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TRANSPORTATION AND LAND USE DYNAMICS IN METROPOLITAN JAKARTA

Bambang Susantono

This article is an attempt to build an understanding of current interactions between land development and transportation infrastructure in the Jakarta Metropolitan Area. The intention is to provide a basis for further research in transportation and land use planning in megacities in the developing world. Four issues are revealed by the discussion. First, transportation infrastructure development has promoted urban sprawl in Jakarta's peripheries. Second, the increased accessibility of suburbs, combined with poor land management and corrupt public servants have resulted in uncontrolled development in Jakarta's urban fringes. Third, the current situation of Jakarta's organic growth has resulted from the informal development practices which dominate the land development in Jakarta's suburbs. Fourth, the government should be more consistent in following their own plans and regulations. Otherwise, the uncontrolled development which has reached an alarming position will be far more difficult to handle.

Introduction

Along with Indonesia's rapid economic growth of about 8 percent annually in the last decade, the city of Jakarta has been experiencing some dramatic changes in its landscape. As the dominating economic and political center of the country, Jakarta has been growing economically and demographically at least twice as fast as the nation as a whole. Yet the planning and management responses to those changes have been inadequate because of various limitations. As a consequence, land use changes often do not conform with the plans, employment centers are located regardless of the traffic impacts in the surrounding areas, and traffic congestion is found in almost every corner of the city. This article is a preliminary attempt to provide a basis for further quantitative research on land use and transportation planning in Jakarta.

The article is structured in four parts. The first part is an overview of current social and economic conditions of Jakarta, followed by a discussion of land use planning and transportation infrastructure development planning. The next section examines the interaction of land use and transportation since the 1980s. Before the concluding remarks, a discussion on land development in Jakarta's suburbs is presented. This last section illustrates current practices of land development in the suburbs and discusses factors behind the uncontrolled development which impedes the application of urban and regional development concepts in metropolitan Jakarta.

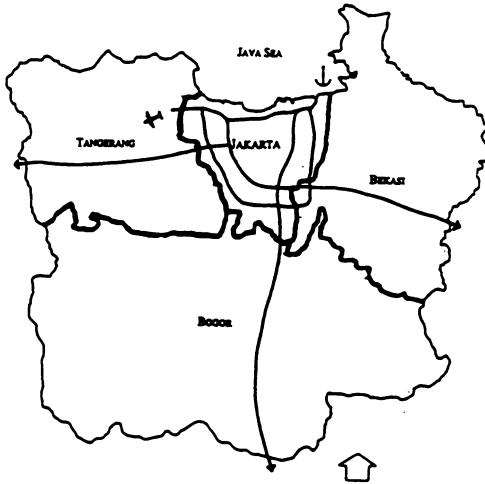
Overview of the Greater Jakarta Metropolitan Area

With a total area of approximately 650 sq. km., the city of Jakarta (officially known as DKI Jakarta) had about 8.5 million inhabitants in 1990, with an annual growth rate of between 3-4 percent. Yet the urbanized areas as well as the related urban activities have outgrown the administrative boundaries, forming an urban agglomeration covering the city of Jakarta and three neighboring counties (*kabupatens*) of Bogor, Tangerang, and Bekasi with a total population of approximately 17 million. This urban agglomeration is often called Jabotabek, an acronym from the first syllables of the names of the counties within it (see Figure 1). It has been projected that by the year 2000 this metropolitan region will become the twelfth largest megacity in the world (UNDP 1994).

For Indonesia, Jakarta is a dominant center of economic, social, political, administrative, and many other activities. As the national capital and as a province of its own, bureaucracy (at the national, provincial, and municipal levels) is a major sector of employment in the city. Yet, Jakarta cannot be seen exclusively as "a government city." Jakarta is also the residence of almost all Indonesia's largest private companies, almost all state-owned companies, all the largest banks, and all main branches of multinational companies in Indonesia. Moreover, the metropolitan region is also seen as the best location for market-oriented manufacturers in Indonesia, primarily because of its relatively higher quality of labor supply, local infrastructure, and market purchasing power. The latter is primarily attributed to the growing middle-class in the city, a new phenomenon for the country.

Figure 1

*JABOTABEK
(Jakarta and Three Neighbouring Counties)*



As divided as the population seems to be, Jakarta's land use pattern is mixed and complex without being segmented into clearly divided districts. Most low-income people live in informal settlements called *kampungs*¹ where the majority do not have adequate infrastructure such as water supply, drainage, etc. High-income people live in better planned housing, gated communities, or western style real estate complexes. In many cases though, the two types of residential areas are intermingled in a particular pattern, often with both types of settlements in the same neighborhood. In general, we may see high-income people living in houses along major streets and the low-income people living just behind those houses.

Similar ribbon-patterned development also occurs for non-residential land uses. Commercial uses and offices (public and private) are generally located along the main streets with residential uses just behind the commercial uses. The higher the street is within the transportation hierarchy, the more

prestigious the offices or the commercial buildings — and in many cases the taller the buildings — along that street.

Until about a decade ago, such a linear pattern also held true for industrial uses, with small factories located along major roads that lead to the harbor or to other cities (Bogor, Tangerang, and Bekasi) and low-income settlements just behind those industries. But, as the government began to recognize the adverse impacts of such a mixture between industrial, commercial and residential uses, it began to concentrate industrial uses into several locations, primarily in the eastern and western peripheral areas of the metropolitan region.

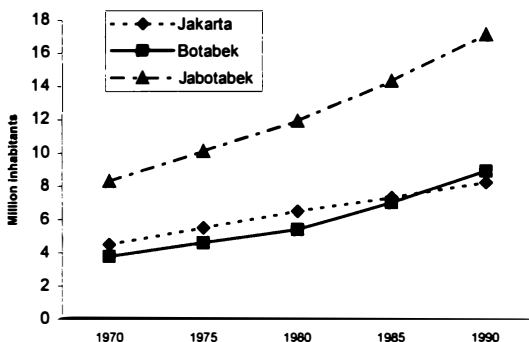
Jakarta has a "master plan" intended to direct and control growth. The current master plan — called the Structure Plan for DKI Jakarta 2005 — indicates that the urban growth should be directed westward and eastward in order to avoid further development in the more favorable southern part of the metropolitan region. The southern suburbs of Jakarta are water recharge areas, whose function is to control the run-off from the mountainous areas in the south and to provide ground water for Jakarta's water supply. The actual development of the city, though, has in many cases been different from what has been planned. Urban sprawl continues to convert vacant protected land in the south into residential areas.

On-going Suburbanization

The population of Greater Metropolitan Jakarta (Jabotabek) in 1990 reached 17,132,000 people. Only half live in Jakarta. The growth of Jakarta, Botabek and Jabotabek populations for the years 1970 to 1990 are shown in Figure 2. This figure shows that population growth rates decreased in Jakarta, whereas in Botabek there was a strong increase. The main reason is a change in the settlement pattern of migrants to the Botabek area.

The rate of population growth in Jakarta during the period 1980-1990 declined to 2.4 percent as compared with 3.8 percent between the period 1971-1980. The Botabek area, however, showed an increasing rate of population growth from 4.0 percent during 1971-1980 to 4.9 percent in the next decade. The highest increase, from 3.5 to 6.1 percent, occurred in Bekasi.

Figure 2

Population Growth in Jabotabek. 1970-1990

Source: Calculated from various census

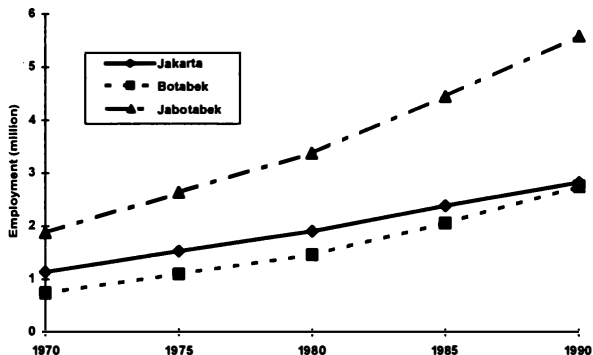
The growth of employment in Jabotabek during 1971-1990 is shown in Figure 3. The decreasing population growth in Jakarta was accompanied by the decreasing rate of employment growth. However, the growth rates of employment still exceed those of population by almost two percent during 1970-1980 and by more than 1.5 percent during the next decade. The number of increasing workplaces in Jakarta attracts labor from the Jabotabek area generating commuters from Botabek to the city. Despite the new jobs, unemployment in 1990 was still 8.1 percent showing that job generation could not keep pace with the labor supply.

Employment growth in Botabek was high through the 1970-1990 period. While employment growth was about 4.1 percent, higher than population growth in the 1970-1980 period, the last decade showed a declining trend due to a major backlog in economic development. The share of employment of Jakarta within the Jabotabek complex steadily decreased from 60 percent in 1970 to 51 percent in 1990.

The service sector dominates employment in Jakarta. Arguably, this dominance occurs in both the formal and informal economy.² The tertiary (service) sector provides more than

Figure 3

Employment Growth in Jabotabek, 1970-1990



Source: Calculated from various census

three-quarters of all jobs. The secondary sector, however, still provides around 22 percent of jobs. This number has remained constant during the last decade. As the land consumption of non-agricultural sectors outbids the agricultural sector, the primary sector has lost its relevance in the last 20 years.

The Botabek area has traditionally been an agricultural region. About 20 percent of the jobs are still within the primary sector, proving that there remains a large rural-agricultural area in Botabek. However, the share of primary sector jobs has steadily been declining the last 20 years, although in absolute number they have increased about 2.7 percent annually. The secondary sector shows an increasing rate from 14 percent in 1971 to 29 percent in 1990. This increase indicates the development of industries in the area. The growth in the secondary sector is accompanied by an increase in tertiary sector jobs from 42 percent in 1971 to 51 percent in 1990.

Transportation Planning

Indonesia had almost 9 million motorized vehicles in 1990, of which 70 percent were motorcycles and 15 percent were cars.

The motorized vehicle fleet increased in line with the urban population. There were 5 motorized vehicles for every 100 persons in 1990. The percentage of urban households owning a non-motorized vehicle in 1989 was only slightly higher (35%) than those owning a motorized vehicle (29%). By 2015, it is forecasted that about 2.5 million cars and 1.2 million motorcycles will crowd the roads of Jabotabek (BPPT 1992).

Road Development

Basic road development in Metropolitan Jakarta is based on the Jakarta 2005 Transportation Plan. It consists mainly of the north-southward thoroughfares and east-west thoroughfares, which are being built in conjunction with ongoing tollway development and arterial road improvements. Replicating the experience of the Jakarta Inner Ring Road Project, the Jakarta Outer Ring Road (JOOR) Project is being built under a Built-Operate-Transfer (BOT) scheme. The JOOR is currently under construction and is projected to be completed and operated in 1999.

The construction phases of two other main toll roads have also been started under BOT arrangement. The first one connects the new town of Bumi Serpong Damai, Bintaro Jaya and other large scale residential areas in the southwestern part of Jakarta. Total area to be served by this road is more than 10,000 ha. The structure of the road is called a triple decker since it has light rail train (LRT) at the second level, toll road at the first level, and arterial road underneath. Total investment for this project is estimated at \$1.3 billion.

The second toll road will serve all new towns and residential areas in the east of Jakarta, including the new Lippo City, The Legend Town, etc. The structure will stretch over the Kali Malang River with single pier. This method is proposed due to the difficulties in obtaining the right-of-way for the road.

Another major proposal for Jakarta's transportation is the construction of a subway along the major north-south corridor. The subway will start from the old suburbs in the south (which is now hardly separated from Jakarta) to the old downtown (now Chinatown) in the north. The total track length is 14.5 km with a project cost of \$2 billion.

Besides new construction, the road development program for Jakarta also includes the construction of fly-overs in several congested intersections, maintenance and improvement of

urban arterial roads, and upgrading of several collector and local roads in accordance with the road's hierarchical system.

Rail based transportation

The Jabotabek area is served by 7 rail lines totaling 160 km in length and 55 railway stations. Almost all lines have double track railroads and are electrified. The BPPT (1992) transportation report shows that of rail passenger movement in Jabotabek in 1990, only 6 percent were urban trips in Jakarta, while 27 percent were suburban trips in Jabotabek and 62 percent were long distance trips. The modal share of Jakarta railway was very low: only 0.25 percent of all trips inside Jakarta and 4.7 percent of Jakarta- Botabek trips, resulting in an average share of 1.1 percent in 1990. The very low share indicates that this mode of transportation is not popular among public transit riders in Jakarta. The reasons often cited as factors behind the low share are unreliability, lack of cleanliness, and lack of comfort.

The railways in Jakarta were built during the Dutch colonial period and were not intended to serve the intra-urban passengers. It was clear that the strategic concept of the colonial suburban railway was to connect Jakarta with other small centers such as the cities of Bogor, Tangerang and Bekasi. Thus, railways did not correlate with the urban development patterns which mainly guided development towards major arterial roads.

The Evolution of Transportation and Urban Form in Jakarta

Until the mid-1970s, the city of Jakarta grew without proper planning. Most city streets were widened or realigned. As the satellite city in the southern part of Jakarta became consolidated with the old town boundary, urban expansions developed southward. The first toll road in Indonesia was built in 1978 along this growth corridor. Connecting Jakarta and the country town of Bogor in the south, the Jagorawi toll road was financially profitable.

The experience of the Jagorawi toll road motivated the government to build other toll roads. Since then, Jakarta has been carved with toll roads, beginning with the Westbound toll road (Jakarta-Tangerang-Merak), Eastbound toll road (Jakarta-Bekasi-Cikampek), and the inner ring toll road.

The opening of Jagorawi corridor has induced real estate development in the southern peripheries. By examining the opening date of toll roads and the development of real estate in Jakarta (office and residential), the following timeline sketches out the interaction between transportation and land use.³

Changing Land Uses in Metropolitan Jakarta

Evolution of the CBD

The first old town of Jakarta was located near Jakarta's Chinatown, one of the biggest trade centers in southeast Asia. Following the first master plan of Jakarta in the early 70s, the CBD moved to the corridor of Sudirman-Thamrin where one can easily see the variety of office towers and high-rise buildings. Following the demand for offices in the 80s, office development began along the newly constructed Jakarta beltway (outer ring road). However, traditional settlements, "back-to-back" with the new high-rise buildings, made it possible for developers to also infill development within the CBD.⁴

The concept of superblocks was popularized during the early 90s and is reflected in the mixed-use developments in the CBD. There are three superblocks under construction in the highest land price area in Jakarta, the so-called Golden Triangle area. The total supply of these projects is projected to meet the demand for office space in Jakarta up to the year 2000. The main locational advantage of these superblocks is their proximity to the various centers of activities.

In summary, office development in Jakarta has been undergoing both infill development and *beltwaytization*. Office development began in the old trade center, moved to the principal road network, and moved outward along the beltway. At the same time the CBD was developed more compactly.

The Suburbanization of Housing

It should be noted first that there are two types of housing in Jabotabek — formal and informal housing. Most urban, low-income housing is supplied by the informal housing market. They are built individually, unplanned, and do not have any transaction record. The location of informal housing is scattered and exhibits irregular patterns of development.

Massive housing development in Jakarta started during the oil boom era when the government established the National Housing Development Enterprise (PERUMNAS) in 1974. The main task of this agency is to provide housing for middle- and low-income people. The first new settlement area to be built was *Depok*, a large scale public housing program in the southern part of Jakarta. During the same period, another site in the West, *Klender*, was built with an emphasis on low cost housing. The major arterial road development — westbound and southbound — made it possible for developers to develop the areas.

Following PERUMNAS, private developers increased their activities in building low cost housing projects stimulated by a home ownership credit program from the National Savings Bank. Most of them targeted middle-income housing which had the greatest potential in the formal housing market. New residential areas emerged in the fringe areas of Jakarta such as *Kelapa Gading*, *Pulo Gebang* in the East, *Bintaro*, *Pamulang Serpong*, *Cinere* in the South, and many others in the West. Scattered settlements and small scale developments (between 5 to 20 ha) characterize the pattern of urban development. Residential development expanded growth outward in all directions, making the urban fringe the most dynamic area of development.

As the residential land within Jakarta's administrative area became scarce, land prices in the inner city rose enough to offset the costs of developing residential areas. The next target for development was the other satellite cities of Metropolitan Jakarta such as Bekasi, Bogor and Tangerang. The low price of land made it possible to develop large scale urban settlements, and new town developments became an attractive investment. The idea of a self contained town was introduced with the development of Bumi Serpong Damai (BSD) by the private sector in the southwest. Following the development of this town, other new towns were built mainly in the east and west corridor, sparked by the development of the eastbound and westbound inter-urban toll roads. Some of them are Lippo City, Tiga Raksa, and Muara Kapuk. In the meantime, housing development for middle-income groups was also taking place in the east-west corridor. PERUMNAS and private developers built small-to-medium scale new settlements along the toll roads. The residential development in the outskirts of Jakarta is following the ribbon pattern of development along the major freeways.

The massive development of residential area in the suburbs is not causing the decline of inner city residential development. Starting in the early 90s, there has been a boom for luxury housing and apartments in Jakarta. Following dynamic economic growth, high-income families and new young urban professionals have increased the demand for housing in the inner core. Developers responded by building luxury apartments and housing near the CBD and along the major freeways within the city boundary. New trends of residential development, in the form of condominiums and high-rise apartments, became a fashion among the new professional class. Other potential tenants are ex-patriate families who prefer to live in apartments.

The success of apartment development in the high-end market has not been duplicated in the low-end market. One barrier is the lack of public social acceptance of living in high-rise apartments, a problem requiring changes of behavior and habit to solve. Another obstacle is developers' perception that this real estate segment is not profitable. This leaves the state public housing agency as the only supplier of low cost apartments in the market.

Retail sector developments have also created a more dispersed urban form, as they follow the development of residential areas. The development of new satellite towns or other large scale residential areas often create a derived service demand. One consequence of residential development is the development of free-standing shopping centers and malls. It is estimated that before 1999, Jakarta's retail supply will reach 1,930,000 square meters (Center for Property Data 1996). This trend reflects the increase of disposable income among the middle-class and the growing popularity of recreational shopping centers. There are clear trends of investment in the mall-type shopping centers around the Jakarta fringe area.

Uncontrolled Development in the Suburbs

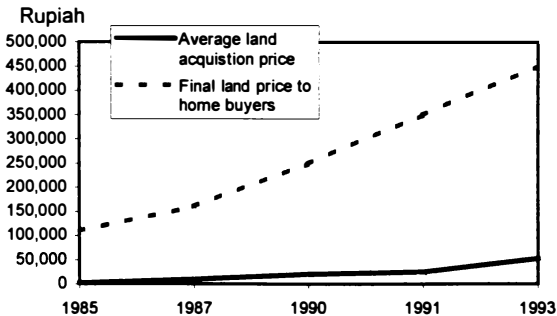
It is clear that transportation infrastructure development increases access to land in Jakarta's suburbs. As a consequence, land and property prices also increase. Several studies of road capitalization effects in residential land markets have demonstrated this phenomena. Dowall and Leaf (1992) showed that on average, road infrastructure adds 49 percent to residential land values in DKI Jakarta, with a premium of 30 percent within 5 km of the CBD and 88 percent at a distance of greater than 15 kms from the CBD. Cervero and Susantono

(1997) demonstrate that offices within 0.5 km of a freeway interchange rented around \$1.35 more per square meter per month than office buildings located beyond 2.5 km of an interchange. Another study of land readjustment projects found that road improvements increased land values by 32 percent, or \$7 per m² in Bali, and in the case of a land consolidation project in rural Java, an 83 percent capitalization rate was attributed to road projects (Cervero 1991).

The great financial promises of Jakarta's suburban land has invited strong competition among developers to acquire the land. This high demand, however, is not followed by proper land administration. Land registries for residential properties are notoriously incomplete. It has been estimated, for example, that only 25 percent of residential parcels in DKI Jakarta are registered with the National Land Agency, Badan Pertanahan Nasional, or BPN (Dowall and Leaf 1992). The high demand for land, coupled with poor land administration, has enabled land speculators to escalate the prices of land according to their scenarios. Figure 4 shows how developers can reap the benefit from land in Jakarta's suburbs.

Figure 4

*Land Price Before and After Developers:
Price per Square Meter in Nominal Terms*



Source: Aksoro 1994.

Increasing accessibility has sparked development in Jakarta's suburbs. What was supposed to be guided land development has turned into uncontrolled development. Organic growth patterns are emerging throughout the suburbs. Southern areas which are supposed to be protected or have limited development are being converted to residential areas. Green areas are fast disappearing and becoming brown (housing) areas. Uncontrolled developments are often cited as the main factor behind routine flooding and severe droughts in Jakarta during the recent decades. Several factors contribute to this failure in the urban development system: the malfunction of the master plan, overlapping institutions, non-compliance with zoning, and the large-scale practice of informal development.

Malfunction of the Master Plan

The Master Plan has proven to be ineffective in controlling and managing urban growth in Jakarta. The plan was too broad and covered a long term development perspective (the time frame is 25 years). The constant dynamic of development requires that the master plan be periodically updated. This updating process requires institutional capacity such as professional or trained staff at the local level. While in theory master plans can be constantly adjusted according to the demand of development, the limited capacity of municipal governments hinders such processes.

The master plan is supposed to be translated into structural plans, and then into detailed, local infrastructure plans. In reality, the master plan is too broad and vague. The structure plan indicates zoning with no specific details of development. To request a location permit, for example, one often cannot find adequately scaled maps at local level to sufficiently show the exact boundaries of parcels, projected land uses, and infrastructure plans. The malfunctioning of the master plan implies that there will be an absence of long-term development goals. This means that the overall area in the Master Plan is spatially disintegrated.

Overlapping Institutions

Different agencies are in charge of planning, implementation, financing and issuing various permits for development. Planning is fragmented and overlapped between many institutions at the central, provincial, and municipal levels. At the central level, the

Ministry of Public Works, Ministry of Home Affairs, National Land Agency, Ministry of Trade and Industry, National Planning Agency, and Ministry of Agriculture are among key players who issue various permits within their jurisdictions. These ministries have their branches in provincial and local levels of government which in many cases made decisions and took approaches on their own volition. In sum, this condition leads to a confusing policy on urban management.

Non-compliance to Zoning

The government uses location permits as a tool to control land development according to the designated master plan. The goals of permits are to make sure that future development complies with local development plans, avoids the use of prime farmland, and minimizes environmental degradation. Although theoretically location permits can act as a tool to control development, the reality always demonstrates the opposite. Bertaud (1989) considers zoning regulation in Indonesia as written rather than practiced by developers. The JMDP report (Ministry of Public Works 1993) indicates that the areas in three neighboring counties (Bogor, Tangerang, and Bekasi) which do not comply with zoning are as large as those who comply with zoning. The following table demonstrates the non-compliance attitude of developers to the zoning:

Table 2

Comparison of Land Development in Compliance and Non-compliance to Zoning

<i>County</i>	<i>In Compliance to Zoning</i>		<i>In Non-compliance to Zoning</i>	
	<i># of Sites</i>	<i>Size (ha)</i>	<i># of Sites</i>	<i>Size (ha)</i>
Bogor	2	16.4	3	19.4
Tangerang	108	14,965.2	218	27,114.2
Bekasi	56	1,483.9	124	2,718.4
BoTaBek	237	17,433.5	403	33,338.0

Source: Ministry of Public Works 1993.

The Widely-practiced Informal Process.

All factors discussed above lead to so-called informal settlement process in which all development takes place outside of laws and regulations. Several studies have documented that the suburbs of Jakarta are being urbanized mainly through informal land development services (OB Server 1996; Aksoro 1994; Leaf 1991). It has been estimated that 85 percent of the newly added housing stock in Jakarta is being built informally (Struyk et al. 1990). In this practice, the concept of urban and regional planning has been replaced by the informal, instantaneous development for the benefit of the few. Collusion between bureaucrats and developers has made this practice possible. Ferguson and Hoffman (1992) found that large developers frequently influence government officials to change zoning. Private interests are able to obtain approval, even when not in accordance with the master plan or zoning, through a back-door process by bribing the officials. One of the main factors often cited is the low, insufficient salary of public servants which encourages this collusion to be widely practiced.

Informal development in the suburbs has resulted in irregular shaped site plans. Pocket size estates, often located in gated-communities, emerged in many areas as developers could not acquire all areas designated by their plans. This development pattern creates serious problems of inequity because in many cases, indigenous people's access is eliminated by the erection of walls around the new housing complex.

Informal settlements tends to emerge in the areas where public infrastructure services do not yet exist. Irregular patterns of land parcels impedes good planning, and makes the operation, development and maintenance of infrastructure difficult. In the transportation sector for example, the absence of a good hierarchy of collector and local roads is commonly found in the suburbs. As a results traffic jams occur and are commonly found in all parts of the suburbs. Many Jakartans have to endure very long commutes, often more than an hour and a half, in the clogged and polluted streets.

Conclusion

This article has demonstrated that there are relationships between transportation infrastructure development and land use changes in Jakarta's peripheries. The dynamic growth of

Jakarta has resulted in urban sprawl and suburbanization. Toll road and beltway development has increased the accessibility of suburbs. These investments have induced the real estate industry to relocate from the city to the suburbs. The three surrounding counties, Bogor-Tangerang-Bekasi, already outnumber the population and jobs of Jakarta.

One of the tools to control development is the location permit. This permit is meant to facilitate government control of developments according to the master plan and zoning. However, it is clear that this goal is rarely achieved, due to four main problems address in this article. First, the master plan cannot keep pace with dynamic growth. The plan and its derivatives are too broad and require institutional capacities which are not available at municipal level. Second, overlapping institutions have made it impossible to coordinate development in Jakarta. Third, many developments in urban peripheries do not comply with the zoning. Fourth, informal processes dominate the land development in the suburbs. In general, all cases show the inability and inconsistency of the government to follow their own plans and regulations.

Uncontrolled development in the suburbs has severe consequences on economic efficiency, equity, and environmental damage. The expansion of development in Jakarta has reached an alarming position and calls for more stringent control. This article argues that Jakarta has to apply proper urban and regional development planning, and not rely on the current informal development process. Otherwise, it will be too late and too costly to reverse the negative consequences.

¹ A *kampung* is an urban village whose characteristic is rural. It is generally characterized by high density, minimum basic infrastructure, and unclear land tenure.

² According to Lubell (1991), the informal economy has two characteristics: small size (micro scale) enterprises and enterprise that avoid official regulations and taxes. The formal economy is defined as the opposite.

³ Analysis is based on data from: Center for Property Data 1996; Ministry of Communication 1995; Indonesian Highway Corporation 1994; Center for Business Data 1996; Ministry of Public Works 1994; Brown 1992.

⁴ The urban dualism phenomena is commonly found in cities in the developing world where high-rise buildings are next to the traditional

houses or slum areas. The "back-to-back" pattern reflects the co-existence of both formal and informal land uses.

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