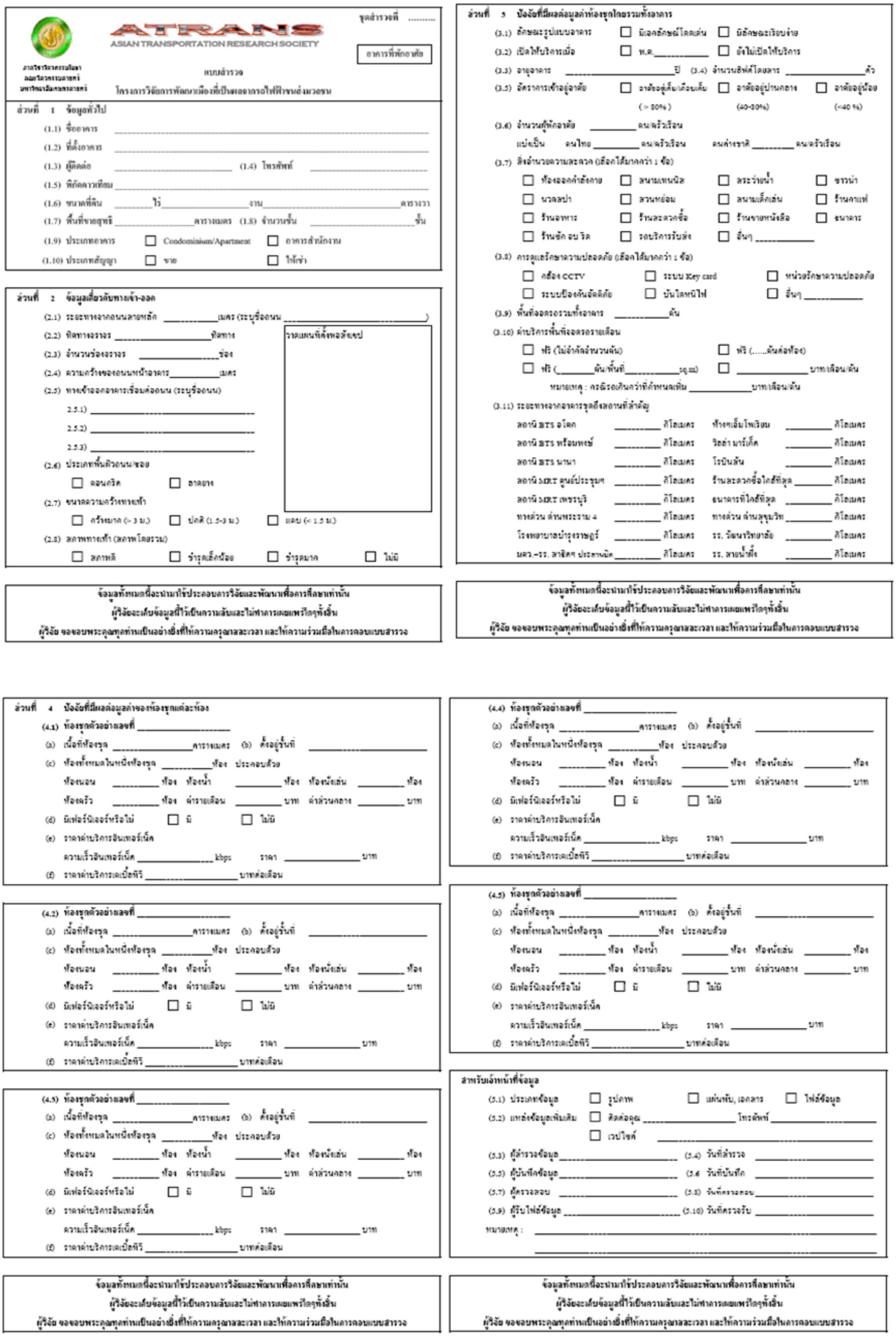

Figure 2.1 Survey Sheet

2.2.1 Sukhumvit Area

In Sukhumvit study area, 418 buildings (179 condominiums and 239 apartments) were investigated as shown in Figure 2.2.

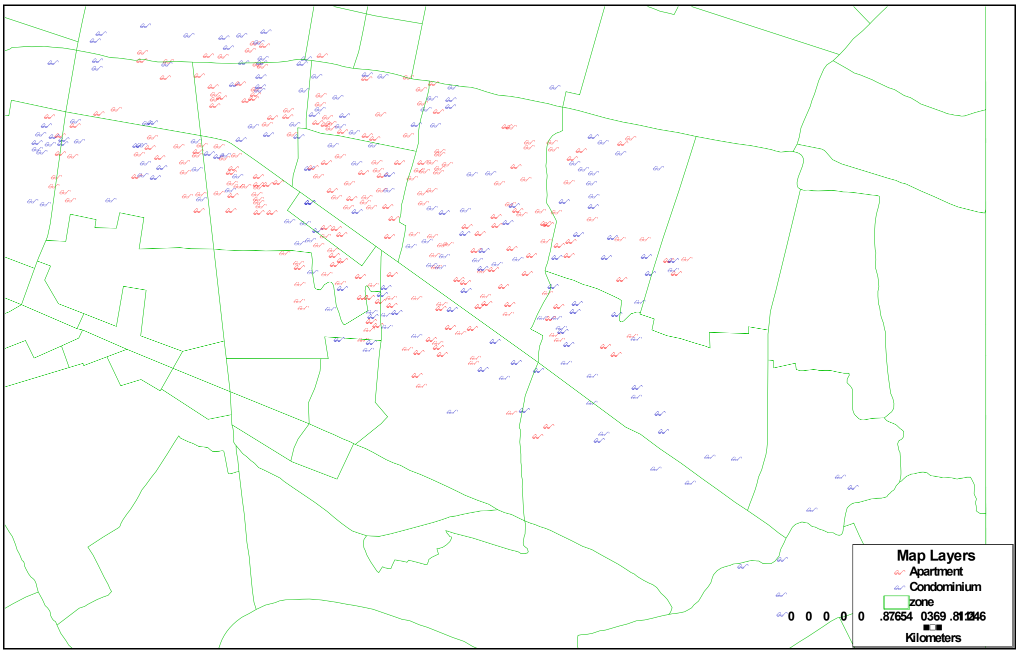

Figure 2.2 Sample Data in Sukhumvit Study Area

2.2.2 Lat Phrao Area

In Lat Phrao study Area, 506 apartment buildings were investigated; shown in Figure 2.2.

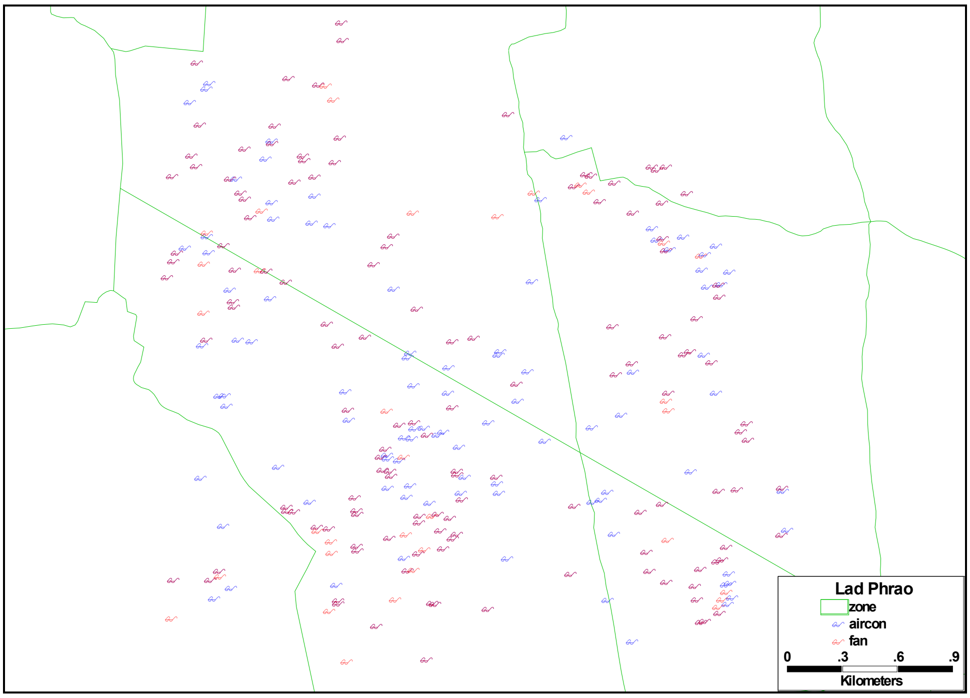

Figure 2.3 Sample Data in Lat Phrao Study Area

CHAPTER 3 IMPACT OF RAILWAY ON URBAN DEVELOPMENT

This study has conducted the review of existing literatures both practically and academically. The review of the existing transport projects in Bangkok has been conducted to identify the extent of land development impact consideration in the planning and evaluation process. This let us understand the background of the land use and transportation development in Thailand, especially in Bangkok. Some project reports are as follows.

- Transport Data and Model Center, TDMC (Office of the Commission for the Management of Land Traffic 2000)
- Transport Data and Model Center V: TDMC V (Office of Transport and Traffic Policy and Planning 2006b)
- Urban Rail Transportation Master Plan in BMA and Surrounding areas (URMAP) (Office of the Commission for the Management of Land Traffic 2001)
- BMTA Route Planning and Scheduling Project (Office of the Commission for the Management of Land Traffic 2003)
- The Intermodal Service Integration for the Improvement of Mobility, Accessibility, Sustainability and Livelihood for Bangkok Metropolitan Region (BMR) and Surrounding Area (Office of Transport and Traffic Policy and Planning 2006a)
- The Study on Holistic Plan for Traffic System Development - Holistic Development Plan for Transportation and Traffic 2006 - 2011

On the other hand, the review of research materials regarding property data survey, impact of transport on land price, has also been conducted such as (Cervero and Duncan 2004; Hess and Almeida 2007; Lewis 2007; Ryan 2005; Tse 2002; Yiu and Wong 2005). This let us know the technical advancement and experience in the other cities of the world.

Previous study (Vichiensan et al. 2007) showed that land price has remarkably increased around the stations. It is especially pronounced around Asoke transfer station for BTS and MRT lines. This is shown by a contour plot of change of the official land value assessment during the year 1992 and 2006 in Figure 3.1.

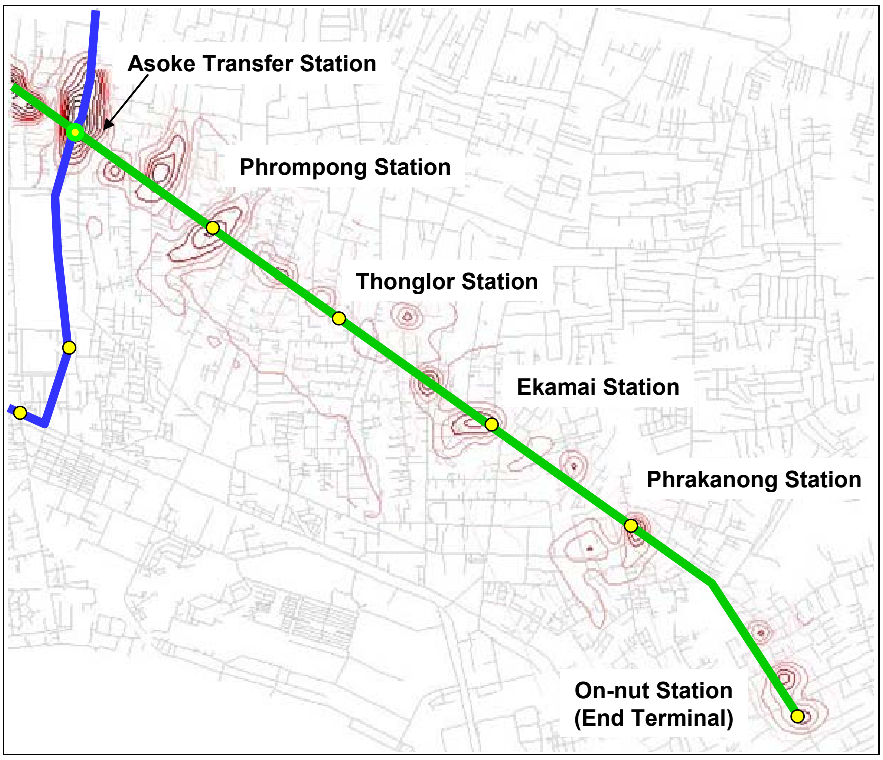

Figure 3.1 Increase of Land Value on the BTS Corridor

3.1 Building Stock

All buildings in Asoke study area, as colored in white in Figure 3.2, were investigated in the field. They may be classified into three groups according to their age:

1) Those existed before BTS, i.e., before 1992, green-colored buildings in Figure 3.3
2) Those constructed during BTS development, i.e., during 1992-1998, red-colored buildings in Figure 3.4
3) Those built after BTS opened, i.e., after 1998, blue-colored building in Figure 3.5

Figure 3.2 Existing Buildings in 2009

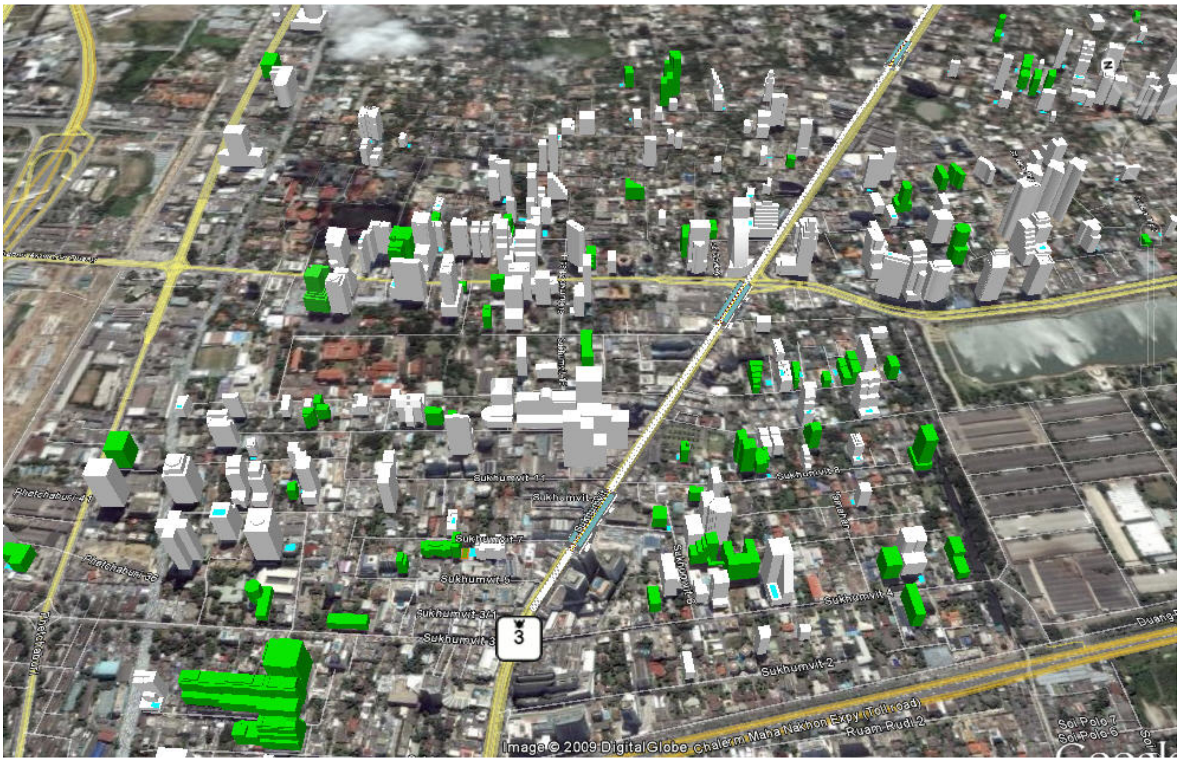

Figure 3.3 Buildings Existed before BTS

Figure 3.4 Buildings Constructed During BTS Development

Figure 3.5 Buildings Built After BTS Opening

The cumulative numbers of building and floorspace, or so-called building stock, are shown in Figure 3.6. It is obvious that the stock has grown up very rapidly as a result of BTS development along Sukhumvit Road. This is compared with the building stocks of Petchburi Road, which is a parallel road but not reached by BTS.

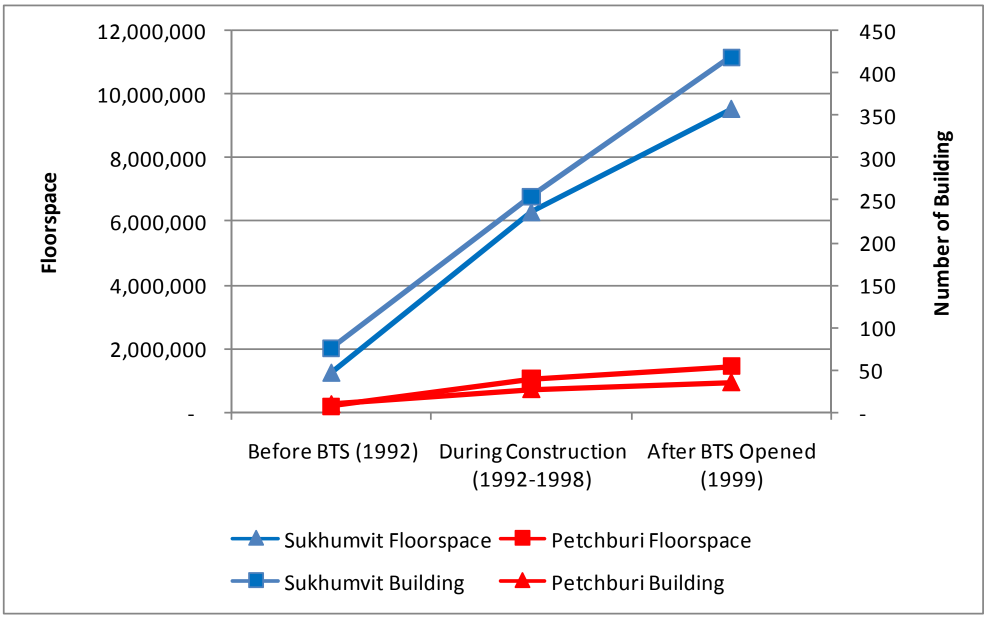

Figure 3.6 Building Stock: Sukhumvit vs. Petchburi Roads

3.2 Land Value

The appraised land values from 1992 to 2008 (both minimum and maximum) are observed at several reference points:

- Sukhumvit Soi 3
- Sukhumvit Soi 21
- Sukhumvit Soi 39
- Sukhumvit Soi 55
- Sukhumvit Soi 63
- Sukhumvit Soi 71
- Petchburi Road

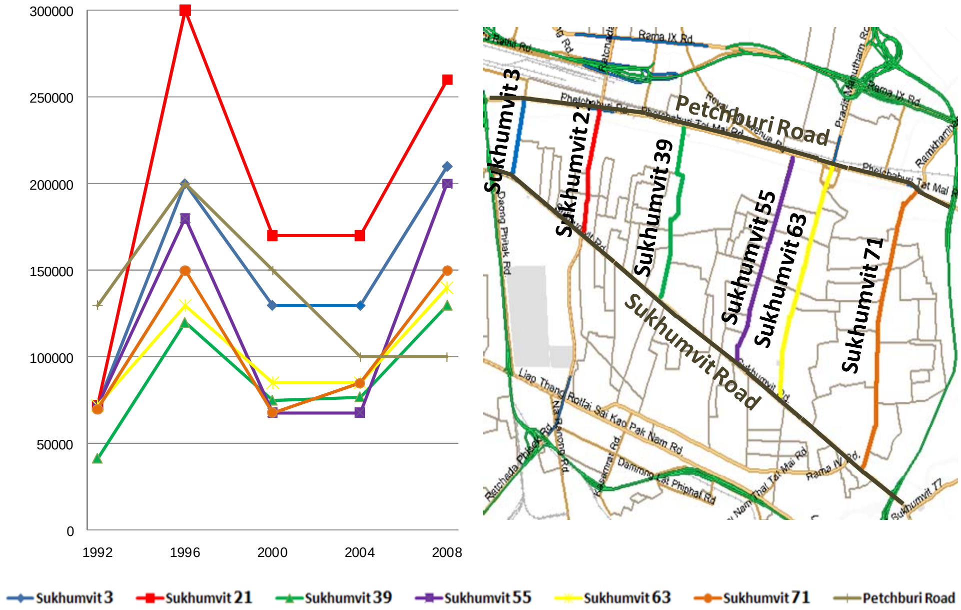

Figure 3.7 Track of Land Value (Minimum)

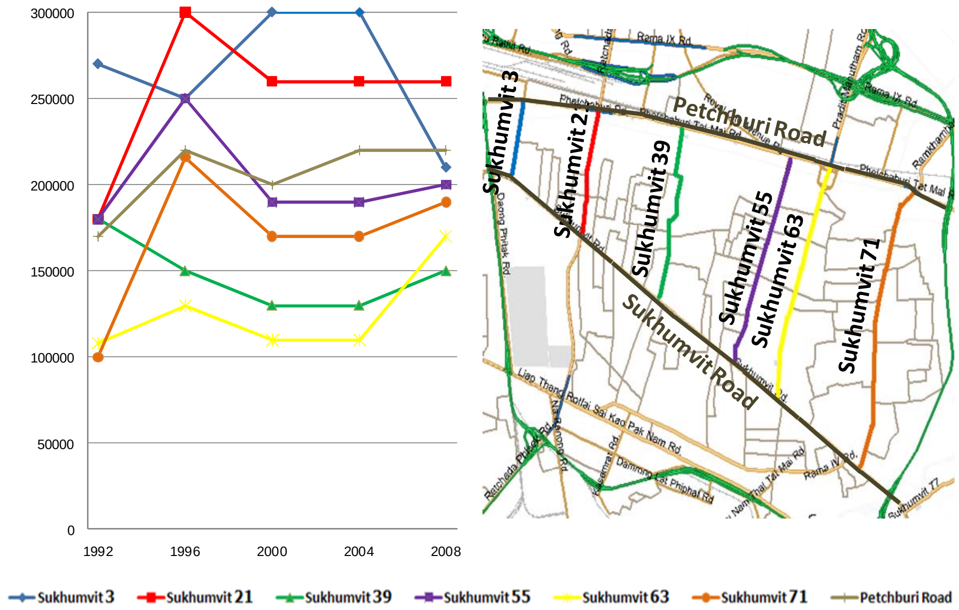

Figure 3.8 Track of Land Value (Maximum)

It is again obvious that land along Sukhumvit corridor has gained rapid increment after BTS service, although the value has slightly dropped during the economic recession in 1998.

CHAPTER 4 HEDONIC STUDIES

The term hedonic is used in economics, especially in real estate (property) economics, to estimate demand or prices as a combination of separate components, each of which may be treated as if it had its own market or price. In the context of regression these separate components are often treated as the independent variables in the modeling process.

Classical hedonic approach has been long employed. (Pan and Zhang 2008) employed a simple hedonic regression to show the land value premium of proximity to train station in Shanghai. (Ryan 2005) also employed a simple hedonic model in San Diego showed that access to highway is significant effect to office rent while access to LRT is not. (Munoz-Raskin 2007) found that walk access to BRT in Bogota has great impact on property value. Alternatively, some studies have taken into account the neighborhood effects. (Cervero and Duncan 2004) showed that composition of neighborhood has great influence on land value. (Bae et al. 2003) proved by a standard hedonic model that distance to the line-5 subway station in Seoul has less impact than other factors such as quality of school district, proximity to high-status sub-center, and accessibility to recreational resource. (Chalermpong 2007) examined the impact of BTS urban railway on property price in Bangkok by employing a spatial autoregressive regression model. (Shin et al. 2007) observed the impact of transportation accessibility on residential property value with a spatial lag model. (Hess and Almeida 2007) examined the impact of the LRT in New York on station-area property value with individual regression models for each of the light rail system's 14 stations. It was found that effects are not felt evenly throughout the system. Proximity effects are positive in high-income station areas and negative in low-income station areas.

In Thailand (Vichiensan et al. 2007) showed that after the BTS railway in Bangkok has opened, the land price along the corridor has remarkably increased especially at the transfer stations. (Chalermpong 2007) has shown that the premium of transit accessibility is approximately $10 for every meter closer to a station. In Hong Kong, (Yiu and Wong 2005) showed that there were positive price expectation effects well before the completion of the tunnel. The expectation effects allow the government to finance infrastructure projects by selling land in the affected districts in advance.

4.1 Variables

The explanatory variables in the present study, which were obtained from the sample data, are summarized in Table 4.1.

Table 4.1 List of Data and Variables

Variable	Description
ID	Sample ID
NAME	Name of the condominium or apartment
SOI	Name of road
BLDG_UTM_X	x coordinate in UTM system
BLDG_UTM_Y	y coordinate in UTM system
BLDG_USABL	Total usable floor area of the building (sq.m)
BLDG_STORE	Number of storey of the building
BLDG_TYPE	Building type (Condominium or Apartment)
BLDG_SELLRENT	Sell or rent (dummy)
BL_AGE	Age of the building (year)
UNIT_SIZE	Floorspace of the unit (sq.m)
UNIT_FLOOR	Floor number of the unit
UNIT_BED	Number of bedroom in the unit
UNIT_BATH	Number of bathroom in the unit
UNIT_LIVIN	Number of living room in the unit
UNIT_KITCH	Number of kitchen in the unit
UNIT_MAID	Number of maid room in the unit
UNIT_PRICE	Sale price or rent of the unit (Baht)
UNIT_FAC_E	Common facility charge (Baht)
UN_FURNISH	Furnished (dummy)
DIST_MAINR	Distance to main road (km)
DIST_BTS_M	Distance to the nearest railway station (km)
DIST_HOSPI	Distance to the nearest hospital (km)
DIST_SCHOO	Distance to the nearest school (km)
DIST_SHOPP	Distance to the nearest shopping place (km)
DIST_CON_S	Distance to the nearest convenient store (km)
DIST_BANK	Distance to the nearest bank (km)

4.2 Hedonic Models

4.2.1 Linear Regression

Regression analysis is used to model the relationship between one (or more) dependent or response variables and a number of independent or predictor variables. The general regression model can be specified as follows.

$$y = \boldsymbol{X}\boldsymbol{\beta} + \varepsilon \quad (1)$$

$$E[\boldsymbol{\varepsilon}] = \mathbf{0} \quad (2)$$

$$\boldsymbol{\Omega} = E[\boldsymbol{\varepsilon}\boldsymbol{\varepsilon}'] = \sigma^2\mathbf{C} \quad (3)$$

where $\boldsymbol{y}$ is a vector (n×1) of observations corresponding to a dependent variable, **X** is a matrix (n×k) of observations of k independent variables, $\boldsymbol{\beta}$ is a vector (k×1) of regression parameters, $\boldsymbol{\varepsilon}$ is a vector (n×1) of errors, and **C** is a positive definite covariance matrix. The errors are often assumed to be normally distributed with an expected value of 0 and a variance-covariance matrix Ω of size n×n. Hence, *classical ordinary least squares (OLS)* is obtained by defining **Ω**= σ^2**I** and the solution for the coefficients can be obtained:

$$\hat{\boldsymbol{\beta}} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\boldsymbol{y} \quad (4)$$

4.2.2 Geographically Weighted Regression

Some of previous studies focus on local variation of the impact by incorporating the nonstationarity; a situation when parameter estimates vary with different spatial entity used. (Paez and Suzuki 2001) examined the impact of transportation on land use change by looking at local effect by using GWR: Geographically Weighted Regression. Similarly, a study in Tyne and Wear Region, UK also employed GWR and revealed that nonstationarity existing in the relationship between transport accessibility and land value (Du and Mulley 2006). It showed that transport accessibility may have a positive effect on land value in some areas but in others a negative or no effect. The important conclusion was that a uniform land value capture would be inappropriate. Likewise (Vichiensan et al. 2006) proposed a nonstationary spatial interpolation method based on the GWR framework and had taken into account the spatial autocorrelation and nonstationarity.

GWR is the approach introduced by (Fotheringham et al. 2002) to describe a family of regression models in which the coefficients, **β**, are allowed to vary spatially. The regression model in (1) may be rewritten for each local model at observation location *o*:

$$y_o = \boldsymbol{X}_o\boldsymbol{\beta}_o + \varepsilon_o \quad (5)$$

where the sub-index *o* indicates a observation point where the model is estimated. The coefficients $\boldsymbol{\beta}_o$ are determined by examining the set of points within a well-defined neighborhood of each of the sample points. This neighborhood is essentially a circle of radius *r* around each data point. However, if *r* is treated as a fixed value in which all points are regarded as of equal importance, it could include every point (for r large) or alternatively no other points (for r very small). Instead of using a fixed value for r it is replaced by a distance-decay function, *f(d)*. Various functional forms of *f(d)* are available. A simple function may be defined such as $f(d) = \exp(-d^2/h)$, where *d* is the distance between the focus point *o* and other data points, and *h* is a parameter (is also called bandwidth). A small bandwidth results in very rapid distance decay, whereas a larger value will result in a smoother weighting scheme. This parameter may be defined manually or alternatively by some forms of adaptive method such as cross-validation minimization or minimization of the Akaike Information Criterion (AIC). Following the framework of equation (3), the variance-covariance matrix for the GWR model may be defined as:

$$\boldsymbol{\Omega}_o = E[\boldsymbol{\varepsilon}_o \boldsymbol{\varepsilon}_o] = \sigma_o^2 \mathbf{C}_o \tag{6}$$

The diagonal elements of matrix $\mathbf{C}_o$ are given by

$$g_{oi}(\gamma_o, d_{oi}) = \exp(\gamma_o d_{oi}^2) \tag{7}$$

where the off-diagonal elements are all equal to 0.

The variance is defined as a function of two parameters, namely σ_o^2 and γ_o, and d_{oi} is the distance between focal point *o* and observation *i* (=1,…, n). The advantage of using an exponential function such as (7) is that the i^{th} diagonal element of the covariance matrix $\omega_{oi} > 0$ as long as $\sigma_o^2 > 0$, thus ensuring positive definiteness. Assuming normally distributed errors with a variance-covariance matrix as in (6) and (7), the local parameter estimates can be obtained:

$$\hat{\boldsymbol{\beta}}_o = (\mathbf{X}'\mathbf{C}_o^{-1}\mathbf{X})^{-1}\mathbf{X}'\mathbf{C}_o^{-1}\boldsymbol{y} \tag{8}$$

$$\hat{\sigma}_o^2 = \frac{1}{n}(\boldsymbol{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_o)'\mathbf{C}_o^{-1}(\boldsymbol{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_o) \tag{9}$$

These are conditional upon a structure of matrix $\mathbf{C}_o$. These estimators, when substituted and introduced into the corresponding log-likelihood function, result in a concentrated function that depends on a single parameter, namely γ_o:

$$-\frac{n}{2}\ln\left[\frac{1}{n}(\boldsymbol{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_o)'\mathbf{C}_o^{-1}(\boldsymbol{y} - \mathbf{X}\hat{\boldsymbol{\beta}}_o)\right] - \frac{1}{2}\sum_{i=1}^{n}\gamma_o d_{oi}^2 \tag{10}$$

The above function can be numerically maximized with respect to γ_o to obtain a parameter that can be substituted in (10) to obtain the maximum likelihood estimates for $\hat{\boldsymbol{\beta}}_o$.

4.3 Sukhumvit Area

In this section, a hedonic study of residential properties in Sukhumvit area is presented.

4.3.1 Condominium for Sale

Using the condominium offering price data, an OLS model is estimated. The result is shown in **Error! Reference source not found.**. Among several variables, three are significant: size of the condominium unit, floor number of the unit, and the distance to the nearest railway station. In words, firstly, size is very intuitive, i.e., larger is more expensive. Secondly, floor number, the higher floor the unit is located; premium can be expected due to better scenery and open space. Thirdly but most important, proximity to railway station, either BTS or MRT station, has significantly added value to the property indicated by negative in the model coefficient.

Table 4.2 Condominium Sell Price in Sukhumvit

	OLS		*GWR*		
	Coefficients	*t-Stat*	*Coefficients*		
			min	*max*	*mean*
(Constant)	1,602,257.76	1.954	- 314,532.14	1,669,666.50	964,616.84
UNIT_SIZE	62,335.84	16.152	61,641.54	68,919.43	63,776.29
UNIT_FLR	157,033.13	3.809	145,386.32	189,442.46	161,437.56
DIST_BTSMRT	- 1,561.79	-2.325	- 1,633.13	- 1,178.64	- 1,422.51
Number of observations	180		180		
Number of parameters	4		5		
AIC	5981.6		5994.6	6017.0	6007.4

With those statistically significant coefficients suggested by the OLS model, the GWR model is then estimated. Since GWR estimates a model at each data point, the number of estimated parameters is equal to the number of data points available, i.e., totally 180 sets of parameters are obtained. For ease of presentation, the results of GWR model are presented by three representative statistics: minimum value, maximum value, and mean of the coefficients, also shown in **Error! Reference source not found.**. The GWR estimates have the same trend as that of OLS. The goodness of model fit is evaluated by Akaike's Information Criterion (AIC), which is based on the value of the likelihood function and weighs in the trade-off of how much information is obtained and the number of variables used. It is found that the GWR model is out performed comparing to the OLS, indicating that the nonstationarity has played significant role in improving the model goodness-of-fit. In the other words, the extent of the effect of each explanatory variable to the property value varies spatially in the study area. To illustrate this, the coefficients are interpolated by the inverse distance weighting method with the aid of MapInfo. The interpolated coefficient surfaces of two variables are shown in Figure 4.1 and Figure 4.2. Obviously, the coefficients vary substantially within the study area; indicating that there is varying spatial relationship, i.e., nonstationary in the model parameters. The spatial variations of the parameters are shown in maps in Figure 4.1 and Figure 4.2. It is obvious that the parameters vary significantly at different locations, showing that there is varying spatial relationship, i.e., nonstationary in the model parameters.

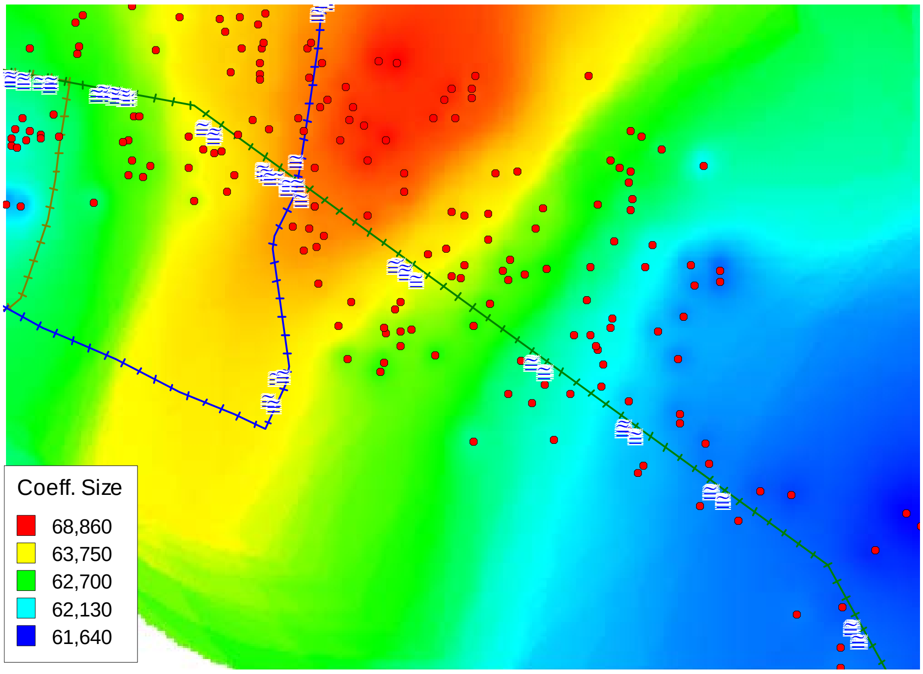

Figure 4.1 Effect of Unit Size to Condominium Sell Price

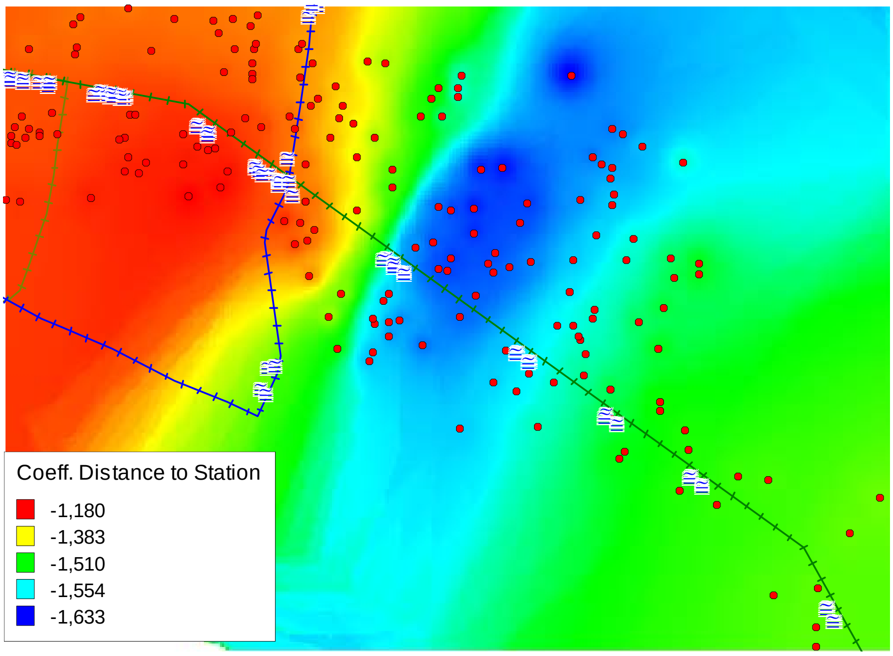

Figure 4.2 Effect of Distance to MRT to Condominium Sell Price

4.3.2 Apartment for Rent

Similar to the sale condominium, the apartment rent model is developed. The dependent variable is the price per square meter; in order to represent the other effects more explicitly. The estimation result is shown in Table 4.3.

Table 4.3 Apartment Rent in Sukhumvit

	OLS		*GWR*		
			Coefficients		
	Coefficients	*t-Stat*	*min*	*max*	*mean*
(Constant)	768.2795	14.0978	759.737	781.6273	772.4175
BL_AGE	-12.9361	-6.4406	-13.1326	-10.8654	-12.4267
DIST_BTS_MRT	-0.0842	-2.6148	-0.08645	-0.05963	-0.0806
DIST_HOSPITAL	-0.0860	-2.9859	-0.12563	-0.08355	-0.09823
Number of observations	361		361		
Number of parameters	4		5		
AIC	5,110.021		5,101.6	5,126.2	5,121.4

In the OLS model, it is interesting that building age and proximity to station are significant. Age directly reflects the quality of the property. And intuitively, the station proximity reflects the convenience of travel by railway. Comparing the OLS model to the GWR model, it is not certain that GWR provides better fit to the data based on AIC values. However, this provides insight how the coefficients vary over the study area.Again, the spatial variation of the parameters are shown in Figure 4.3 and Figure 4.4

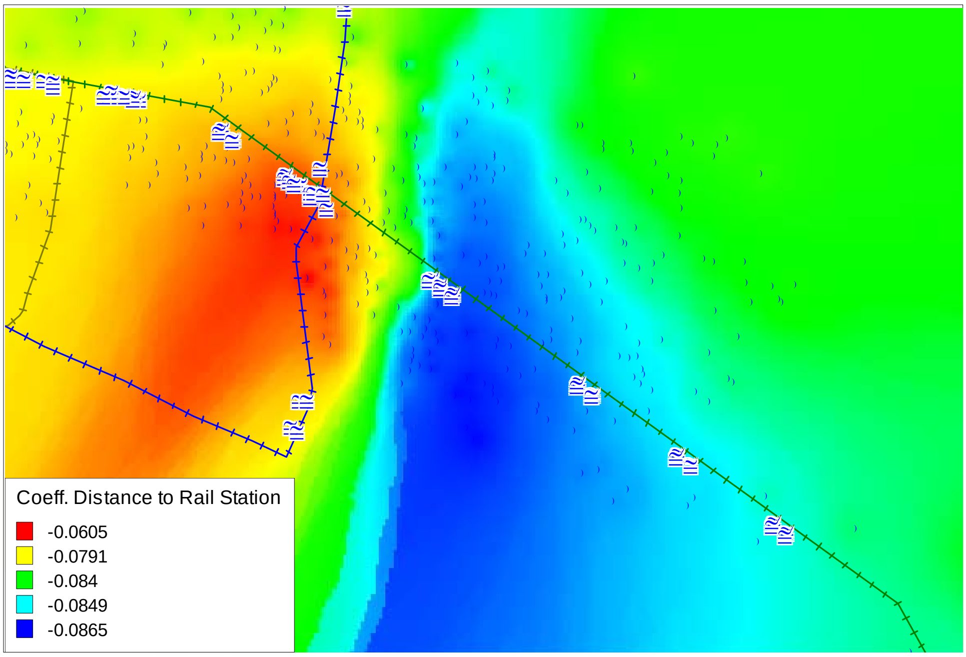

Figure 4.3 Effect of Station Proximity to Apartment Rent

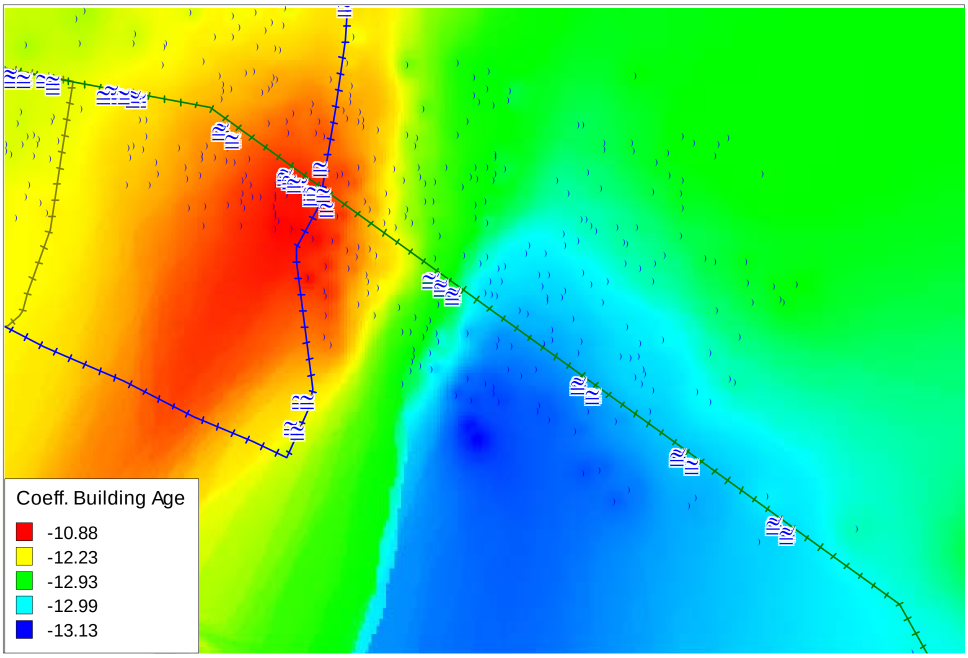

Figure 4.4 Effect of Building Age to Apartment Rent

From the figures, it is obvious that the parameters vary substantially over the study area. It is found that station proximity is a significant price-determining factor around the station.

This confirms the station area benefit brought up by the railway. For the building age, it is found that age is less important when trading off with station proximity, as shown by the large red band in Figure 4.4.

4.4 Lad Phrao Area

Similarly, a hedonic study of residential property in Lad Phrao area is conducted; two types of models are estimated: OLS and GWR respectively. The results are shown in Table 4.4.

Table 4.4 Apartment Rent in Lad Phrao

	OLS		*GWR*		
	Coefficients	*t-Stat*	*Coefficients*		
			min	*max*	*mean*
(Constant)	190.5289	22.9178	182.5550	192.3770	188.4057
BOAT_STOP	-0.0065	-2.3950	-0.0090	-0.0041	-0.0058
BUS_STOP	-0.0116	-2.2251	-0.0131	-0.0078	-0.0116
Number of observations	230		230		
Number of parameters	4		5		
AIC	2,411.38		2,382.53	2,423.89	2,410.49

The OLS model shows that proximity to two types of transport facility is statistically significant: canal boat and bus. These two models are analyzed in the GWR model. In this case, GWR model gain stronger power over the OLS model, as evaluated by the AIC values. The distributions of the explanatory variable coefficient are shown in Figure 4.5 and Figure 4.6.

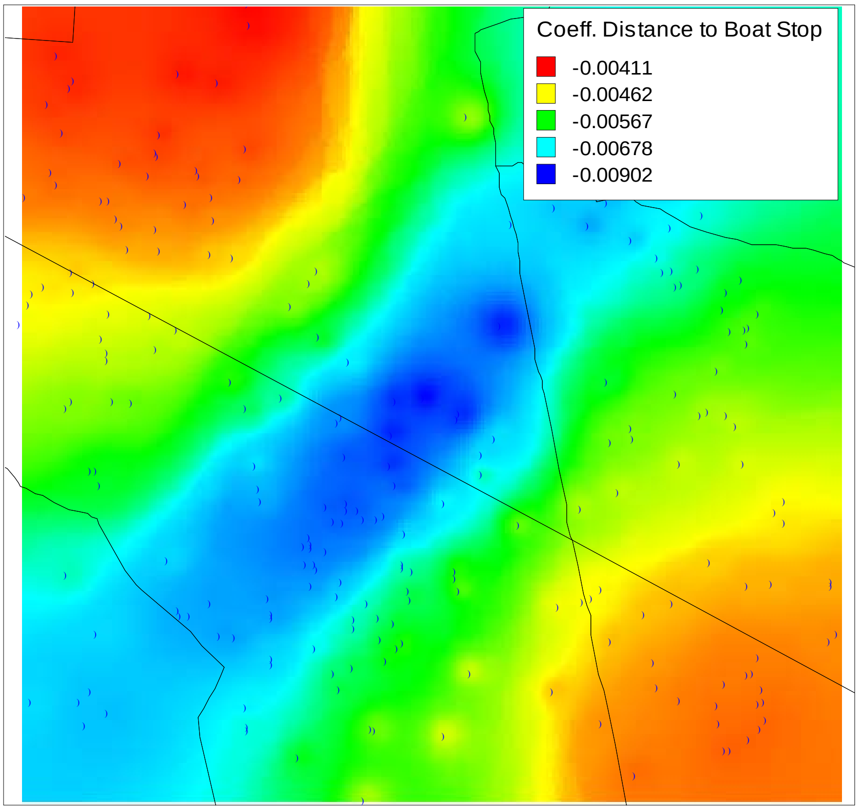

Figure 4.5 Effect of Canal Boat Proximity to Apartment Rent

It is obvious that influence of proximity to canal boat stop is varied in different location, as shown by different color bands in Figure 4.5. The blue band is the surrounding area along Ladphrao 122 sub-road, or called locally Soi Lad Phrao 122, which road connects Lad Phrao main road to the canal boat pier. It provides the area good accessibility to the city center via the canal boat service.

For the bus stop, Figure 4.6 indicates that accessibility of bus service has different influence on rent setting in different area. As getting closer to a large shopping mall located in the southeast direction in the figure, bus stop proximity is playing larger role in raising the rent of an apartment room.

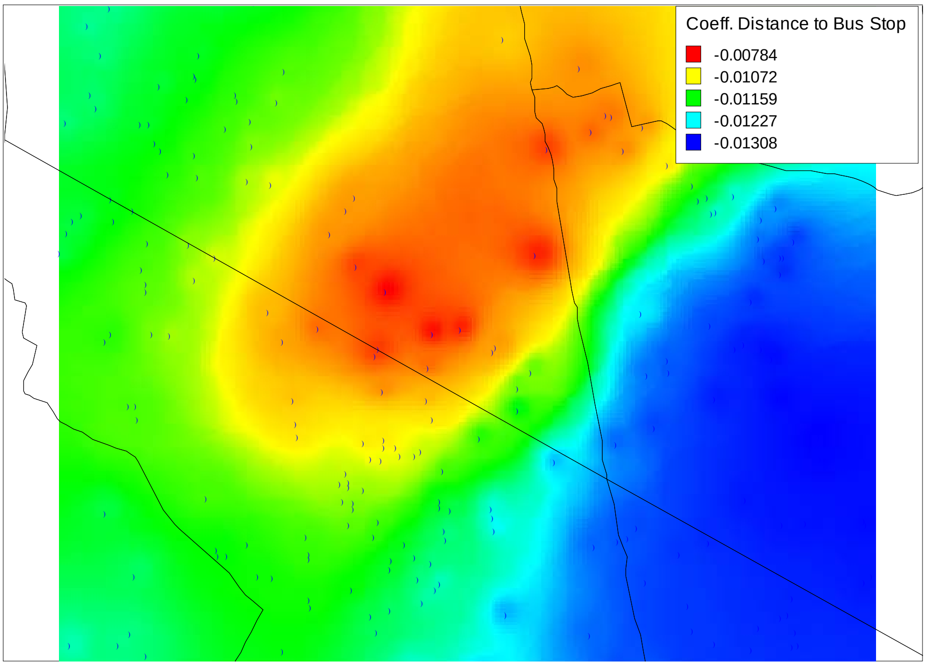

Figure 4.6 Effect of Bus Stop Proximity to Apartment Rent

CHAPTER 5 SEMINAR ON LAND USE/TRANSPORT INTERACTION

That land use interacts with transportation has been known for long time. But it is practice, especially developing countries, that land use is considered exogenously to transportation, i.e., land use/transport interaction is implicitly neglected. It is expected to learn Japanese experience on how land use has been considered in transportation planning. How and why does it success? It is also expected to address the necessary to consider land use/transport from different perspectives, e.g., academic and implementation.

5.1 Program

The seminar was held on 29 April 2009 at Imperial Queen Park Hotel in Bangkok. The program and agenda were as follows.

9:00 – 9:15	***Welcome Address***
	Dr.Tuenjai Fukuda, Secretary General, ATRANS
9:15 – 9:30	***Empirical Study of Land Use/Transport Interaction in Bangkok***
	Dr.Varameth Vichiensan
9:30 – 10:15	Keynote Lecture:
	A New Approach of Land Use Consideration in Transportation Planning and Implementation in Sendai Metropolitan Area, Japan
	Professor Dr.Kazuaki Miyamoto, Tokyo City University, Japan
10:15 – 10:30	*Coffee break*
10:30 – 11:15	Keynote Lecture:
	Estimation of CO_2 Emission Reduction of BRT Using the Concept of Extended Life Cycle Environmental Load (ELCEL)
	Professor Dr.Atsushi Fukuda, Nihon University, Japan
11:15 – 12:00	Discussion: **Transportation planning practice in Thailand**
	Key member: Professor Dr.Wiroj Rujopakarn, Kasetsart University, Thailand
12:00 – 13:00	*Lunch*
13:00 – 15:00	**Achievable Integrated Land use/Transportation Planning in Thailand**
	- Land use regulation in Thailand (by Dr.Kerati Kijmanawat)
	- Difficulty in integrating land use and transportation plans

	- Necessary preparation
	- Research & development
	- Legislation & institutional issues
15:00 – 15:30	**Summary**

In the seminar, the lecture given by Professor Miyamoto is extremely informative and provides good direction for urban planning in Thailand comparing with the other cities in the world. The lecture material can be found in the appendix.

The round-table discussion, shown in Figure 5.1, provides very great opportunity for the participants to exchange idea on land use related matter. Debate on how land use is significant in transport planning has come up with conclusion that Thailand should pay more attention to land use/transport interaction than before by employing the existing human resources in land use and transportation field.

Figure 5.1 Round Table Discussion

5.2 Participants

The participants are listed as follows.

1 Professor Dr.Kazuaki Miyamoto Tokyo City University

2	Professor Dr.Atsushi Fukuda	Nihon University
3	Professor Dr.Wiroj Rujopakarn	Kasetsart University
4	Dr.Tuenjai Fukuda	Nihon University
5	Mr.Shinichiro Yamamoto	Japanese Embassy in Thailand
6	Mr.Shunsaku Sawada	JICA
7	Asst. Prof. Dr.Sittha Jeansirisak	Ubon Rajathanee University
9	Asst Prof.Dr.Varameth Vichiensan	Kasetsart University
8	Dr.Prapatpong Upala	King Monkut Institute of Technology, Ladkrabung
10	Dr.Thaned Satiennam	Khon Kaen University
11	Dr.Kerati Kijmanawat	PCBK Co., Ltd.
12	Mr.Surawongse Swangbamrung	Traffic and Transportation Department, BMA
13	Mr.Prapas Lueangsirinapha	Traffic and Transportation Department, BMA
14	Mr.Thosapol Suparee	Traffic and Transportation Department, BMA
15	Ms.Premsiri Kasemsanta	Department of City Planning, BMA
16	Dr.Orapim Pimcharoen	Department of City Planning, BMA
17	Ms.Supattani Panuratana	Department of City Planning, BMA
18	Ms.Tusanee Sinlapabutra	Office of Transport Policy and Planning
19	Ms.Sathita Malaitham	Kasetsart University
20	Ms.Vasinee Wasuntarasook	Kasetsart University
21	Ms.Jarinthip Turean	Kasetsart University
22	Mr.Panit Sinchavanwat	Kasetsart University
23	Mr.Thitirat Jirathitiporn	Kasetsart University
24	Ms.Suwanna Thuraphan	ATRANS
25	Mr.Visarut Soontararak	ATRANS

The research team would like to express sincere thanks to the three professors that sharing their valuable time in the seminar.

Figure 5.2 Invited Professors: Prof.Miyamoto, Prof.Fukuda, and Prof. Wiroj

CHAPTER 6 CONCLUDING REMARKS

This study has empirically shown that the influence of the rail transit on residential property value is large; indicated by the increasing land value and building stock in the case study. It is, furthermore, found that the impact is quite complicated and varied over space. Spatial hedonic study was presented. The global model, OLS, suggested the influencing factors. The local model, GWR, revealed the varying relationship between property values and those influencing factors, .e.g., size or station proximity. It is found that ease of station access varies substantially along the railway corridor. This may be a usual case in many cities in the developing countries. Previous studies in the literatures mostly paid attention to interpreting the coefficients as premium of the location, i.e., what determines price. Alternatively this paper looked at the coefficient variation as a reflection of the present circumstance in the study area; i.e., what the price informs. This information will be useful to the concern parties such as real estate developers, railway operator, as well as general customers.

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Research Report 2009
Project No: A-08/003

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