*Is Bangkok's Traffic Crisis Unavoidable?: A Comparative Study of Transport Patterns, Policies and Measures Between Bangkok and Japanese Cities**

วิกฤติจราจรในกรุงเทพฯ หลีกเลี่ยงไม่ได้จริงหรือ?: การศึกษาเปรียบเทียบรูปแบบการจราจร นโยบายและมาตรการที่เกี่ยวข้องระหว่างกรุงเทพฯ กับเมืองต่าง ๆ ของญี่ปุ่น

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บทคัดย่อ

ปัญหาวิกฤติจราจรในกรุงเทพฯ นั้นเป็นที่ทราบกันทั่วโลกว่ามีความรุนแรงมาก ถึงแม้ว่าสถานการณ์จะดีขึ้นบ้างหลังจากเกิดวิกฤติเศรษฐกิจ แต่ปัจจุบันก็ดูเหมือนว่าปัญหาจะเริ่มกลับมารุนแรงเหมือนเดิมอีก ผลกระทบที่เกิดจากปัญหาการจราจรนั้นมีมากมาย เช่น มลพิษทางอากาศ การเผาผลาญเชื้อเพลิงปริมาณมหาศาลระหว่างที่รถติด และผลกระทบต่อสุขภาพของประชาชน

ขณะที่กรุงเทพฯ ประสบปัญหาการจราจรอย่างรุนแรงนั้น เป็นที่น่าสนใจว่าเมืองใหญ่ ๆ ของญี่ปุ่น ซึ่งมีประชากรอยู่กันอย่างหนาแน่นเช่นเดียวกัน ทำไมจึงไม่ประสบปัญหาเหมือนกับกรุงเทพฯ จากการศึกษาเปรียบเทียบด้านรูปแบบการเดินทาง นโยบายและมาตรการที่เกี่ยวข้อง พบว่าสาเหตุหลักที่กรุงเทพฯ มีปัญหาจราจรที่รุนแรงคือการเพิ่มขึ้นอย่างรวดเร็วของยานพาหนะ โดยมีปัจจัยด้านรายได้ที่เพิ่มขึ้นเป็นปัจจัยสำคัญ อย่างไรก็ตามปัจจัยสำคัญอื่น ๆ ที่มักถูกมองข้ามไปคือ 1) บริการขนส่งสาธารณะที่ไม่เพียงพอและไม่มีประสิทธิภาพ 2) ความยากลำบากของการเดินทางโดยการเดินและใช้จักรยาน 3) โครงสร้างพื้นฐานด้านการคมนาคมขนส่งที่ช่วยส่งเสริมการเดินทางโดยยานพาหนะส่วนตัว ขณะที่เมืองต่าง ๆ ของญี่ปุ่นสามารถหลีกเลี่ยงปัญหาวิกฤติจราจรได้โดยนโยบายและมาตรการที่สำคัญคือ 1) การให้ความสำคัญเป็นลำดับแรกกับการขนส่งสาธารณะ 2) การเอาใจใส่ต่อคนเดินเท้าและผู้ใช้จักรยาน 3) การสร้างอุปสรรคสำหรับการใช้ยานพาหนะส่วนตัว ชุมชนของไทยและหน่วยงานที่เกี่ยวข้องควรนำบทเรียนจากเมืองต่าง ๆ ของญี่ปุ่นมาพิจารณาประยุกต์ใช้ถ้าต้องการหลีกเลี่ยงวิกฤติจราจร และทำให้กรุงเทพฯ เป็นเมืองที่น่าอยู่มากขึ้น

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** อาจารย์ประจำหลักสูตรบัณฑิตศึกษาทางการจัดการสิ่งแวดล้อม สำนักพัฒนาบัณฑิตศึกษา สถาบันบัณฑิตพัฒนบริหารศาสตร์

Abstract

Traffic congestion and related environmental problems in Bangkok are notorious worldwide. Though seemed less severe during the past two years as a consequence of the economic crisis, the situation is now likely to become worse again. The impact from these problems is enormous in terms of air pollution, energy loss, health impact etc. It is very interesting that while Bangkok is seriously suffering from the traffic crisis, several large Japanese cities are not facing such problems. This paper therefore attempts to examine the reasons behind this by comparing Bangkok's and Japanese cities' transport patterns, policies and measures. It was found that the main cause of traffic congestion in Bangkok is the extraordinary growth of motor vehicles during the past two decades. Not unexpectedly, increasing wealth during that period emerges as an important factor in the underlying patterns of vehicle ownership. However, there are other major factors contributing to this phenomenon. These factors are: 1) inadequacy and inefficiency of public transport service; 2) non-viability of walking and cycling; and 3) transport infrastructure that encourages private vehicle use. On the contrary, the Japanese cities, which are much richer than Bangkok, have avoided the traffic disaster by applying sensible and effective transport policies and management strategies to curb the use of motor vehicles. The three major strategies are: 1) priority to mass transit system; 2) attention to pedestrians and cyclists; and 3) restrictions on private motor vehicles. Thai communities and relevant agencies should take this lesson from the Japanese cities into consideration, and put it forward if they want to make Bangkok a more livable city.

1. Introduction

Today about 42% of the world population dwell in urban areas, of which about 72% in more developed countries and about 34% in less developed world. By 2025, it is estimated that around 61% of the world population will be in cities and towns.[1] In Thailand, although the overall ratio of urban population is not that high, several large cities contain quite large number of population. Bangkok alone is a home of about 8 million people.

It is very common that any area in which there is so many people living together is likely to face sereral problems e.g. unhealthy housing environments, traffic congestion, air pollution, water pollution, unemployment, crimes, etc. The situation will certainly become worse with inefficient management. There are plenty of such examples around the world and Bangkok is one of such examples. While there are about 8 million people living in Bangkok at present, the environment has been deteriorating so that living in Bangkok can be no longer called a pleasant home or a livable place for its residents. Bangkok is now one of the most infamous cities of traffic congestion. Travelling on a road in the city center during peak hours may take about 1 hour for a distance of 2-3 kilometers. Air pollution problem in the city is also very serious, particularly along main roads. This is largely attributed to the emission from nearly 4 million motor vehicles. It is estimated

that about 1 million Bangkok's residents are suffering from respiratory diseases. The energy loss due to traffic jam is noted at around 40,000 million baht per year. About 1,000 people are killed in road accidents in Bangkok each year. Although the situation seems a bit better at present as a consequence of the economic crisis, Bangkok is continuously losing its livable quality.

Japanese cities are similar to Bangkok in terms of their crowded population, particularly during daytime when a large number of people commute from suburbs to work in cities. A large city like Tokyo has much larger number of residents and workers than Bangkok. This megalopolis alone contains about 18 million people. Very interestingly, none of the Japanese cities are seriously suffering from traffic congestion and its adverse consequences. For example, the overall road traffic speed in Tokyo in 1990 was around 24 km/h., compared to only around 13 km/h in Bangkok. In addition, average transport-related deaths in Tokyo was only 5.3 per 100,000 residents compared to 16.1 in Bangkok.[2] This might be a matter of management and beyond that, the visions of Japanese governments, planners and people. This paper therefore attempts to exqmine reasons behind this, which will be a valuable lesson for Bangkok.

2. Transport Patterns in Bangkok and Japanese cities

Road-based trasport is the dominant from of travel in Bangkok (more than 95% of total motor vehicle trips). In 1989 Bangkok residents made 15.6 million trips daily, of which 27% by private cars, 16% by motorcycles, 33% by buses and 8% by taxis. Only 14% of daily trips was made by foot, and a fragment of less than 1% by bicycles. The rest of the daily trips e.g. by train and boats accounted for only less than 1%.[3] These figures also indicate that private motor vehicle is the main mode of travel in Bangkok.

In large Japanese cities, commuting trips generally depends on public transport system particularly railway, and also walking and cycling. In 1988, on average, around 30% of daily trips in those cities were made by trains, 8% by buses, 10% by foot and 15% by two-wheels vehicles, mainly bicycles. Nevertheless, trips by cares also had a significant share of around 30%. In Tokyo, for example, in 1988 trips by train accounted for 25%, by bus 2.8%, trips made by foot had a very high share of 27%, by bikes 17.6%, while trips by car were about 25% (Figure 1).

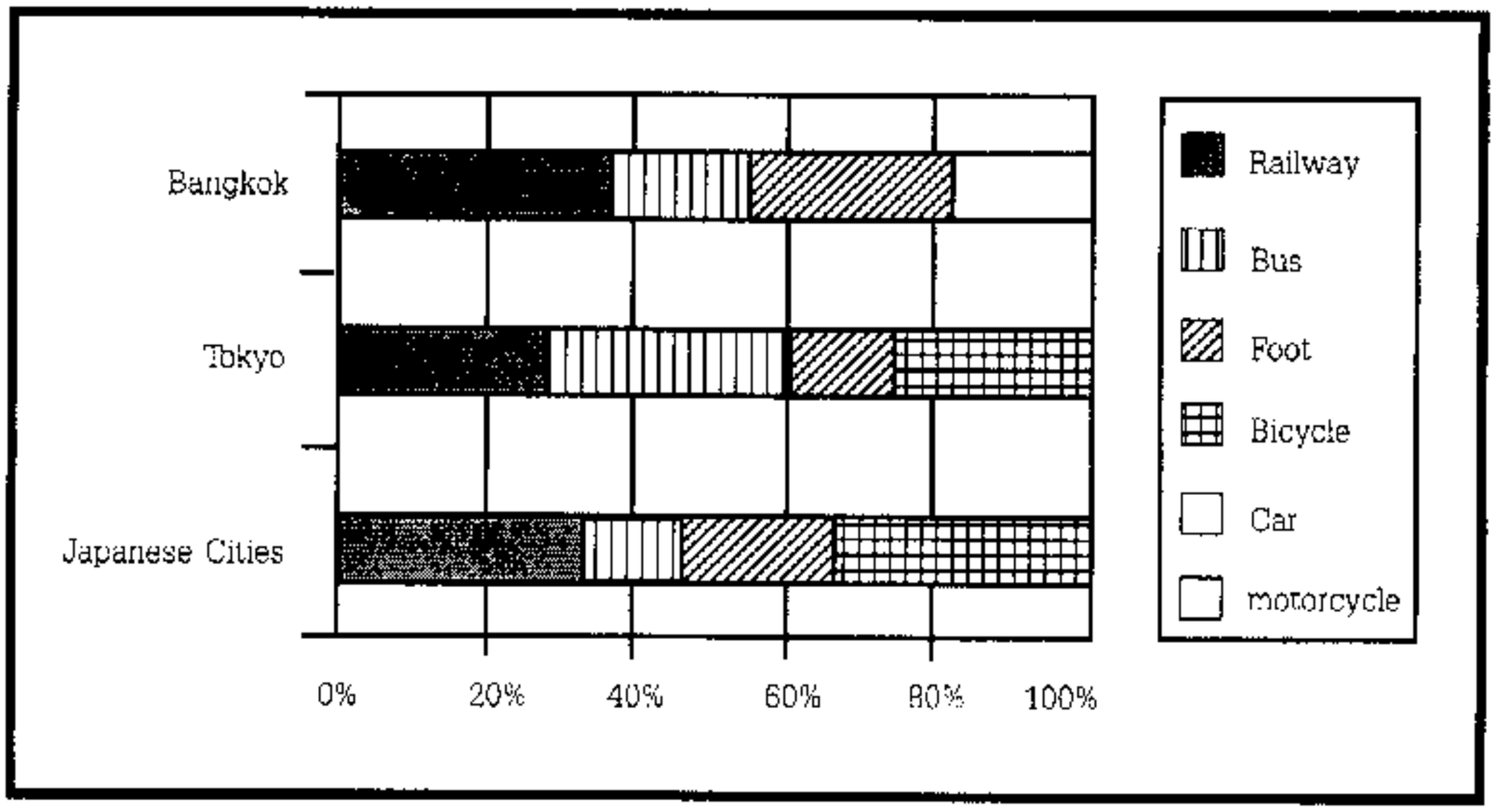

Figure 1 Transport patterns in Bangkok and Japanese cities

Sources: 1. JICA, 1990
2. City Bureau, Ministry of Construction and Japan Transportation Planning Association, 1993

3. Some Major Causes of Traffic Crisis in Bangkok

To see the differences between transport policies and measures applied in Bangkok and Japanese cities requires clear understanding of the causes of traffic problems in Bangkok. This section therefore attempts to examine the root causes of traffic crisis in Bangkok.

Similar to cities elsewhere, the rapid growth of vehicle population and vehicle use is the main cause of traffic congestion and related problems in Bangkok. Prior to the economic crisis in 1997, the annual growth rate of vehicle numbers in Bangkok was around 8-10% during the 1980s and increased to 12 15% during the 1990s. Not unexpectedly, increasing wealth during that period emerges as an important factor in the underlying patterns of vehicle ownership. However, there are other major factors contributing to this phenomena but, unfortunately, they are often overlooked by planners and decision-makers. These factors are: 1) inadequacy and inefficiency of public transport service; 2) non-viability of walking and cycling; and 3) transport infrastructure that encourages private vehicle use.

3.1 Inadequacy and Inefficiency of Public Transport Service

Public transport is generally recognised as a crucial means of transport for a large urban community. Where the service is inadequate and inefficient, potential passengers will shift to use private vehicles whenever possible

3.1.1 Buses

In Bangkok buses are the backbone of

public transport, yet bus services are generally poor in both quantity and quality. Consequently, the share of bus services has been declined substantially. In 1972, buses shared 53 per cent of total trips in Bangkok, compared to only 33 per cent in 1989.[4] Two major factors contributing to decline in bus services and use are in adequate services and traffic jams.

In terms of inadequate services, contrary to the overwhelming increase of private vehicles during the 1980s and 1990s, the number of buses operating in Bangkok has only marginally increased. In 1980 there were 7,900 buses, in 1990 there were 11,100 buses, only 3.5 per cent increased annually during that decade. In 1996 the bus numbers were about 11,500, almost as same as the 1990 numbers.[5] The number of buses per 1,000 people has only slightly increased from 1.2 in 1980 to 1.3 in 1990 and 1996. Moreover, a lot of urban development in outer Bangkok in outer Bangkok during the last two decades has occurred in such a way that unrelated to the bus system and almost totally dependent upon private vehicles.

In addition to the inadequate services, traffic jams have severely exacerbated the quality of bus services. Commuters often have to wait for a long time and are often unable to get on overcrowded buses during peak hours.

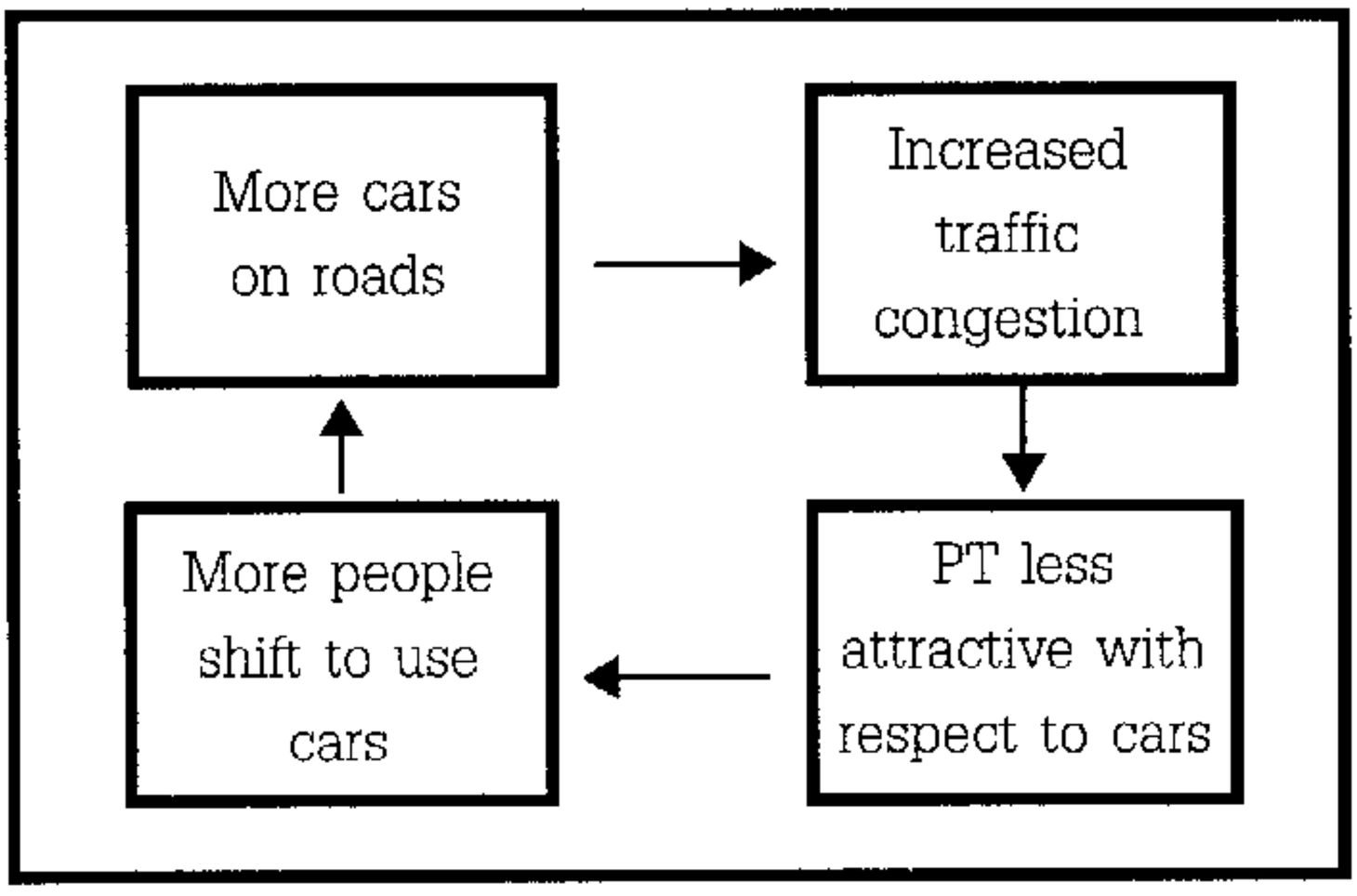

Figure 2 The vicious circle of increasing cars, declining public transport and increasing congestion in Bangkok

As a result, most Bangkokians do not hesitate to purchase cars, pick-ups when the opportunity arises. The increase in private vehicle use further exacerbates traffic congestion. Hence, the vicious circle continues (Figure 2).

3.1.2 Railways

Despite its high capacity to carry a large number of passengers in urban area, railway

system plays only a tiny role in Bangkok and has no role to play at all for travelling in other Thai cities. The rail system in Thailand has received very little attention over a long period, particularly in urban areas. Thus, the share of train passengers in Bangkok is only around 1% which is extremely low compared to the railway share of 25% in Tokyo and 30% on average in large Japaneses cities. Most of the past Thai governments and relevant agencies have ignored the neccessity of train system, though several studies strongly suggested about this. The suggestions can be traced back at least since 1975 when a German consultant conducted a study on Bangkok's transportation. Fortunately, during the last few years there have been attemps to construct three urban train lines in Bangkok. After undergoing several serious obstacles, particularly financial constraint and resistances from different groups, a 23 kms. elevated railway system is about to start operation by December this year and a 20 kms. underground system is under construction with a schedule to finish by 2002. Yet, these only two urban train lines are still far from being accessible alternatives for most Bangkokians.

3.2 Non-viability of Walking and Cycling

Walking and cycling affect levels of vehicle ownership and vehicle use, and vice versa. Levels of walking and cycling are also closely related to levels of public transport use, i.e. where the public transport share is high, levels of walking and cycling are also high. As a result, proportions of private vehicle use tend to be low. This phenomenon is seen in many Asian cities and wealthier cities in Europe.[6] The most recent data shows that in 1995 walking accounted for only 11% of all trips while cycling share was less than 1% in Bangkok,[7] compared to 25% share of walking and 17% share of cycling in Tokyo. These extremely low levels of walking and cycling are attributable to several obstacles especially the lack of appropriate infrastructure. There are almost no bikeways and no ramps at kerbs along footpaths, cyclists must share crowded roads with motor vehicles. Many local streets have been widened to cater for cars, leaving no footpaths for pedestrians. Severe air pollution and noise constitute additional barriers to cyclists and pedestrians.

A recent study on the use or non-use of bicycles among school students in Bangkok confirms the above argument. It found that main hindrances inhibiting the use bicycles are: 1) danger from road traffic; 2) too long distance from home to the school 3) no proper infrastructure provided for cycling; and 4) severe air pollution from road-base vehicles.

3.3 Transport Infrastructure that Encourages Private Vehicle Use

Transport infrastructure is an important factor affecting transport patterns in any city. Cities with higher levels of public transport infrastructure provision, particularly rail networks, tend to have a higher share of trips on public transport, whereas the automobile cities of American and Australia, have very high levels of road provision. For Bangkok, transport infrastructure factors significantly contributing to private vehicle use are the lack

of infrastructure for the modes other than private vehicles, in particular, a very low level of railway infrastructure provision. There is only 130 kms of regional train lines, which is partly used for suburban train, or about 1,200 meters per 1,000 ha., compare to 11,500 meters on average for European cities, 6,400 meters for Hong Kong, 4,820 meters for Tokyo, 2,700 meters for Kuala Lumpur and 2,150 for Singapore (Figure 3).

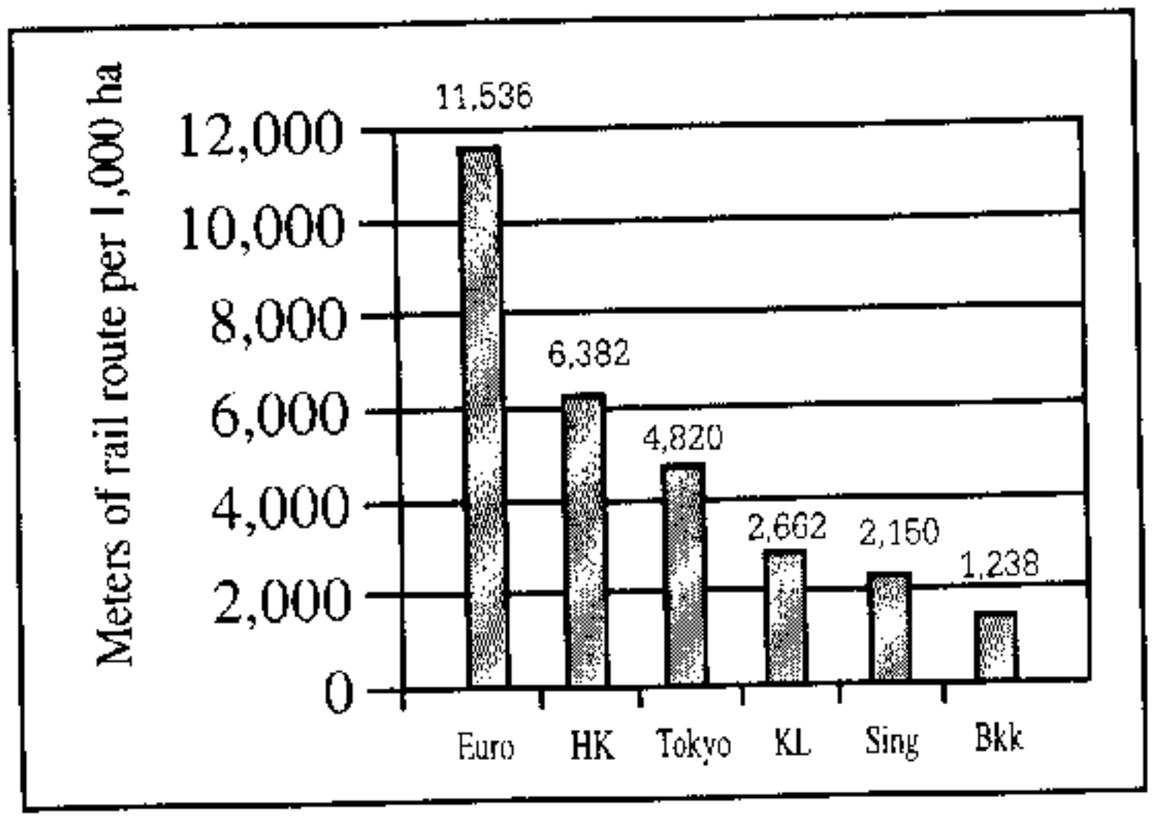

Figure 3 Railway route length per 1,000 ha of urbanised area

Sources: Poboon, 1997: Figure 4.13

Figure 4 Summarises the factors affecting the rapid increase of private motor vehicles and related consequences in Bangkok.

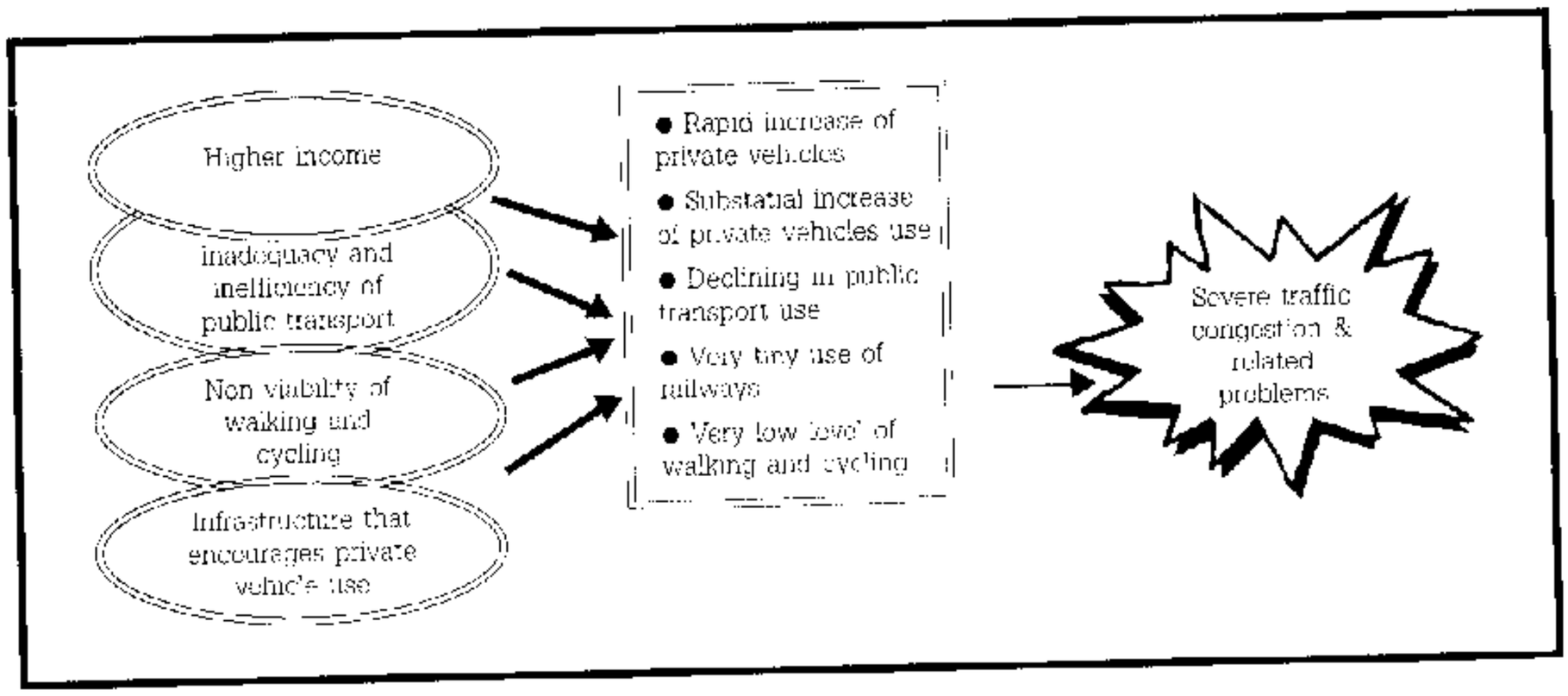

Figure 4 Factors affecting the rapid growth of private vehicles in Bangkok

4. Japanese Transport Policies and Practices

Japan, comprising of four major islands (Honshu, Hokkaido, Shikoku, and Kyoshu), has three metropolitan areas-the national capital region (Tokyo), the Kinki region (Osaka), and the Nagoya region-all are located in Honshu Island. The population of Japan in 1994 was around 125 million, of which over 60% live in urbanised areas. This is the consequence of the accelerated urbanisation taken place since the 1950's. The majority of population are concentrated in Tokyo, Osaka and Nagoya Metropolitan Regions. Since the arable land is very limited (only one quarter of the entire area), most Japanese cities are densely populated. As of 1993 there were 11 cities with population of over 1 million and 54 municipalities with population of 300,000 to 1 million.[8] In addition, as same as other countries, motorisation in Japan is noticeable. The number of automobiles increased from less than 10 million in 1970 to over 60 million in 1990.[3] It is very interesting that how Japanese cities cope with the consequences of these two concurrent events, so that there are not serious traffic congestion and related problems such as air pollution, health impact and accidents as prevailing in Thai cities. The following policies and measures are likely to be the answers.

4.1 Priority to Mass Transit System

In large and dense cities where there are very large numbers of trips while the land provision for transport routes is limited, efficient transport system that can carry large number of passengers is definitely required. Hence, public transport, particularly mass transit system is the most suitable and efficient mode of travel. Furthermore, public transport system, including buses, produces much lower emission compared to private automobiles, considering on a basis of emission per passenger.

In all large Japanese cities, the development of mass transit system is evident and has been adapted to the requirement of each area. Such system comprise of both conventional system such as surface railway, elevated railway, subway and modern system such as monorails and automated guideway transit (AGT) system (Table 1). In metropolitan areas such as Tokyo, Osaka, Nagoya, urban railways extend to about 4,300 kilometers. Daily passengers of the urban railway system are around 59.2 million. In the Tokyo megalopolis, where there are about 20 million people living there, the JR East's railways, metropolitan subways and private railways carry about 9.3 million people a day. The total length of these rapid transit systems reaches some 2,100 kilometers.[15]

Table 1 Mass transit system in Japanese major cities

Tokyo Megalopolis								
Tokyo	7,966	●	●	●	●	●	●	
Tama	143							
Yokohama	3,307	●	●	Δ	●			
Kawasaki	1,202	●				●		
Chiba	843	●			●	●		
Omiya	431	●			●			
Kamakura	171	●				●	●	Δ
Kansai Megalopolis								
Osaka	2,602	●	●	●	●	●	●	
Kyoto	1,463	●	●					
Kobe		1,423	●	●	Δ	●		
Other areas								
Sapporo	1,756	●	●					
Sendei	971	●	●					
Nagoya	2,152	●	●		●	●	●	Δ
Hiroshima	1,108	●			●	●	●	
Kitakyushu	1,019	●				●		
Fukuoka	1,284	●	●	Δ				
Nagasaki	438	●					●	
Kumamoto	650	●					●	
Naha	301					Δ		

Notes: ● in operation

Δ under construction or planned

source: Japan Overseas Rolling Stock Association. 1996: 3

In general, a major part of urban public transport services in Japan have been provided by private operators e.g. urban rapid railways are mainly operated by private railroad companies and the Japan Railway Companies (JR group). However, some local governments are in charge of the construction and operation of urban public transport facilities under the control of the national government. Large cities with a population of around 1 million actually operate buses and subways for themselves. Since the development of railway system requires a huge investment and often becomes a big burden for private railway companies, the Railway Development Fund was established in 1991 through a 100% government investment to promote railway development. The main purpose is to provide funds at free or low interest rates for construction of Shinkansen (Bullet Train) and urban railways. At present, about 9.2 trillion Yen has been employed.[11]

As a consequence of such policy and measures, in all large Japanese cities rail plays very vital role. For example, the modal share of rail, including subways, in Tokyo and Osaka, is as high as 70% of the total passenger transport.[12] In Tokyo a huge railway network comprises of 17 JR commuter lines, 12 subway lines and 13 private railways, carrying about 36 million passengers daily.[13]

A key reason behind the substantial use of public transportation in Japanese cities is likely to be the continual governments' policies to discourage the use of private automobile and encourage the use of rail-based mass transit and non-motorised modes. These were done by investing very little public money into road infrastructure relative to other developed countries until the early 1970s, while significant investments were made into railroad. Meanwhile, use of the automobile was discouraged by heavy taxation on fuel, high tolls, and automobile consumption taxes.[14]

Furthermore, to encourage the use of public transportation, regular commuters using trains or buses can buy commutation passes, which give them a discount of 40% and allow them the convenience of passing through ticket gates. In case of students, a higher discount rate is adopted, for example, 70% for high school students.[15] This is clearly an effective incentive for using public transport.

4.2 Attention to Pedestrians and Cyclists (non-motorised modes)

Walking and cycling are widely acknowledged as human and environmental-friendly modes of travel as they emit no pollution, consume almost no external energy and, as we can say, are harmless to people. Any cities wishing to achieve livability and sustainability must pay attention to and encourage these modes of travel.

In most Japanese cities, walking and cycling are very popular. For example, around over 40% of total trips in large cities such as Tokyo, Nagoya, Fukuoka, Sendai, and Kanazawa are made by walking and cycling. This excludes walking and cycling to and from railway stations (Figure 5).

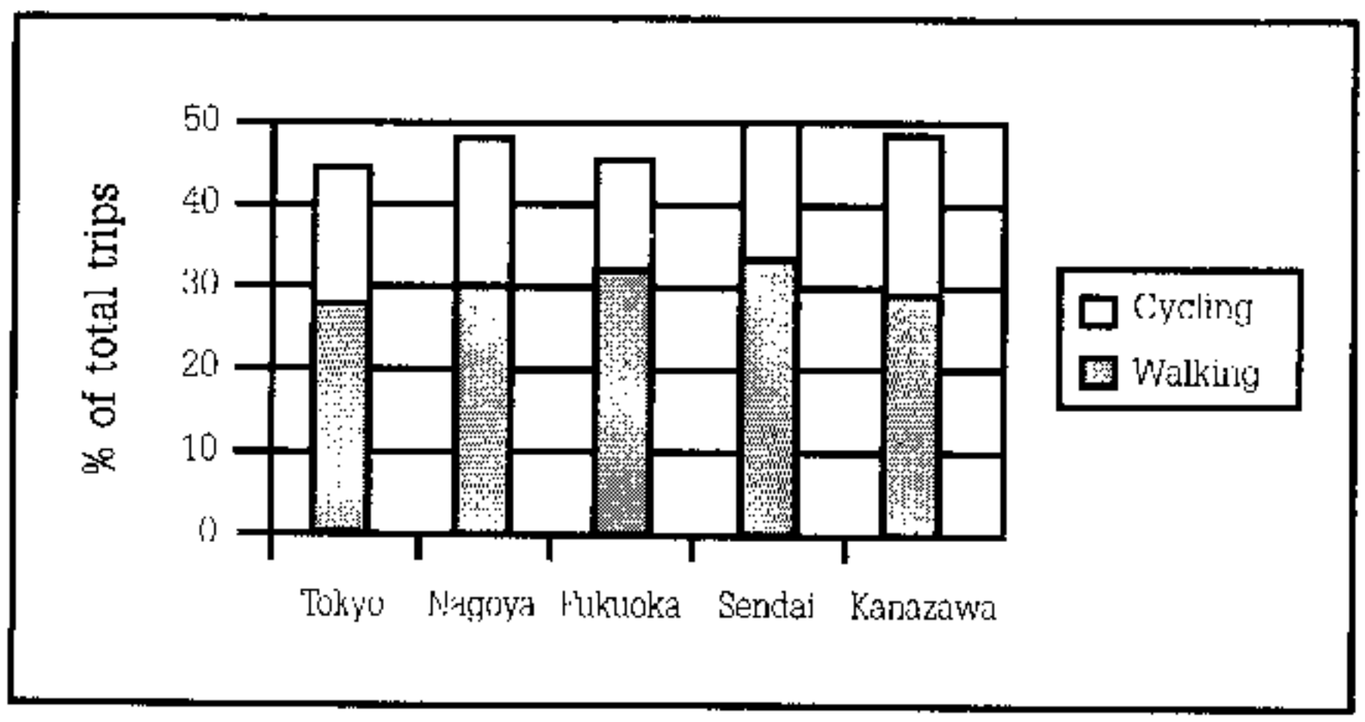

Figure 5 Shares of trips by walking and cycling in selected Japanese cities
Source: City Bureau Ministry of Construction and Japan Transportation Planning Association, 1993

This massive walking and use of bicycle in Japanese cities is mainly attributable to the appreciable improvement of infrastructure and facilities for pedestrians and bicyclists.

For pedestrians and cyclists' safety, exclusive pedestrian paths and bicycle tracks are planned and constructed in addition to sidewalks along arterial urban roads. The

national government extends subsidies covering 50% of project costs. Since the introduction of the subsidy scheme in 1974, a total of 230 projects with a total length of 320 kilometers have been implemented.[16]

As a consequence of the historical pattern of investment which was mainly into railway mass transit, Japan was able to encourage a high density development pattern centered around its rail network. This also made walking and cycling convenient due to the short distance between their living places and railway stations. The use of bicycles to and from railway stations has increased considerably since the 1970s. In moderate and lower density suburban areas around major cities between 15% and 45% of rail station access is by bicycle. In Tokyo, bicycle access to railway lines has increased from only 4% in 1975 to 15% nowadays.[17]

Another key factor affecting the massive increase in bicycle commuting to railway stations is the rapid improvement of bicycle parking facilities at or near stations. The Bicycle Law, passed in 1977, provided public funding and tax incentive for the construction of bicycle parking facilities. Japan's 1980 Bicycle Law requires that newly constructed or enlarged department stores, supermarkets, and banks must provide bicycle parking. Japan has spent around US$ 10 billion on bicycle related infrastructure over the past two decades, which led to the construction of some 8,735 parking facilities holding some 2.77 million bicycles.

Since the first and foremost concern of cyclist or one who want to cycle in any cities is safety, while safety is directly related to traffic speed. Japanese agencies have applied traffic calming practices onto most local roads and streets to ensure safety for pedestrians and cyclists. For example, traffic are forced to slow down by widening footpaths, adding bends to roads, adding rough road surfaces or installing some barriers onto road surfaces in downtown areas and in residential areas. Speed limit is another measure that is imposed on most roads and streets. For most larger urban roads where there are separated footpaths and cycle ways, the speed limit is 50 km/h., while on most smaller local streets where pedestrians and cyclists have to share road surfaces with traffic, the speed limit is only 20 km/h.

4.3 Restictions on Private Motor Vehicles

Although Japan is one of major car production countries, to own and use a car in Japan is not all easy and cheap. The most popular type of car is one with a 1,500 cc gasoline engine, which averagely costs around 1.35 million yen (about 405,000 baht) including car purchase tax and consumer tax at about 100,000 yen (around 30,000 baht). Although the cost of car purchasing is not so high but costsis of using a car substantially high. A car owner has to pay about 47 thousand yen (around 14,000 baht) annually for car tax and car weight tax. Compulsory insurance costs about 18 thousand yen (around 5,400 baht) per year. In addition, a car is to be inspected at regular intervals, i.e. at the third,

fifth and seventh year, which costs approximately 60 thousand yen (around 18,000 baht) each time. Furthermore, since parking spaces in most cities are very scarce, a car owner has to rent a parking space. The average rental charge in Tokyo wards has recently become as high as 35 thousand yen (around 10,500 baht) per month.[15] These high costs of car ownership have to some degree discouraged many people from owning cars.

The Japanese transport policies, measures and their consequences are summarised in Figure 6.

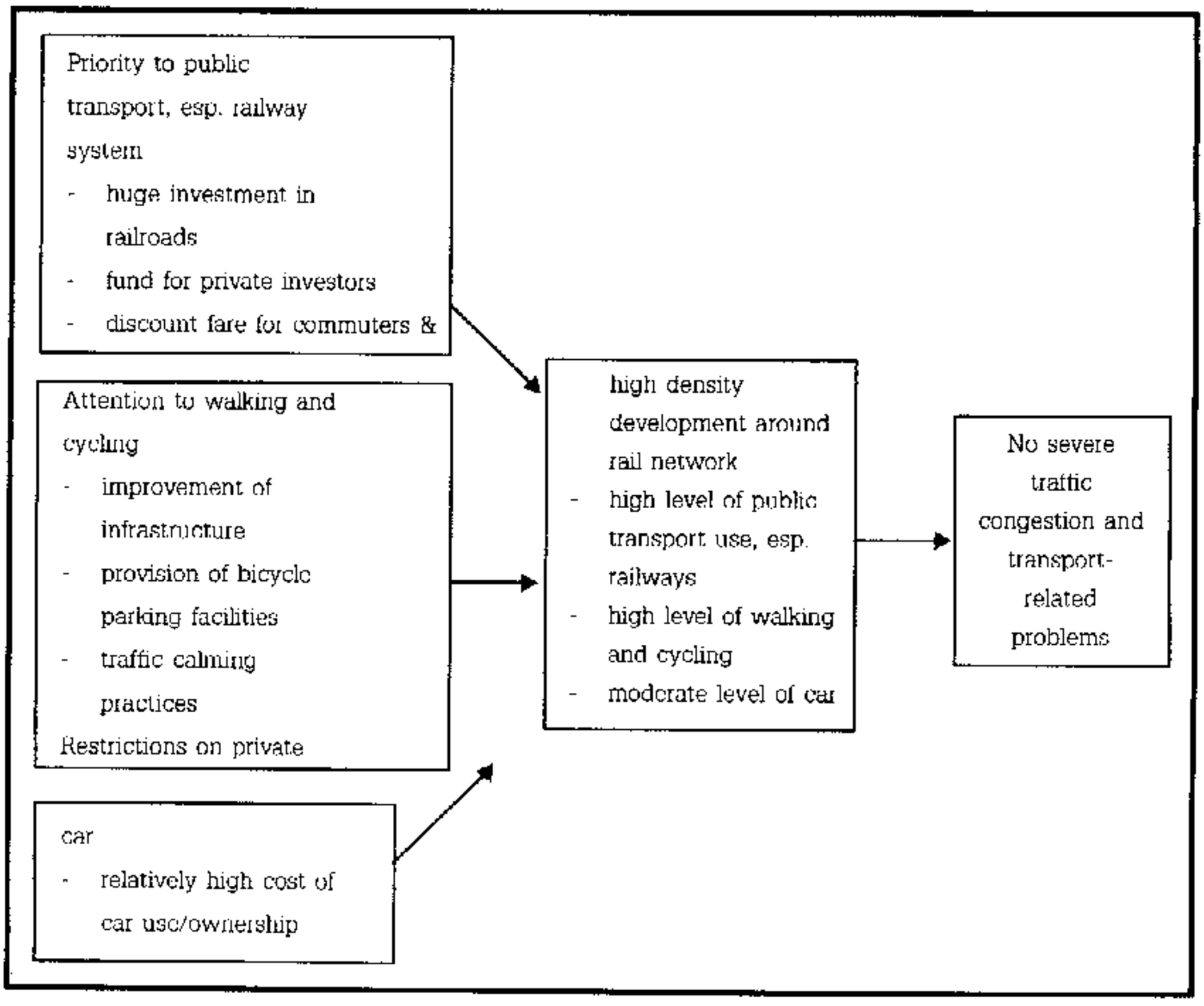

Figure 6 Japanese transport policies, practices and their consequences

5. Conclusions

The above arguments depict quite clearly the different policies and practices that lead to substantially different consequences in terms of transport situations and related problems between Bangkok and Japanese cities. Bangkok's traffic crisis stems from the rapid increase in numbers of private motor vehicles. In addition to the economic factors, the three major factors contributing to such increase, which are often overlooked, are inadequacy and inefficiency of public transport service, non-viability of walking and cycling, and transport infrastructure that encourages private vehicle use.

Japanese cities provide valuable lessons on how they have shaped their transport system to serve people of all groups, not only those who have privileges e.g. owning private automobiles. This has been done through three main measures: giving priority to mass transit, particularaly rail based system; taking care of pedestrians and cyclists; and restriction on private automobile users. The consequences of these three measures in to long-run leads to no serious traffic congestion in Japanese cities and the environment is likely to be friendlier to the residents, particularly when compared to Bangkok. Much of the Japanese policies and practices are indeed consistent with the sustainable transport concept which is progressively acknowledged in more and more cities around the world (see, for example, Newman, 1992, 1996; Barter, 1996; Pendakur, 1992). Thai palnners, decision-makers and communities must take these lessons from Japanese cities into consideration if they desire to avoid traffic crisis and make Bangkok more livable and sustainable.

Foot Note

[1] Miller, 1994: 71

[2] Poboon, 1997

[3] JICA, 1990

[4] F.H. Kocks KG and Gemeurges MHB, 1975: B22; JICA, 1990. Figure 2.2.4

[5] BMTA, 1996-Annual Report

[6] Poboon, 1997

[7] JICA, 1997

[8] Institute for Future Urban Development, 1996: 1-7

[9] Institute for Future Urban Development, 1996: 8

[10] Japan Overseas Rolling Stock Association, 1996: 2

[11] City Bureau Ministry of Construction and Japan Transportation Planning Association, 1993: 1-18

[12] Institute for Future Urban Development, 1996: 7

[13] Japan Overseas Rolling Stock Association, 1996: 25

[14] Hook, 1994: 2

[15] City Bureau Ministry of Construction and Japan Transportation Planning Association, 1993: 1-14

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