Not Just from Point A to Point B: Failures of the Transportation and Land-Use Plans for the Northeastern Bangkok

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Abstract

The Comprehensive Plan for the Bangkok metropolitan area was revised and enacted in April 2006. The new land-use plan maintains the former plan's land-use pattern-only reclassifies and reduces the land-use classes. The concentric rings of land uses highlights the importance of the city's core while spots of urban sub-centers are designated at key outlying intersections. Essentially, the model of the transportation and land-use interaction has not changed from the former plan—designation of urban sub-centers interconnected by a series of arterial roads. This model seems to base on conventional urban transportation and land use interaction model where origins and destinations are the generators of traffic to be supported by adequate supply of transportation channels. It is to realize that this model has not well served the development patterns in Bangkok, evidently in the past decade, to develop a new plan that truly supports the system of urban sub-centers. This study—using a case study of the northeastern region of the Bangkok Metropolitan—illustrates the failures of the transportation and land-use plans for Bangkok metropolitan area that concerned mainly the connection from point A to point B (urban sub-centers) but disregarded the in-between places. Bangkok Metropolitan Administration's planners should have learned such failures during their implementation of the predecessor plan—the 1999 Comprehensive Plan (the First Revision) and planned the new Plan

for a better chance of success in generating and supporting the urban sub-centers. However, the new Plan shows that the planners have not done their homework revising the 1999 Plan.

Keywords : Bangkok Metropolitan Administration, Comprehensive Plan, Transportation and Land Use Plan, urban sub-centers

From Point A to Point B: Urban Sub-Centers in the 1999 Comprehensive Plan for Bangkok

This study analyzed the former Comprehensive Plan of 1999, prior being superseded by the new revised Plan in April 2006. The transportation and land-use plans, as parts of the 1999 Comprehensive Plan, for Bangkok metropolitan area inhered classic urban mode—a concentric rings of gradually reduced density, and conventional urban transportation model—origin–destination linkage. These models theoretically explain simplified urban phenomena but do not practically reflect the organic, uncontrolled Bangkok. As a result, the plans miserably failed to generate the urban sub-centers—one of the main goals of the plans.

Since the first city planning law to control land use and urban growth in Thailand enacted in 1952 ; —however, the law was not fully enforced until the 1970s (Vichit-vadakan, 1976). There were a number of plans for Bangkok area: the Greater Bangkok Plan for 1990 in late 1960s, the Greater Bangkok Plan 2000 in 1969, the First Revised Metropolitan Plan in 1971. None of these plans were officially passed into law until 1992 (Piromruen, 2000). This 1992 plan was then revised in 1997, and was passed into law in 1999 to become the comprehensive plan, entitled the 1999 Comprehensive Plan (First Revision Edition), used until early 2006.

The revision of the 1992 plan for the 1999 Comprehensive Plan was minor. The land-use plan was virtually maintained, while the transportation plan was updated with clearer delineations of new major roads. Also, the objectives and goals of the 1992 plan were updated to incorporate the recommendation of a Massachusetts Institute of Technology (MIT) consultant team, in a study entitled “A Vision for

Bangkok" (Bangkok Metropolitan Administration, MIT Consultant Team, & EC/BMA Project Team, 1995), to create a series of urban sub-centers. However, these sub-centers were only schematically outlined in conceptual maps, and not clearly defined in the revised land-use plan.

The 1999 Comprehensive Plan was conceptualized with concentric rings, having commercial zones at the center of the city, high-density residential zones encircling the center, medium-density residential zones surrounding the high-density core, low-density residential zones on the fringe, and agricultural zones on the periphery (Figure 1). This urban model reflects the Plan's underlying mono-centric urban model based on Alonso's land-rent theory (1964), which explains the relationship between land use and distance from a city's center. In fact, the city's center is far more powerful than the distributed sub-centers, and thus becomes the major influence on commercial and land-intensive land use. In 2000, for example, more permits for buildings with six or more stories were issued in the central districts than in the districts with designated sub-centers, 22 to 15 projects (Bangkok Metropolitan Administration Policy and Planning Department, 2000).

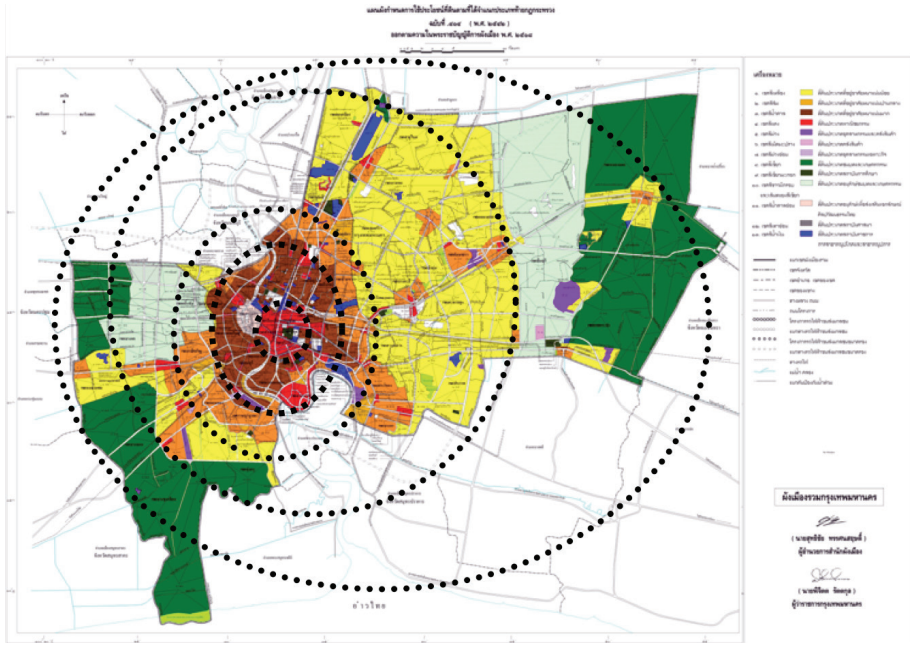


Figure 1 Concentric rings of land use in the 1999 Comprehensive Plan. (Source of underlay map: Bangkok Metropolitan Administration Data Center (1999).)

Despite having the mono-centric urban model as its fundamental concept, the 1999 Plan also incorporates parts of the polycentric urban model (Figure 2), which was developed to explain an emerging phenomenon in modern cities identified in studies of edge cities by Garreau (1991) and of the Los Angeles region by Guiliano & Small (1991). The Plan emphasizes decentralization to sub-centers along and within the outer ring road. Its intention to implement the polycentric concept was emphasized in its vision statement, and was recommended by a Massachusetts Institute of Technology (MIT) consultant team in a study entitled “A Vision for Bangkok” (Bangkok Metropolitan Administration, MIT Consultant Team, & EC/BMA Project Team, 1995).

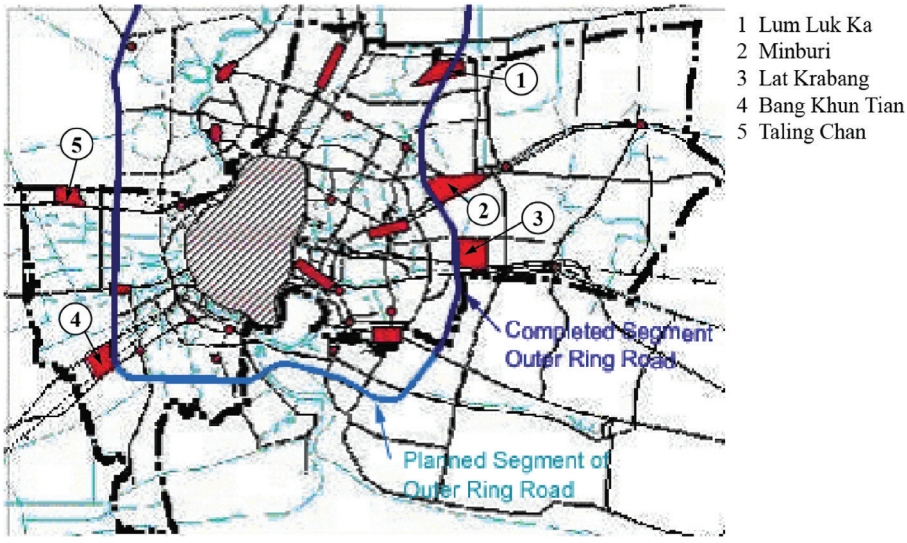


Figure 2 Conceptual plan for polycentric sub-centers. (Source: Modified from 1999 Comprehensive Plan (First Revision Edition), Bangkok Metropolitan Administration Data Center (1999).)

The planned sub-centers are areas containing commercial land use at the core, surrounded by high- and medium-density residential zones. Each zone provides up to 10% of the area that may be allocated to uses other than the desig-nated use, excluding industrial uses larger than 100 square meters, fuel storage sites, commercial animal farms, cemeteries, silos, waste storage sites or land fills, and junk yards. By law, parcels with commercial buildings are required to have a minimum of 10% open space. As a result, the land at the commercial core of each sub-center is to have commercial-building coverage up to 80% when the land is fully developed.

The plan describes four scales of sub-centers neighborhood, community, district, and city—defined by the size of the area, radius of service, and size of the population. The neighborhood and community centers support retail commerce with basic services such as primary schools, post offices, police stations, and health clinics. The district and city centers support large-scale commerce—offices, retail shopping centers, hotel and convention centers, entertainment facilities—with other services such as vocational schools, colleges, hospitals, and public parks.

The 1999 Comprehensive Plan specifies ten land-use classes. In this study, commercial land use and high- and medium-density residential land use were considered to be the target land-use types for the development of urban sub-centers in the study area. The areas of these planned sub-centers were not clearly delineated in the Comprehensive Plan, however: various conceptual maps in the Plan (see, for example, Figure 2 to Figure 4) merely point out locations of planned sub-centers schematically, using symbols such as circles and ellipses. Identifying the planned sub-center areas for purposes of evaluation therefore inevitably involved a certain amount of interpretation of these locations, based on the designated land-use zones of the Plan.

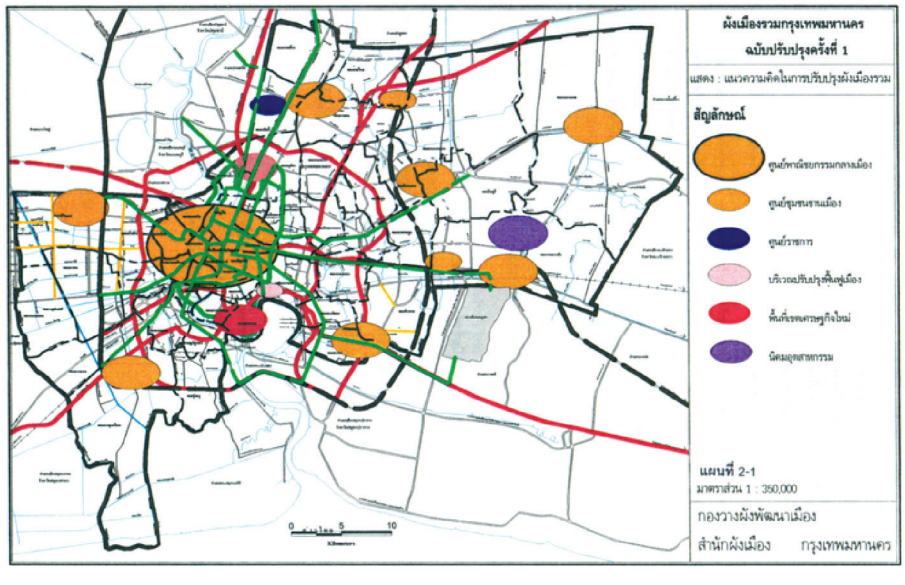


Figure 3 Conceptual map of urban sub-centers.
Source: (Bangkok Metropolitan Administration, 1999)

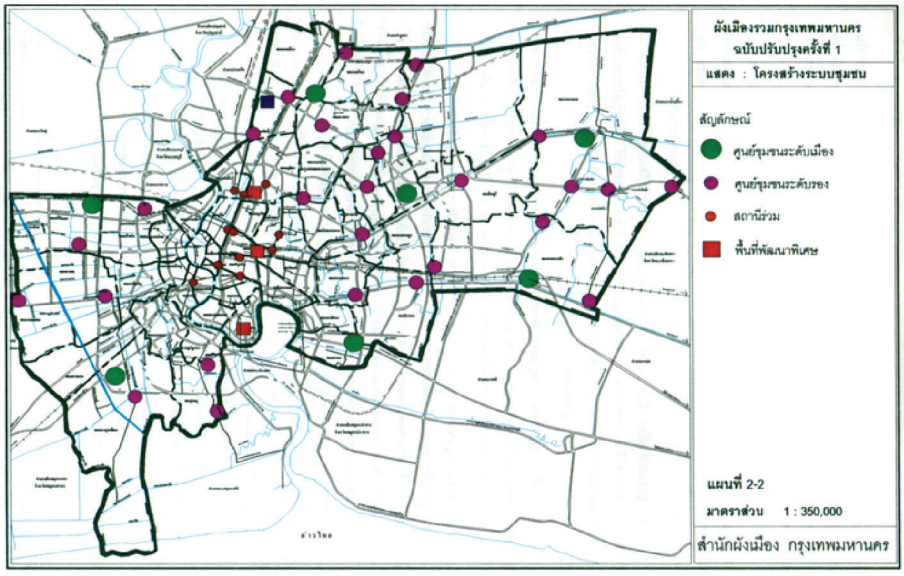


Figure 4 Conceptual map for three scales of sub-centers. Source: (Bangkok Metropolitan Administration, 1999)

The Plan was obviously conceptualized based on a view of the transportation and land-use relationship that focuses on linkages of origins to destinations. The Plan ignores the development potential of areas along the linkages. Furthermore, it views the new arterial roads (Figure 5) as having lesser roles in supporting the sub-centers.

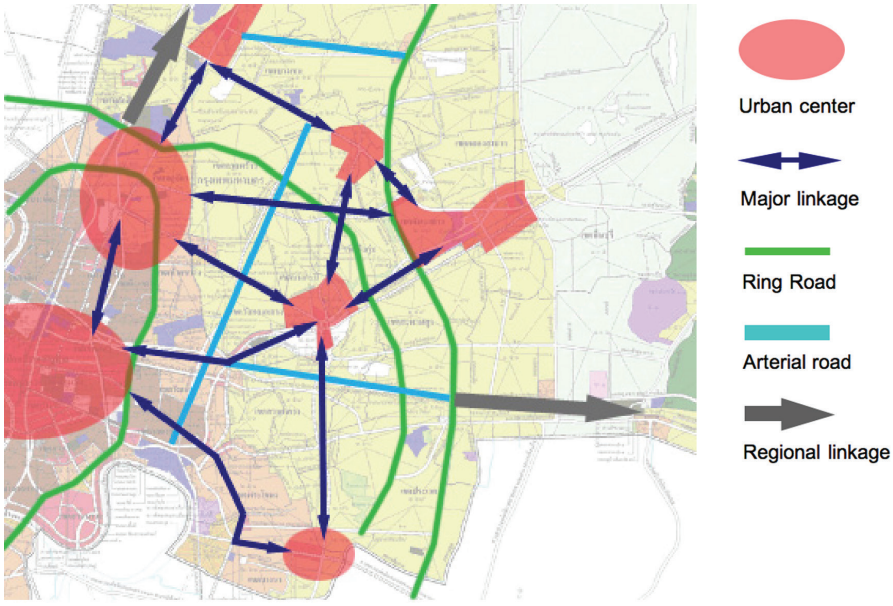


Figure 5 Conceptual diagram of polycentric model and transportation linkages.

The processed comprehensive land-use plan (Figure 6)—which shows the planned land-use zones of the Comprehensive Plan—was rasterized image modified and georeferenced to 25-meter-resolution GIS raster data from a JPEG-format land use map for spatial analysis. The map identifies planned zones of commercial land use and high- and medium-density residential land use that match those shown in Figure 2 above.

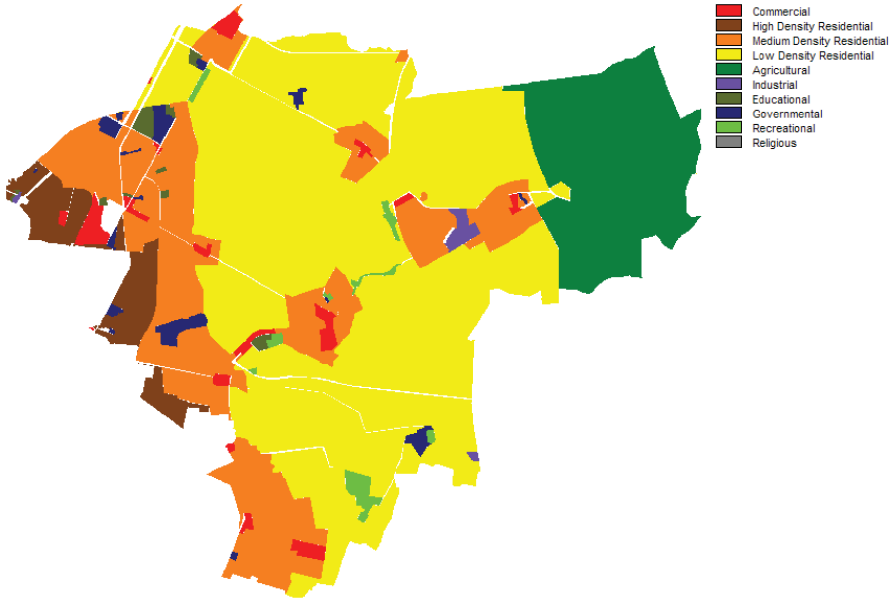


Figure 6 The 1999 Comprehensive Plan's designated land uses.

The planned land-use map shows that only 2% of the study area is planned for commercial land use, with 4.5%, 20.3%, and 55.7% planned for respectively high- medium- and low-density residential land uses (Figure 7). A combined total of 26.7% of the area is therefore planned for a commercial, high-density residential, and medium-density residential land uses—the target land uses for the sub-centers.

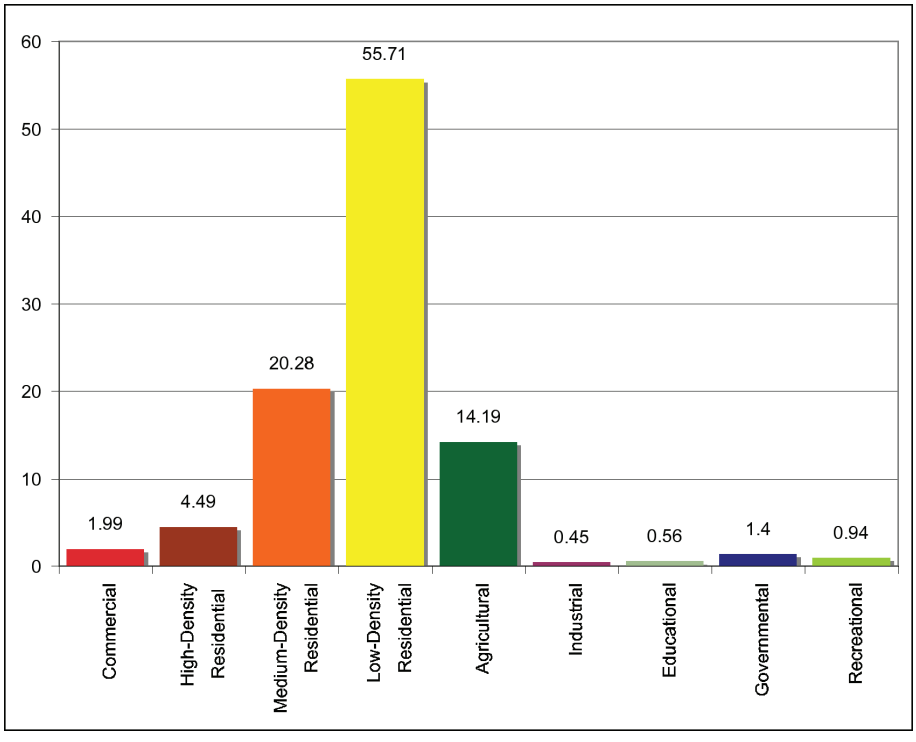


Figure 7 Distribution, in percent, of the 1999 Comprehensive Plan's designated land uses.

Where are Actually Point A and Point B?: Commercial and Mixed-Use Development in 2000

The surveyed land-use map of 2000 was obtained from the Department of Town and Country Planning in a digital image file format. The image was processed and georeferenced to the map of the Land Use Plan above (see Figure 8). The surveyed land use map shows that, in the year 2000, the largest land use in the study area was residential, covering 68.4% of the study area (Figure 9). Areas with commercial land use covered 6.3% (note, for later reference, that this exceeds the 2% of the area planned for commercial land use under the Comprehensive Plan), while mixed-use areas covered 4.9%, so that commercial and mixed-use land uses together covered 11.1%.

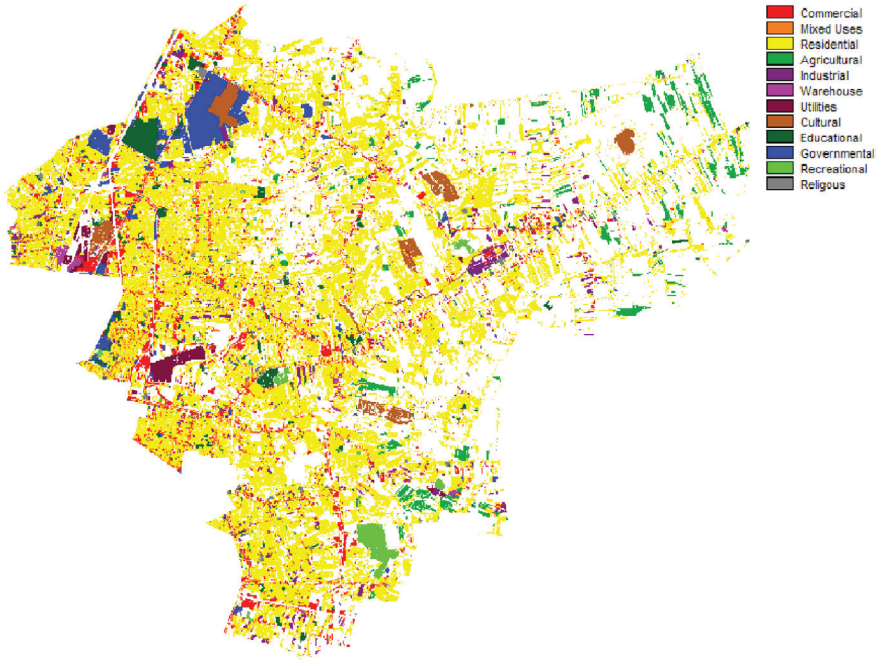


Figure 8 2000 surveyed land use map.

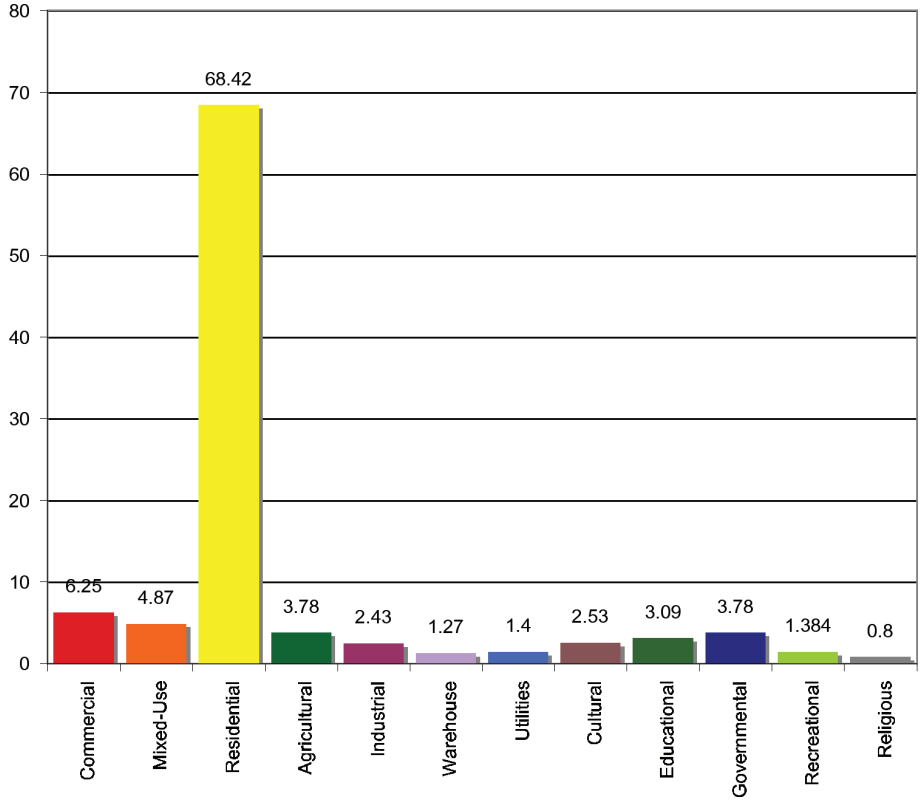


Figure 9 Distribution, in percent, of 2000 surveyed land use map.

The commercial and mixed-use areas in 2000 were extracted out from the surveyed land use map, as shown in Figure 12. The maps of commercial and mixed-use areas in 1990 and 1995 were reconstructed using reduction method. The reconstruction process was based on the information from the 2000 map and remote sensing data (LANDSAT imagery and aerial photographs) from which non-urban built-up areas in 1990 and 1995 were identified. Hence, commercial and mixed-use areas in 2000 can be deducted to create the maps for the earlier years (Figure 10 and Figure 11). These maps clearly show the linear pattern of the commercial and mixed-use developments along the arterial roads and the impact of new roads, especially Ratchadaphisek Road which was completed in 1993. In 2000, Pradit-Manudharm Road improved accessibility of many roads inside the Ladphrao-Ramintra superblock resulting increasing area of commercial and mixed-use developments in the middle of the block.

In order to quantify the pattern of the commercial and mixed-use areas quadrat analysis was used to determine the degree to which points in a scatter are regularly distributed, randomly distributed, or clustered. The analysis is based on the number of points in grid cells of given area, and in particular the ratio of the variance of that number to its mean (Clark Labs, 2002). Variance/mean ratio values close to 1.0 suggest a random point pattern. Values significantly smaller than 1.0 suggest a regular distribution, while values greater than 1.0 suggest a clustered distribution.

The results of the quadrat analysis of the pattern of commercial and mixed-use developments in 1990, 1995, and 2000 show variance/mean ratios ranging from 0.89 to 0.94, which suggest that the combined commercial and mixed-use areas were randomly distributed. Statistically, the patterns were clearly not clustered in the planned urban sub-centers.

Table 1. Statistics from quadrat analysis of commercial and mixed-use areas in 1990, 1995, and 2000.

	1990	1995	2000
QUADRAT			
n	380331	380331	380331
mean (density)	0.0589	0.0931	0.1112
variance	0.0554	0.0844	0.0988
Variance/Mean Ratio	**0.9411**	**0.9069**	**0.8888**
t	-25.6834	-40.6004	-48.4786
df	380330	380330	380330
Significance level	<0.001	<0.001	<0.001

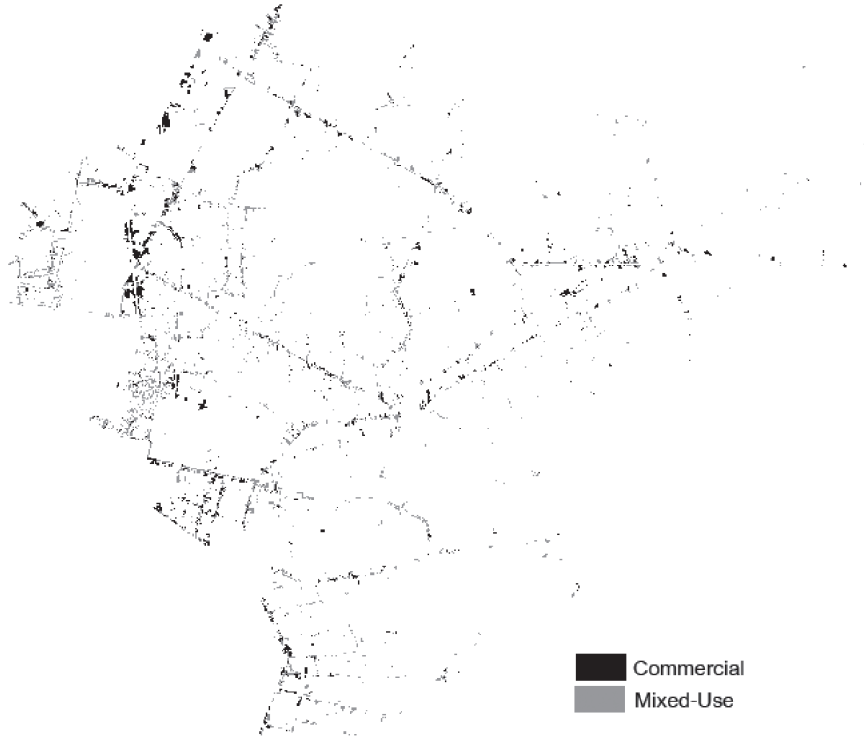


Figure 10 1990 commercial and mixed-use areas.

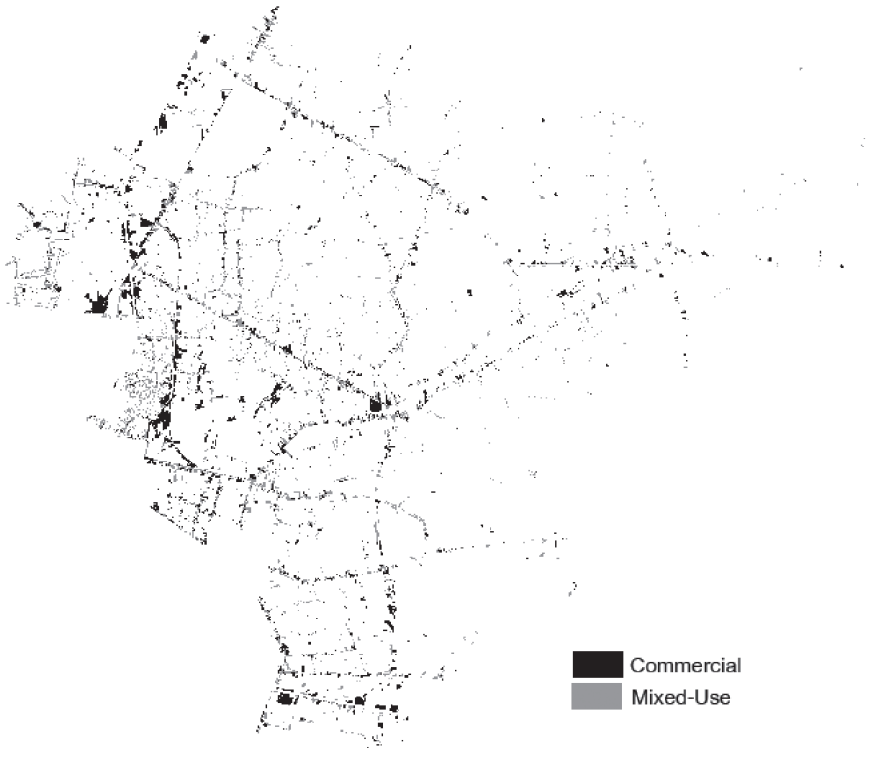


Figure 11 1995 commercial and mixed-use areas.

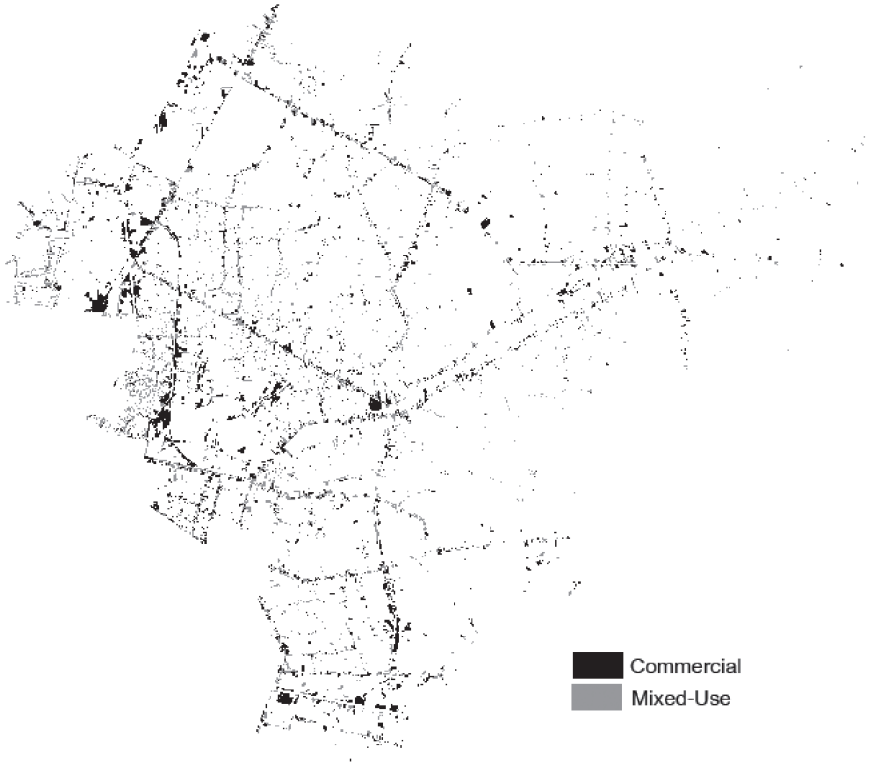


Figure 12 2000 commercial and mixed-use areas.

Distribution of Commercial and Mixed-Use Land Uses Compared to the Planned Sub-Centers

To evaluate the success of the Comprehensive Plan at directing commercial and mixed-use land uses to planned sub-centers, this section examines the distribution of areas with actual, surveyed commercial and mixed-use land use across the Comprehensive Plan's planned land-use zones. Because, as noted above, the Plan does not identify the precise areas of the sub-centers, the planned land-use zones are used as proxies for the sub-centers in this analysis. Specifically, the sub-centers are interpreted as corresponding to the planned commercial, high-density residential, and medium-density residential zones combined.

Commercial and Mixed-Use vs. Planned Commercial, High-Density, and Medium-Density Residential Zones

These three planned zones combined cover 135,841 pixels (84.9 sq km) or 35.7% of the study area. In 1990, actual commercial and mixed-use areas covered only 10.3% of the zones (Table 2), a proportion that increased to 15.5% in 1995 and 16.9% in 2000. At the same time, the proportion of commercial and mixed-use areas that occurred inside the combined planned zones fell from 62.3% in 1990 to 59.5% in 1995 and 54.3% in 2000 (Figure 13).

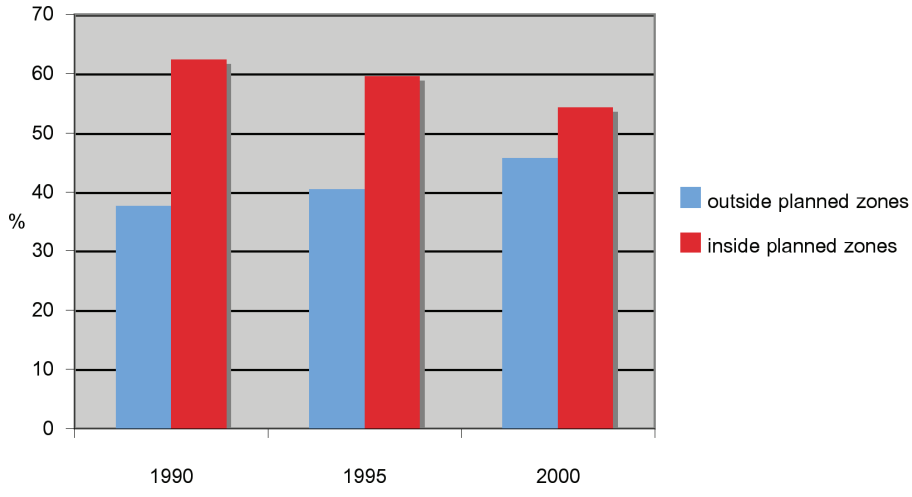


Figure 13 Distribution of commercial and mixed-use areas outside vs. inside planned commer-cial, high-density residential and medium-density residential zones.

Table 2. Actual commercial and mixed-use areas vs. planned commercial, high-density and medium-density residential zones (number of pixels).

	1990		1995		Change (1990-1995)	%Change	2000		Change (1995-2000)	%Change
	Fre-quency	Per-cent	Fre-quency	Per-cent			Fre-quency	Per-cent		
outside planned zones	8438	37.67	14335	40.48	5897	69.89	19317	45.69	4982	34.75
inside planned zones	13963	62.33	21076	59.52	7113	50.94	22965	54.31	1889	8.96
Total	22401	100	35411	100	13010	58.08	42282	100	6871	19.40
non-commercial/ non-mixed-use	121878	89.72	114765	84.48	-7113		112876	83.09	-1889	
commercial/ mixed-use	13963	10.28	21076	15.52	7113		22965	16.91	1889	
Total	135841	100	135841	100	0		135841	100	0	

Between 1990 and 1995, commercial and mixed-use areas increased by 5,897 pixels (45% of the total increase) outside the planned zones, while the in-crease inside the planned zones was higher, at 7.113 pixels (55% of the total increase). However, the rate of increase was greater outside the planned zones, at 70% against only 51% inside the zones. The same was true also between 1995 and 2000, when the rate of increase outside the planned zones was 35% against only 9% inside the zones (Figure 14).

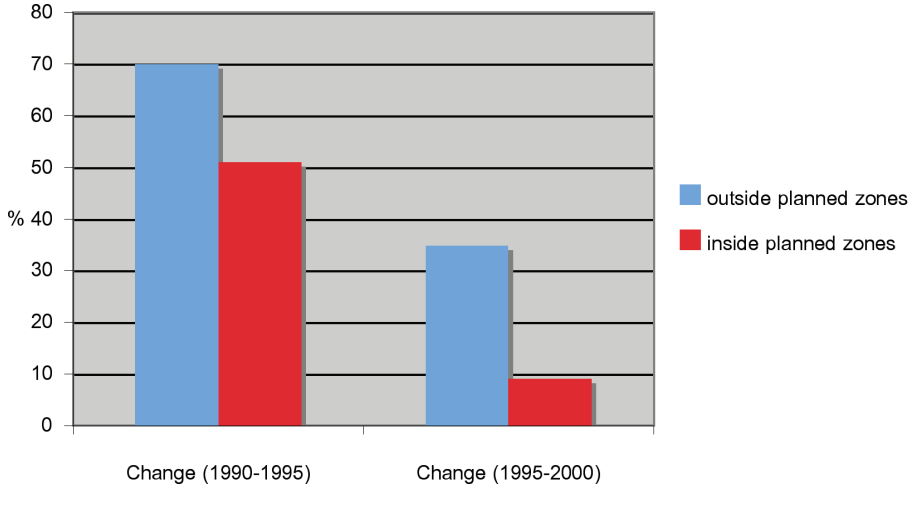


Figure 14 Change of commercial and mixed-use areas outside vs. inside planned commercial, high-density residential and medium-density residential zones.

Figure 15, Figure 16, and Figure 17, which again map the cross-classification results, suggest that the combination of the three planned zones still does not exactly delineate the sub-centers. Including the planned medium-density residential zones in the interpretation of these centers appears to overstate their extent. The three-zone interpretation will be retained, however, for the remainder of the analysis.

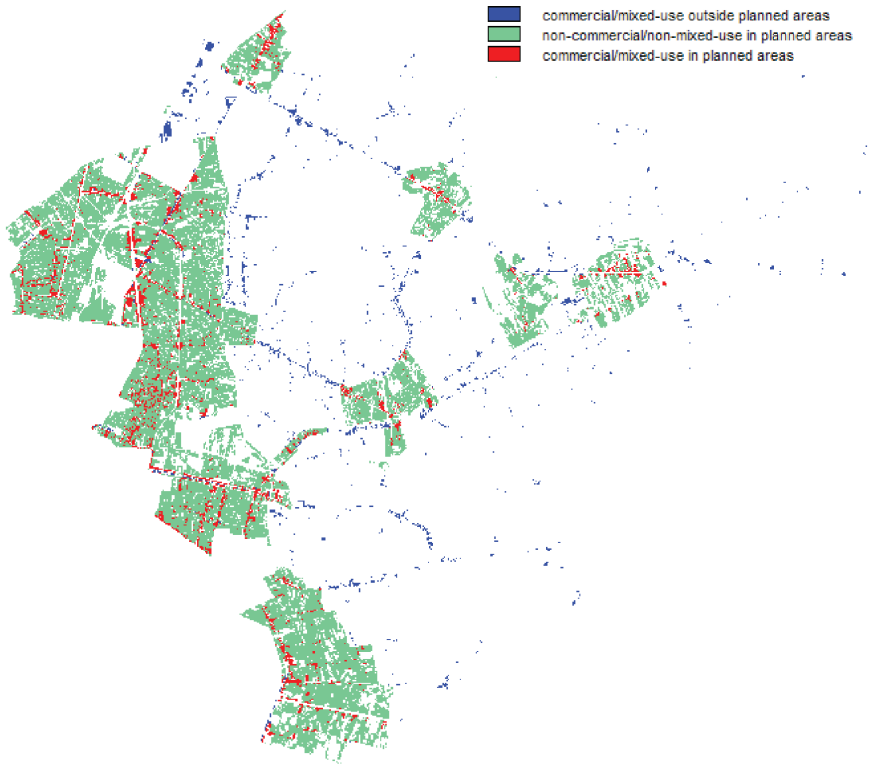


Figure 15.1990 commercial and mixed-use areas compared to planned commercial, high-density, and medium-density resi-dential zones.

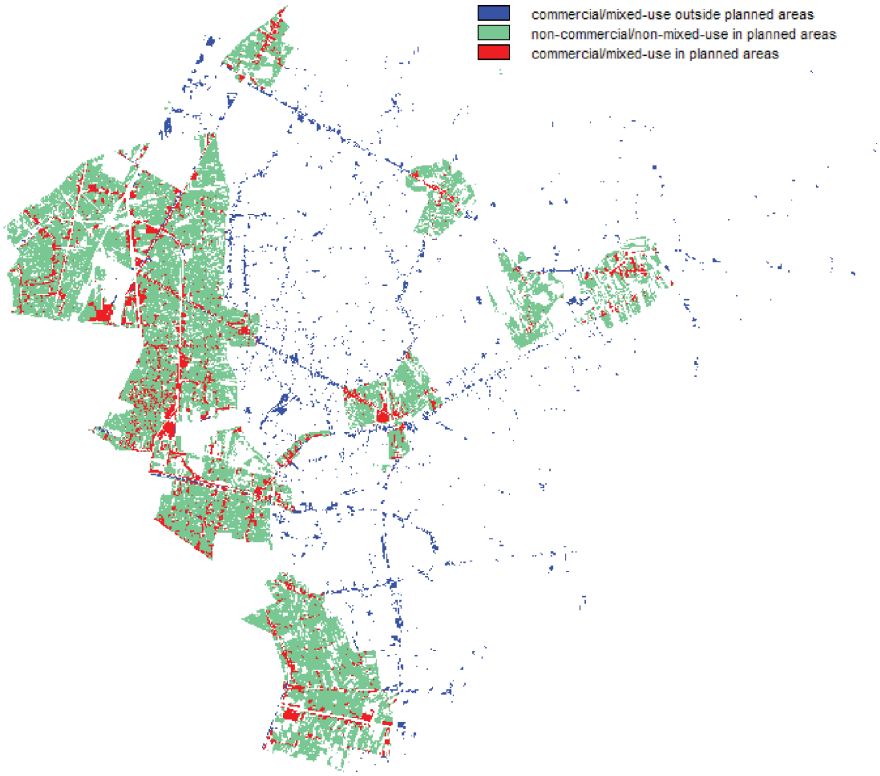


Figure 16 1995 commercial and mixed-use areas compared to planned commercial, high-density, and medium-density residential zones.

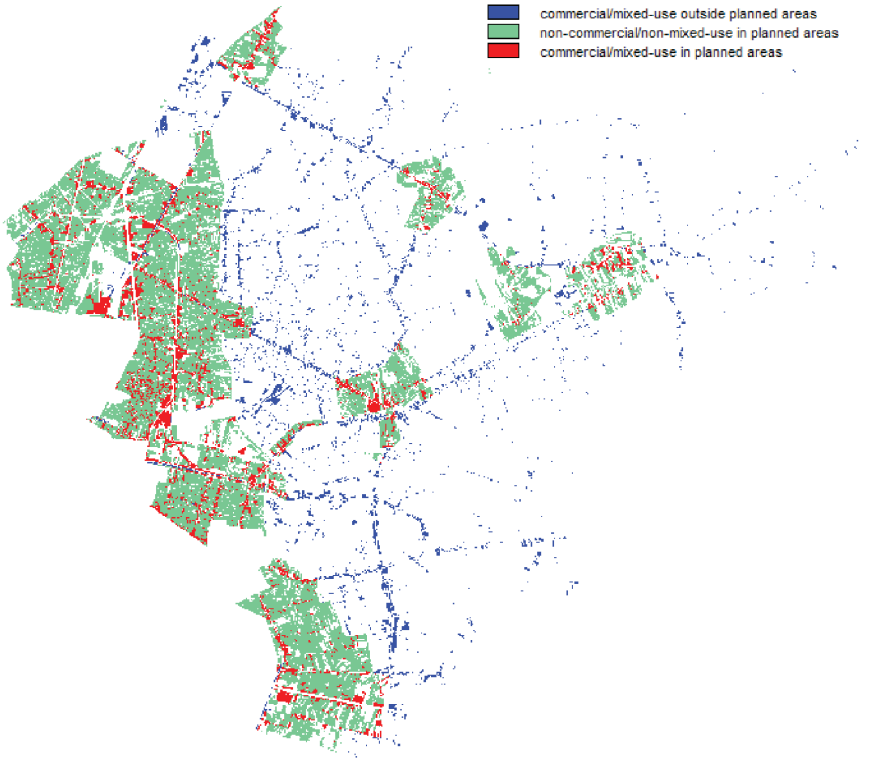


Figure 17 2000 commercial and mixed-use areas compared to planned commercial, high-density, and medium-density residential zones.

Conclusions

It was found that the new arterials did attract commercial and mixed-use development, but to areas along major roads and near major intersections rather than to the sub-centers. This finding suggests a potential explanation for why the sub-centers have not been commercially developed to a great extent. The sub-centers identified with the planned commercial, high-density residential, and medium-density residential zones combined had declining rates of increase of the commercial and mixed-use areas over time, whereas outside the planned sub-centers had increasing rates. Furthermore, the completion of the inner ring road and of new arterial roads during the ten-year period from 1990 to 2000, which was found to be strongly associated with nearby increases in commercial and mixed-use areas, was not found to result in larger increases in the sub-centers. In contrast, the new roads tended to draw new developments to areas along them, rather than to destinations that the roads connected. As a result, the designated sub-centers failed to capture commercial and mixed-use developments.

Two other shortcomings of the Comprehensive Plan were identified in this study. One is that, although there were various conceptual maps identifying sub-centers, the intended sub-centers were not translated into clear spatial delineations in the Plan. The lack of specificity of the Plan contributes to the enforcement problem as well, in particular the fact that locations within designated zones in which other uses are allowed are not specifically delineated. Moreover, the Plan designates only very limited amount of land for commercial land uses, but a large amount for residential land uses. The other is that there continues to be a problem with enforcement. The Plan provides virtually no guidance as to what kinds of urban activities should be combined with high-, and medium-density residential land uses so as to create viable sub-centers, where these activities are to be located, and what development intensity is to be allowed in the sub-centers. In fact, the commercial and mixed-use land uses alone were found in the study area's high- and medium-density residential zones to take up more than the 10% of the total area of these zones permitted for non-residential uses.

The concept of linking origins and destinations of nodes of urban sub-centers by arterial roads may be theoretically sound on paper, but it evidently has not worked in the case of the Northeastern region of Bangkok (and it is also expected to fail in other parts of Bangkok). Linear or strip development pattern is ubiquitous in many parts of Thailand where roads are haphazardly built. Despite the fact that the commercial and mixed-use developments are attracted to areas along major road, the nodal urban sub-centers may be achieved by careful and purposeful planning of the transportation network configuration, from neighborhood streets to highways.

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