

# Influences of Urban Infrastructure Development on Urban Forms and Lifestyle of Greater Bangkok

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## ABSTRACT

**B**y considering the influences of urban infrastructure development impact on land-use and structure, the objectives of this study are; (1) to categorizing urban networks into five index factors for analyzing a pattern of urban form, and (2) to analyze a relationship between urban forms and socioeconomic behavior with uses of urban geo-simulation modelling. The study employed the selection of four areas of study in the Greater Bangkok area. A measurement of each index of urban networks was analysis and then an analysis of the mutual relationships between the two variables was made. The findings demonstrate that residents in the areas understand the mixed use of the area and are satisfied with its convenient commutation systems. There are uncommitted bonds occurred among the residential projects.

**Keywords:** *mixed land use, accessibility, mega infrastructure development, social culture and socioeconomic*

## INTRODUCTION

The study of Greater Bangkok's urban structure aims to generate an understanding of its physical elements and their rearrangement in relation to the behaviors of people living in the area. The aspects of travelling, social and economic practices and real estate will be taken into account. This will be the basis for describing the variety of urban phenomenon. There has been a massive transformation of Bangkok's transportation systems including the development of public rail transit. In the future, more than ten rail transport networks will be developed within Greater Bangkok. As a result, the urban structure is expected to be rapidly transformed. In order to describe and explore Thailand's new urban structural awareness, this study is concerned with policies of land-use, urban infrastructures, urban networks, and linkages to determine the relationships of social and cultural characteristics in various areas. Methods of this integrated science research consist of geographical and statistical tools such as Geography Information System (GIS), the Statistical Package for the Social Science (SPSS), and conceptual transformations from zoning to mixed-use development. Subsequently, this study demonstrates interrelations between fundamental urban structures, land-use, social, economic and cultural factors, which affect development within the Greater Bangkok area.

## OBJECTIVES OF THE STUDY

- 1) To explain the transformation in land-use, building and urban fabric in Greater Bangkok affected by urban infrastructure development with an analysis of the relationships between its urban's geographic model and socioeconomic behavior patterns.
- 2) To study the intensive use of land in areas affected by large-scale infrastructure development.
- 3) To recommend urban planning measures to i promote an intensive mixed-use hybrid.

## THE STUDY'S AREA

The criteria for selecting the areas researched are comprised of two factors; high density building concentration and 500 meters of rail. From these two criteria, four study areas are selected: 1) Asoke – Sukhumvit, 2) Silom – Sathorn, 3) Chidlom – Ratchadamri, and 4) Thonglor – Ekamai. The contents of the research focuses on three components; 1) studying land use patterns, buildings and spaces; 2) studying urban interconnection between buildings and access; and 3) studying habits of residents and visitors in mixed-use areas. (Figure 1)

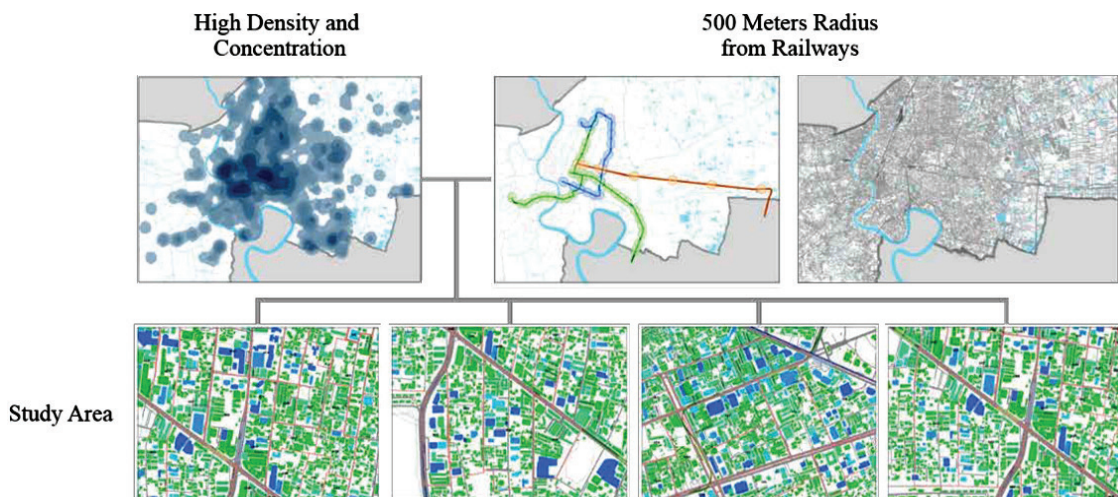


Figure 1:  
The four study areas within the Greater Bangkok context

## Conceptual Framework Diagram

To promote a sustainable urban structure, the study's conceptual framework to be developed in the mixed-use locations contains these significant factors; urban form, zoning ordinance, spatial activity, accessibility and mobility, as well as social and economic aspects.

## Research Methods

Within the research's boundary and conceptual framework, the study reviewed relevant literature and gathered primary and secondary data concerning information about users within the study area such as residents, officers, and retail customers. Others methods include using GIS and self-survey of physical and spatial information, public space, building-use and land-use, and intensity of activity.

Subsequently, after analyzing and summarizing the relationship among all data, suggestive guidelines are provided. The two approaches used for analyzing data as follows;

- 1) The analysis of spatial data called the Urban Network Analysis. This tool is particularly useful for urban designers and urban planners to explain complex urban phenomenon and urban design. The analysis demands mathematic techniques and geographical tools such as ArcGIS 10.4 software with a Network Analyst Extension.
- 2) Analysis data with a Social Science program called "the Statistical Package for the Social Sciences (SPSS)." This analysis is helpful in explaining phenomenon, which is concerned with spatial uses and user's behaviors. The following statistic data are mandate for using SPSS.
  - 2.1) Descriptive Statics Analysis of Variance (ANOVA). The use of ANOVA is used to analyze relations between variables and to test Means between group variance), test variance within groups and analyze distribution of factors of each group.
  - 2.2) Multiple Comparison with Post Hoc Test.

## LITERARY REVIEW

The review of literature on the influences of urban infrastructure transformation mainly focuses on the three following issues;

- 1) Mixed-use development with emphasis on good health and environment area
- 2) Density of residences and building social interaction
- 3) High density mixed-use development in consideration of land identity

Typically, density of residence is a major in urban analysis. GIS generally is used as a tool to measure density of population (Forsyth, 2003). There are various ways in calculating density by the GIS. Rough calculation of density usually requires information about land-use, number of population, and number of different building uses. Relations between areas and various transportation systems are also considered. A current tool of measure is a spatial network analysis in ArcGIS. This is used by urban designers, architects, planners, geographers, and spatial analysts who are interested in studying the spatial configurations of cities, and their related social, economic, and environmental processes. This tool is built for easy scaling, which is suited for small-scale, detailed network analysis of dense urban areas. The tool can also be useful for sparser large-scale regional networks analysis as a predictor for a number of interesting urban phenomena. This is especially useful in explaining the importance of particular junctions in transportation network (Garrison and Marble, 1962). Moreover, the tool has the ability to assess the quantitative measurement of each building's location in conjunction with consideration of the connectivity's network. However, to be able to confirm the accuracy of the model, a high-powered computer is required and it is necessary to obtain both quantitative or other qualitative data .

Living in the same neighborhood, people in urban areas with high density should consider building social interactions. A Hong Kong based research identifies that that people in high density areas typically have less social interaction than people in low density ones. The research also mentions that ironically, people living on different floors have more interaction than people living on the same floor.

Walker H. (1997) remarked that there are seven characteristics of Good Mixed-Use and are as follows;

- 1) There should sufficient mixed use areas for local people. Public transportation or accessible communication should also be ample.
- 2) It is necessary to know functions and target users of land-use so that particular plans for the area can be managed.
- 3) Land-use within the mixed-use area should be clarified. Subsequently, there should be consideration of proportion of function for the land-use within the mixed-use. In other words, how "mix" of the mixed- use should be defined.
- 4) A large proportion of commercial area in the mixed-use, which typically provide loud noise or air pollution in either day or night time, might impact quality of living for people around the area. Therefore, strict regulations should be provided if a large proportion of commercial area is unavoidable.
- 5) There should be various types of uses in the mixed-use land instead of commercial dominance. Consideration of residence and working place should be prioritized in order to be a good mixed-use. The proportion of residential area is generally around 30-65 percent of total use.
- 6) Safety of the area should be considered a priori, especially for pedestrians and bicyclists. Checking standard of Floor Area Ratio (FAR) is also necessary.
- 7) Less polluting types of commuting such as walking and bicycling should be promoted.
- 8) Considering proportion and harmony with the location should be encouraged when constructing any type of building or built environment. For example, if there are typically buildings with 6-floors within the location site, constructing 20-floored building would be inappropriate.

Additionally, a mixed-use land concept in high density areas of the city should be supported by efficient public transportation systems and pedestrian walkways. The mixed-use land should be a combination of residence and other types of uses. Case studies in Hong Kong, show those areas which are successful contain more than three types of uses including residences, commercial, recreation

community facility and public transportation services. Since residential areas dominate in the mixed-use areas, the concept of the Multiple and Intensive Land use (MILU) should be discussed. This discussion is important in developing residential projects of the government sectors along with various types of public transportation and pedestrian networks, which are linked to the city's vibrant fundamental facilities. However, Rowley (1998) noted that there is no strong evidence to support the concept. A single use function should not be more than 2/3 of the total area when developing any type of project. Financial gains from land use should consider profits from commercial, residential, recreation, institute, and industrial areas. Other considerations include types of residences, occupancy, rental, public use, personal land, and race (Coupland, 1997).

The development of industrial technology makes a significant impact upon theoretical ideas concerning urban forms, such as the Suburbia concept. In the 1920, Frank Lloyd Wright proposed a model for suburban areas in the United States called 'Broadacre City,' in which its concept is coherent with increasing density of people and car uses in suburban areas. The mixed-use area in the "Broadacre City" plan only occupies four square miles of low density area. The city's livelihood may be one of reasons car use increases. Wright's concept offers a different perspective in considering a city's character. (Krohe, 2002). Convenient car use and transportation are widely discussed concepts relating to developing suburban areas. (Argan, 1968 and Krohe, 2002).

## THE STUDY'S RESULTS AND DISCUSSION

### Analysis of mixed-land use including, buildings, and unoccupied spaces

The study identifies converted land uses which are affected by the transformation of urban infrastructure development. This includes buildings and unoccupied spaces on mixed-use land. A survey and observations were made of ten buildings in each study area. An analysis of relations between buildings' uses, heights, unoccupied spaces, and parking lots in high-rise buildings is presented as followings. (Figure 2)

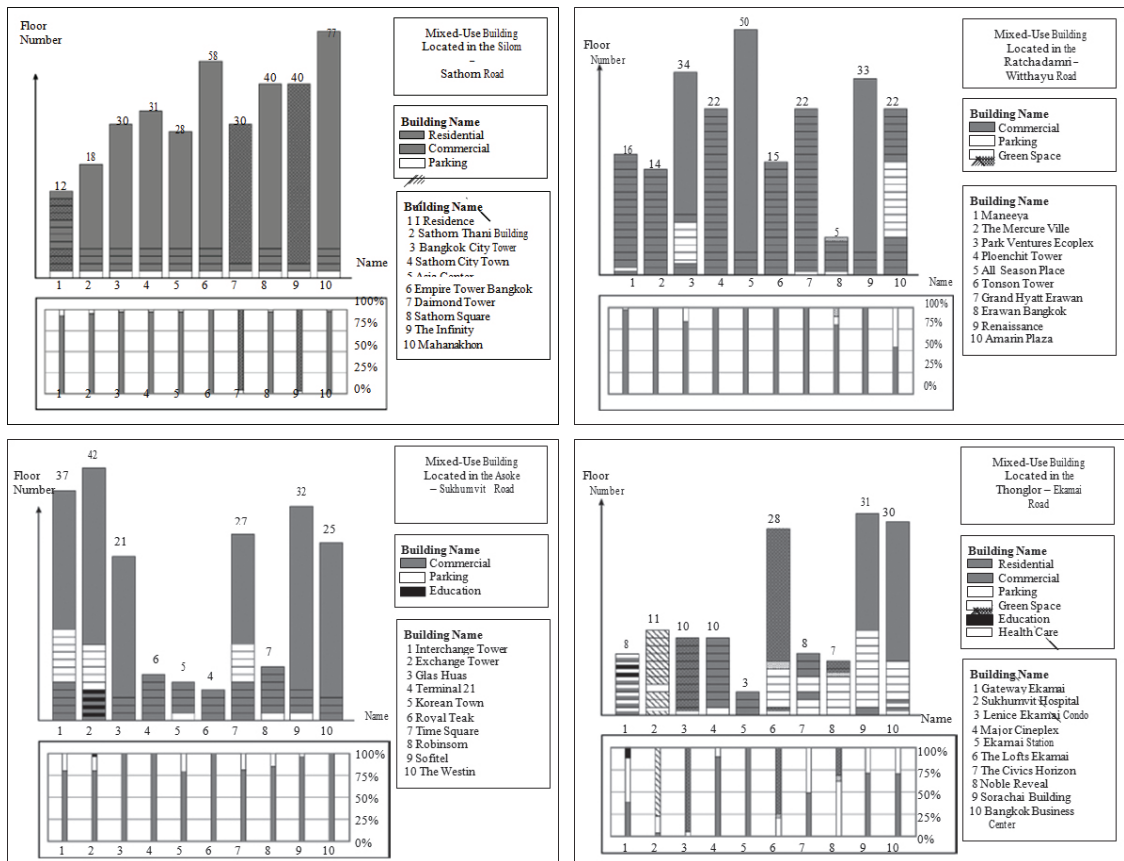


Figure 2:  
Analysis of land use, building, and unoccupied space in mixed-use land

- 1) Silom – Sathorn: Land use is a mix between commercial and residential areas. Due to the adjacent rail way system, parking lots are provided in only some parts of the area.
- 2) Chidlom – Rachadamri: The characteristics of this study area are similar to Asoke and Sukhumvit. Commercial areas are dominant. Parking lots are in the buildings. Green spaces are not found in this area.
- 3) Asoke-Sukhumvit: Most of the land-use areas are commercial. Parking lots are typically located in the buildings. There are no green spaces in this area.
- 4) Thonglor-Ekkamai: Land use varies and includes commercial, residential, and governmental offices. Buildings in this study area also provide

parking lots. Green spaces are founded in residential buildings.

According to the study, building heights around Silom and Sathorn are between 12 – 77 stories. Most are commercial; offices with a mix of residential areas. The study found that parking areas are rare. In the Chidlom – Rachadamri area, most buildings are 5 - 50 stories with the mixed use of commercial and office space. Parking in this area is also scarce except in hotel buildings. For the Asoke – Sukhumvit area, uses of building are also commercial, that of working office. However, the buildings are mostly lower, between 4 to 42 stories. In the Thonlor – Ekkamai area, buildings are the lowest amongst the four areas of study with heights from 3 to 30 stories in buildings serving office and residential uses.



## Influences of Urban Infrastructure on Characters of Intensive Land Use, Urban Form, Building, Building Heights and Accessibility

### Urban Form

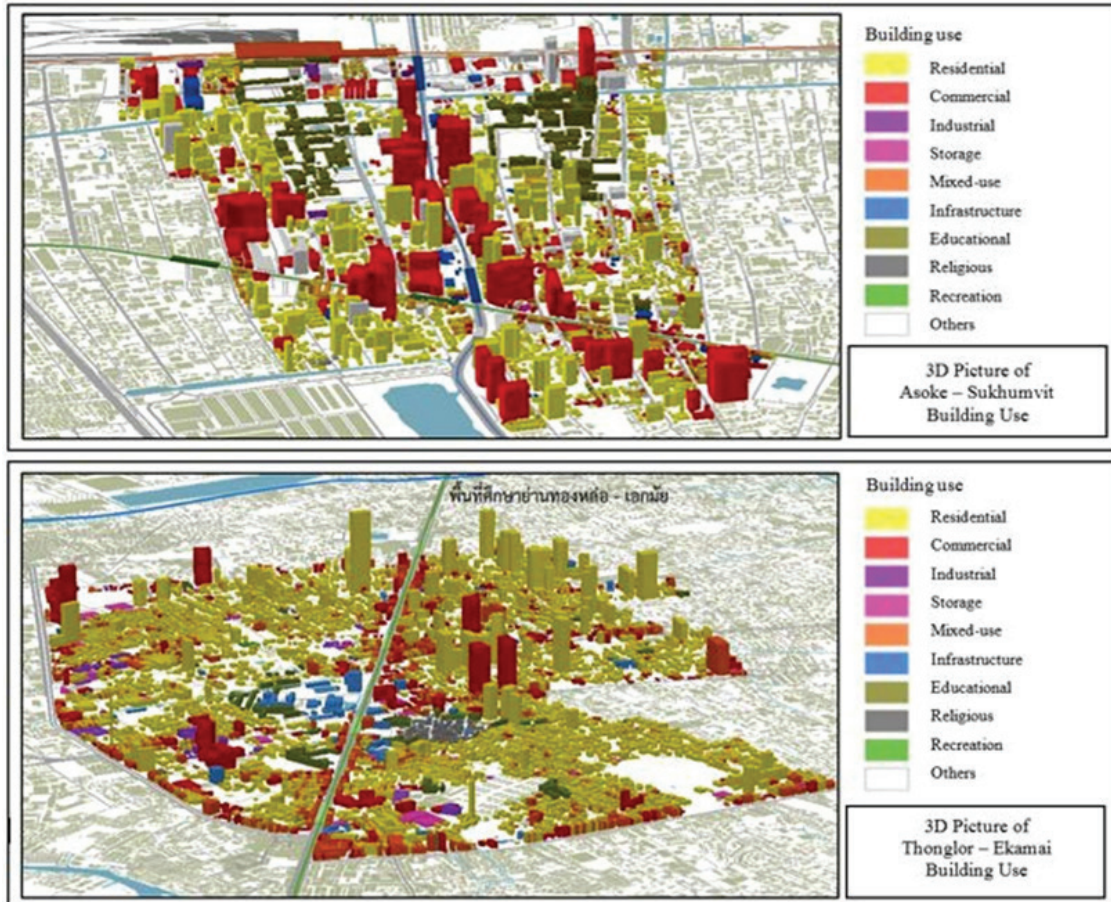


Figure 3:  
The study area: Asoke – Sukhumvit and Thonglor - Ekamai

According to the analysis of the GIS data and Urban Network Analysis model, all four of the study areas are impacted by the development of urban infrastructure. The heights and forms of the buildings studied are shaped by old and new building laws and regulations in relation to the new developments of railway systems. The sections of commercial areas containing old building are regulated by previous codes that state that if the road in front of the building is not wide, the higher floors of the

building need to be set back in accordance to the width of the road. However, the new commercial areas' regulations require that FAR of the building have to be in a 10:1 ratio. If buildings are located along the road that is more than 15 meters-wide, the characteristics of the building's form could be selected from the proposed regulations. In the new regulations, the different widths of the road require various regulations; as a result, each study area is distinctively impacted by the new commercial areas.

For example, regulations of Asoke – Sukhumvit, which has a narrow road width, demands that the height of the buildings needs to be directly associated with width of the road. On the other

hand, the wide widths of the roads area of Silom – Sathorn requires only an ample set back space for pedestrians; therefore, the buildings' form and height in the area are not strongly impacted.

## Intensive Land Use Analysis with Technique of Urban Network Analysis

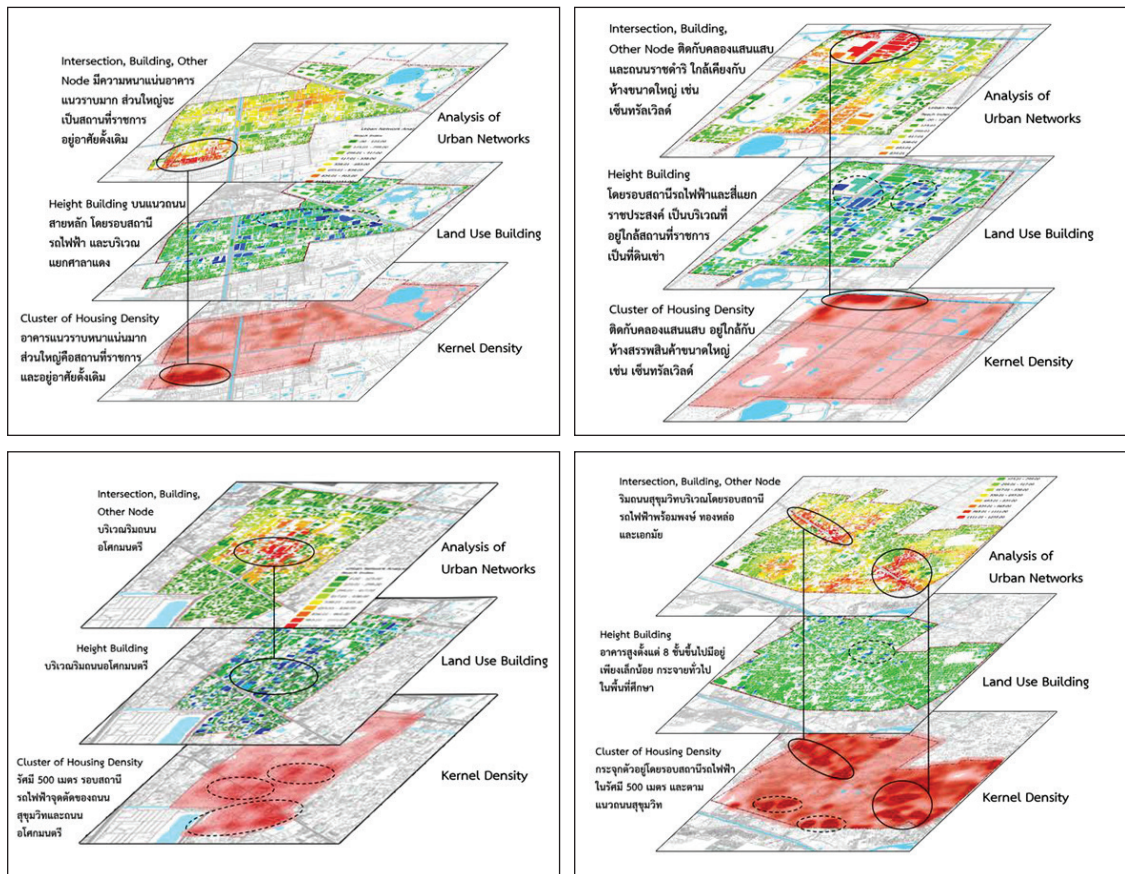


Figure 4:  
Urban network in Silom, Asoke, Sukhumvit and Thonglor

- 1) Silom – Sathorn: The majority of buildings in the area are typically located around governmental buildings such as schools and hospitals. These buildings are low-rise with less than three floors. The main access to the area is in the most dense section which is also around the low-rise buildings. Like Asoke – Sukhumvit, most of the buildings with heights between 15 and 30 floors, are located within a 500-meter diameter of the urban's infrastructure and traffic junctions.
- 2) Chidlom – Rajdamri: The densest areas are at the transferring hubs of boat services, pedestrians, vehicles and railway stations. These are located near the big department stores and are within a 500-meter diameter of

railway stations. This dense area is significant in terms of economic and business aspects. The main traffic flow of the area is also around this area. A greater number of buildings, which are between 5 and 30 floors, are scattered around these transferring hubs and are also within a 500-meter service radius of urban infrastructures

- 3) Asoke – Sukhumvit: The most density area is located within a 500-meter diameter of the railway station or the urban's infrastructures. There are various heights of buildings in the area. Most buildings are distributed around the area and are between three and thirty floors. The core of the study area, which is the center of commercial and office buildings, is along Asoke Montri road, which is. Mostly officers access this area; therefore, the area is also a primary access of the study area. This core area is within the service radius of the urban infrastructure and is also accessible by pedestrians. Most buildings in the core area are between eight to thirty floors.
- 4) Thonglor – Ekamai: Most of the area's density is along Sukhumvit road and is within a 500-meter service radius of the urban infrastructure, which is a transportation hub. With a high volume of travelling, this area is also a location of most accessible circulation. Most buildings are low-rise with between three and five floors. The highest buildings, with between 15 and 30 floors, are scarce, however the ones who are of this height are distributed randomly across the study area.

## Analysis of Factors Deriving from the Urban Network Analysis Model, the Behavior of Social Culture, and Economics for Intensive Mixed Use Development

In this study, methods of the Urban Network Analysis model, social analysis and variable analysis (ANOVA) are applied to the four areas of study. These were used to identify differences

of behavior and perspectives of people within the areas of intensive mixed uses. The findings of the study demonstrated similar behaviors in terms of commuting to/from and within the specified areas. Everyday most of them enter the areas to either work and/or reside. When considering land use the study confirms that most of the areas are residential, followed by commercial mixed uses. However, the mixed land use of the four areas is not intensive. According to the review of literature there should be more than three to five types of uses in the same buildings.

In order to analyze relations between factors, the study uses the Pearson Correlation Analysis with three variables including 1) behaviors of commutation; 2) people's attitudes and awareness; and 3) people's satisfaction. The following table demonstrates the study's results in relation to the first variable listed above.

**1) The dynamics of land use change:** The study found that land use in the Silom and Asoke areas are intensive with influencing factors such as Inter Modal and main roads. The findings also demonstrate the influence of commercial areas, offices, restaurants, hotels, educational institutions and recreation. Their bridges between the buildings allows for ease in walking. These two areas are consistent with the concept of intensive land use. Thus, these areas afford a higher scale living than those areas with fewer than three types of activities.

**2) The analysis of relationships between of intensive land use and behavior and attitudes toward living in each neighborhood by the ANOVA technique:** In this study, behaviors related to travelling in an intensive land use areas, revealed residents or users accept the assumption H0: variation in the behavior of the resident or the use of an intensive land use in each area at no significant difference at the 0.05 level by statistical analysis for multiple comparison (Testing by Post Hoc). Residents living in or using mixed-use land in different locations behaved significantly difference at the 0.05 level

**3) Attitudes and awareness of development of an intensive land use for urban structure**



**sustainability:** Residents or users accept H1 hypothesis: variance of attitudes and awareness of residents or use of mixed land use areas. There were significant differences at the 0.05 level, the study found that were to test the difference in multiple comparison. Post Hoc Tests were similarly analyzed. Residents or occupants of the Silom - Sathorn area have attitudes and knowledge of an intensive land use for sustainability of urban structures. The residents in Ekkamai - Thonglor area were significantly at the 0.05 level.

**4) Satisfaction with living in an intensive land use zone for urban structure sustainability:** In this study, residents or users accept the hypothesis H1: variance of satisfaction with living or using an intensive land use in each area. There were significant differences at the 0.05 level. Statistical analysis was used to test the difference between the multiple comparisons (The Post Hoc Tests).

The result of study found that of the residents of the Ekkamai-Thonglor area are pleased with in an intensive land use zone for sustainability of the urban structure. The residents of Silom - Sathorn and Chidlom - Ratchadamri area were significantly affected at the 0.05 level. Analyze the relationship between variables in in an intensive land use zone and with three-factors; (1) travel behavior in mixed-use areas; (2) attitudes and awareness in an intensive land use zone for sustainability of urban structures development; (3) satisfaction with living in an intensive land use zone for urban structure sustainability by Pearson Correlation Analysis. The study shown that those, who have two factors, were related. The behavior of traveling in mixed land use areas and attitudes and awareness on intensive mix land use zone for the sustainability of urban structures significantly understand and accept an intensive land use zone can lead to sustainable development.

**Table 1:** A study of the behavior of traveling in mixed land use areas

Travel behavior in mixed use areas	Level of Agreement				
	1	2	3	4	5
Residential or working area have easy and convenient accesses and sufficient public transportation				●	
When commuting to Bangkok's CBD such as Siam, Asoke, Silom, Sathorn, public transportation i.e. BTS, MRT and BR is chosen				●	
You are willing to pay transportation fee, which current are appropriate.			●		
You think that intensive mixed use area promotes more walking opportunities; therefore, all activities are linked and potential of economic development is increased.			●		
You satisfy with living and working in area, in which railway network is provided and is an intensive mixed use area			●		

In term of people's attitudes and awareness, the study's findings are as shown in the followings;

**Table 2:** Attitudes and knowledge of integrated development of mixed land use for urban structure sustainability

Attitudes and knowledge of integrated development of land use for urban structure sustainability	Level of Agreement				
	1	2	3	4	5
Various mixed uses and higher density prevent urban sprawl with no direction					
You think that high rise and large building have too big proportion in mixed use. There should be at least other 3-4 types of uses such as office, retail, restaurant, financial institution, education, green space, etc.					
You agree that closeness of the building save time and area					
You agree that setback of the public road and setback between building assist people to access the area and public transportation easier					
You agree that you should receive infrastructure service with development of connected buildings and mixed use development					

Finally, the result of the study in respect to people's satisfaction in living in the mixed use are as followings;

**Table 3:** Satisfaction with living in an integrated mixed use development zone for urban structure sustainability

Satisfaction with living in mixed use development zone of land use for urban structure sustainability	Level of Agreement				
	1	2	3	4	5
You think that living in the high-rise building is not different from the low-rise one					
You think that high-rise building is more safe and provide more privacy than the low-rise building					
You think that people who live in the high-rise building have less interaction comparing to the low-rise building					
You think that living in far distance have more social interaction than living closely					
You do not mind to live and work in the area with high density of high-rise buildings because Bangkok is fascinating					
You agree with design for convenient and willing to pay high price for living in the residential project, which is intensive mixed use and located nearby the railway network					
Design for buildings in the intensive mixed land use should concern with sunlight, ventilation, decreasing of noise, traffic management and landscape design					
You think that mixed land use development is a demonstration of good city development and promote good quality of living					

**Table 4:** Results from relation test

Model Summary <sup>b</sup>			
Model	R	R Square	Adjusted R Square
1	0.370 <sup>a</sup>	0.137	0.132

ANOVA <sup>b</sup>				
	Model	df	F	Sig.
1	Regression	1	28.285	0.000 <sup>a</sup>
	Residual	178		
	Total	179		

In order to analyze of relations between variables of intensive mixed-use development, the method of Pearson Correlation Analysis is applied. The researchers designate that Coefficient value of correlation (R) is between -1 to 1. While the minus values present negative or opposite relation; the plus values show positive or coherent affiliation.

- 1) If the R value is between +/-0.50 and +/-1.00, relation between variables is strong.
- 2) If the R value is between +/-0.30 and +/-0.49, relation between variables is moderate.
- 3) If the R value is between +/-0.10 and +/-0.29, the relation between variables is low.
- 4) If the R value is .00, it means that variables are not related to each other.

**Table 5:** Results of coefficients and excluded variables

Coefficients <sup>a</sup>		Beta	t	Sig.
1	(Constant)		4.907	0.000
	Attitudes and awareness of mixed use development for sustainable city	0.370	5.318	0.000
Excluded Variables <sup>b</sup>		Beta	t	Sig.
1	Commutation behavior in mixed use development	0.110 <sup>a</sup>	1.402	0.163

**Table 6:** Demonstrates summarization of relation analysis of variables in the intensive mixed use development

4.907 + 0.110 (Commutation behavior in mixed use development) + 0.370 (Attitudes and awareness of mixed use development for sustainable city)	= Satisfaction of people living in the mixed use development area for sustainable city
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The analysis demonstrates that the Coefficient value of correlation (R), Significance (t), and percentage of relation between variables are 4.907, 0.370, and 13.7 accordingly. According to the analysis, it can be concluded that satisfaction of the people living in the mixed use area varies and is directly related to their commutation behavior and attitudes and awareness of mixed use development for sustainable city. In addition, it can also be summarize that the users of the mixed use have good attitudes and awareness toward mixed use development for sustainable city. Furthermore, most users agree that more intensive mixed use and more density are helpful in preventing the city sprawling without direction. The users also concur that access to the area and public transportation are more convenient and efficient with designation of setback between buildings and public road. Finally, users are able to access their urbans' facilities and infrastructures more easily with mixed use development.

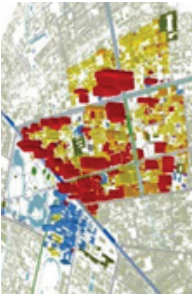
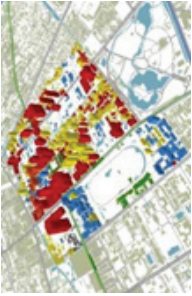


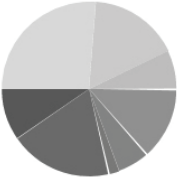
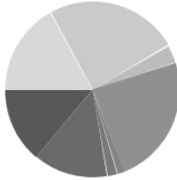


## CONCLUSION

### The Study's Conclusion

This study explores how urban infrastructures impact urban form with spatial analysis tools. The study selected four study areas including 1) Asoke – Sukhumvit, 2) Silom – Sathorn, 3) Chidlom – Ratchadamri, and 4) Thonglor – Ekamai. Additionally, in the four study areas, there are several commutation modes or called 'Inter Modal,' in which areas of linkages between modes are mixed use. Though all four study areas have more intensive mixed use development than other Bangkok's areas, Asoke – Sukhumvit can be identified as the most intensive mixed use area due to a number of Inter Modals and also more users than the other three areas. The results show that the public railway network has a great impact on intensive land use, especially on commercial spaces, office buildings, restaurants, hotels, educational, and recreational uses. There are a great number of connections between buildings. Having buildings connected is coherent with intensive mixed use development's concept and idea in that there should be more than three uses in the area. (Table 7)



**Table 7:** Conclusion of urban network analysis and pedestrian accesses in the four study areas

Factors / Locations	Silom - Sathorn	Chidlom - Rachadamri	Asoke - Sukhumvit	Thonglor - Ekamai
Urban Structure				
Type of Land Use				
Level of Density	High	High	High	High
Type of Residence	Vertical living	Vertical living	Vertical living	Vertical living
Type of Commercial	Office Building	Big Department Store and Restaurant	Restaurant, Office Building and Department Store	Restaurant and Department Store
Access to Public Space and Recreation	Pedestrian in front of building and Lumpini Park	Pedestrian in front of building	Chuvit Park and Benjakitti Park	Pedestrian in front of building and Benchasiri Park
Social Form and Commutation	Like Asoke – Sukhumvit, most users enter Silom – Sathorn area approximately 2 times a day, however, for a residential purpose. Average distance is 5 kilometers while average time is 53 minutes. Commutation budget of each user is about .81 baht	Most users come to Chidlom – Radchadamri 2 times a day for travelling, shopping, recreational and working purposes. Average distance and time are about 11 kilometers and 46 minutes accordingly. Each user typically spends 56 .baht for commutation	Most users enter the study area approximately 2 times a day for a working purpose. Average distance and time are 21 kilometers and 75 minutes respectively. Each user pays the most expensive commutation budget out of the four area at .about 81 baht	Like Asoke – Sukhumvit, users of the Chidlom – Radchadamri enter the area 2 times a day for working purposes. Average distance and time are about 13 kilometers and 62 minutes accordingly. Each user spends the least commutation expense .at 56 baht

## Guidelines for Making Policies that Promote Intensive Mixed Use Development

There are several ideas in mixed use development that are important for neighborhood communities; location of residences, commercial spaces, city facilities and infrastructure. Ideally, without having to own vehicles, users are able to walk to their accommodations and work place on a daily basis. In order to achieve mixed use development, the three following measures should be considered:

### City Planning Measure

- 1) The neighborhood center should be revitalized and developed.
- 2) Intensive mixed use development should be promoted along with building setback and building height's regulations.
- 3) Facilities and services including public parks, recreation areas, schools, and clinics should be encouraged so that people living and working in proximity to railway stations can be relaxed and entertained.
- 4) Commutation is a key issue in district planning. Besides current railway systems, roads for vehicles, and pedestrian walkways, other ways of commuting such as light railway or more public bus, should be provided in the districts. In addition, the district commutation should be linked with the larger community and city scale for greater and more efficient access.

### Environmental Measure

- 1) Mixed use in communities and districts could include both public and private parks. There should be various activities organized and sponsored by both the public and private sectors.
- 2) Due to the dense population security issues should be prioritized. Extensive policies need to be established concerning security issues as well as security cameras set up in all areas.
- 3) To maximize profit in commercial and retail spaces, various mixed use, such as entertainment, restaurants, etc, should be promoted.

### Social Measure

- 1) Community centers should be encouraged so that people in the same community can help each other and enjoy a higher quality of life. This concept is based on the idea of promoting participation within one's local community.
- 2) Mixed use development could promote a city's lifestyles, career resources, and provide effective accessibility to all of a city's facilities.
- 3) The size of family, living space, lifestyle, and culture are significant factors in the needs of residence. These factors impact choices on commutation, education, and the use of other facilities. Therefore, they should be fully addressed.

Developing mixed use spaces may impact the urban form and landscape. These developments may generate repercussions which are not coherent with residency, industry, and commutation. Conflicts may arise if people are not familiar with intensive mixed use's activities and environments. Being conflicted may affect people's satisfaction concerning living in the mixed use areas, and the roles of districts in the city context.

### Recommendations

Recommendations for an intensive urban land use model would be to build a network of public transport links and incorporate the concept of mixed land use. The most important thing is to create a community-level neighborhood in which both residential and commercial facilities are easily accessed. These facilities would not require travel vehicles, but can be gained by walking. Suggestions for this type of development are as follows:

#### City Planning Measures;

- Development should be promoted within the center of the district where areas need rehabilitating.
- In areas of high density measures of the setback and the height of the buildings should be a concern

#### Environmental Measures;

- The district and community must provide both public and private parks parallel to the concentration of buildings.

- To connect and implement community safety measures
- Generate a variety of public and private activities

#### Social Measures;

- Develop community centers
- The community centers must be based on the concept of living in a shared society
- Make lifestyles harmonize in both social and cultural means
- The populist must interact with each other or participate in activities that encourage them feel like the same corporate culture.
- Provide an atmosphere that includes a climate suitable for living.
- Encourage an inclusive society which is able to live in good health, without sources of air pollution.

This development can be sustained in a long run.

#### Further Study

According to the study, the Urban Network Analysis's measuring tool is appropriated for future research by urban planners in analyzing accessibility of walking distances between buildings and roads. This tool helps analyzing urban Geographical data more effectively. In addition, analysis with high level of SPSS will easily assist in explaining relationships among variables of urban areas.

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