

シンガポールの住環境の改善に関する研究

(A Study for Improving Environment in Singapore)

内田 哲郎

Introduction

植民地政府時代に策定されたシンガポール最初の国土計画に関する概念計画であるコンセプト・プランは、人口増加や様々な要求や欲求に対応しながら近代的な住生活環境を整備・実現してきている。

整備水準を2000年、2010年、X年と3時期に分け“リビング・ザ・ネクスト・ラップ”への目標を掲げ、下位に都市計画関連法を体系的に持ちながら住宅開発や建築物の規制、公園緑地の開発、あるいは土地収用等に関する手続きを規定をしている。リー前首相のリーダー・シップに裏打ちされた経済成長は、できるだけ国内に大国を入れようとする全方位外交とASEANを基軸に国際的な発言力を大きくしていこうとする（島ら、1997）外貨導入政策にその一端が伺える。

一方、経済成長や工業化による環境破壊の懸念から、ガーデン・シティ・キャンペーンによる緑地形成と環境衛生の施策により居住する人々

に対し快適性・審美性・健康性といった本来のアメニティある住生活を保証しようとしてきている。居住者は、ガーデン・シティ・キャンペーンについて、居住者の環境意識の向上が今後の課題であるものの、概ねキャンペーンに対する合意形成をしてきていると、アンケート調査による研究が報告されている（内間ら、1992）。

本研究では、多民族国家でありイギリスの影響を受けながら経済発展を為し遂げた国の様々な制度を知ることは、都市計画や国土計画の普遍性や一般性を議論する上で有用な資料となり得ると考える。よって、様々な制度により開発が行われている現状とコンセプト・プランがどのような関わり合いをしてきているかを、現地の行政機関を訪問して実施の現状をヒアリングした上でコンセプト・プランと照らし合わせ、シンガポール共和国の歴史的な変遷を踏まえながら、それらを考察し都市計画の一般性を議論する際の基礎的な資料を提出することを目的とした。

1. Historical transition of Singapore

Peeping through the life style, culture of the people living there and the historical transition until today when discussing the city plan, regional plan, etc. can be supposed to be a very much helpful means for deeply understanding them which are the social plan.

Especially, Singapore is not the nation having a deep history like Japan, but repeated a long history of colony era being governed by the world powers in each era, and with the advent of recent years, has achieved the “Miracle high level growth” under the leaders. When

comparing the way of what the cities should be, among the nations in general including Singapore, the Literature 3 says that it is necessary to accurately compare them considering the social circumstances, cultural level, etc. among the nations. The historical literatures of Singapore, is quite less, and it is imagined that the people send their lives with the fishery or pirate behaviors utilizing the circumferential oceans like the near sea islands. This south ocean island belonged to Majabite Kingdom which prospered in the East South Asia from the 13th century to the 16th century and was called "Singapura" (the meaning of "Lion's street" in Sanskrit language).

On the other hand, the Portuguese fleet representing the powers in those days occupied Malacca in 1551, and kept on occupying the oriental trade with the spices as its center. However, Holland who established the Union East India Company in 1619 challenged to it and deprived all the rights of trade from Portugal.

Thereafter, the oriental trade additionally increased. What challenged to it was England. England desired to possess the Malaysia islands only as the England East India Company but also as the call port reciprocating between India and China.

Thereafter, in the those days when England governed Malaysia, Ruffles who was a high ranking; employee of East India Company broken the Dutch occupancy in the orient trade and established the England Trading House in Singapore for promoting the orient trade for his own country England.

Thereafter, with the advent of 20th century, England established the modern colony system, but Singapore also surrendered in the 2nd World War that began with the war declaration of Japan against the Allied Powers in 1941. However, after the Japan's unconditional surrender in 1945, Singapore was again placed under the military administration of England, but from 1946, the movement of acquiring the self government right become vivid inside Singapore and the domestic confusion continued from time to time. Among the situations for the student campaigns, civil wars and riots against England to continue, England granted the domestic self government right to Singapore in 1959.

In the election conducted in the same year, the People Action Party (P.A.P.) lead by Lee Quwan Yu won the overwhelming victory and he took the post of premier. Singapore which became an independent public nation inside England with this chance as a boundary drove a bald industrialization promotion policy under the powerful leadership of Premier Lee. But in the year of 1968, it was decided that the British military force which occupied $1/4$ the gross income of Singapore until then was to retreat, and the Lee Administrative Power tread over to the radical policy of introducing the foreign investments for riding over this great pinch.

The administrative power induced as much foreign nations' corporations from the USA, EC, Japan, etc. and attempted to increase the chance for employment and the heavy chemical industrialization of industry. This policy wonderfully succeeded, and Singapore achieved the "miracle high level growth" in the 1970s.

Thereafter, Singapore has enjoyed the prosperity as one member in the Newly Industrializing Economies (N.I.E.S.) region in Asia.

2. Present situation of Singapore

Singapore is a small island positioned at the tip of Malaysia Peninsula or at the location of only 136 km north from the Equator. This is the approximately same size as Awaji Island (about 620 km²) of Japan, and consists of large and small 57 islands such as Singapore main island, Pulau Ubin, Sentosa Island etc. Table 2.1 summarized the outline of Singapore. There is nocompulsory education system concerning the education, but the school attendance percentage is 100% for the primary school, and 85% for the senior high school, and there are

Table 2.1. : Outline of Singapore

• Area	633 km ² (same size as Awaji Island)
• Population	2.69 million persons
• Races	Chinese system : 209 million persons (77.7%) Malaysia system : 380 thousands (14.1%) India system : 190 thousands (7.1%) Other races : 30 thousands (1.1%)
• Population increase percentage	1.7%
• Religion	Buddhism, Mohammedanism, Hinduism, Christianity, Taoism.
• Education	No compulsory education (6-3-2-3 system)
• School attendance percentages	100% for primary school 85% for junior high school 23% for senior high school
• Literate percentage	86% (38% for the persons who can speak more than 2 languages out of the said figure).

many two-divisions system during the morning and in the afternoon for the primary and junior high schools. The school attendance percentages for senior high school and higher education are low and the university graduates are regarded to be elites. The G.N.P. per

Table 2.2 : Industry Structure Percentage of Singapore

Industry	Structure percentage
Manufacturing industry	29 %
Financial and business service	28 %
Commerce, hotel, restaurant	17 %
Transportation, communication	14 %
Agriculture, fishery	0.2 %

person is 13,206 US\$, which is about half that of Japan. As the industry structure, commercial business trade can be enumerated following the manufacturing industry as shown in Table 2.2. From this, the state of sight seeing dependent nation can be clearly seen. The Housing Development Board (H.D.B.) constructs the social capital, and 80% of the nation live in the H.B.D. houses, and 79% of the nation live in the houses bought from the H.D.B. Singapore having the state of nation parallel to the advanced nations drafted up the basic concept of government cooperative policy, drove the "Living the Next Lap" concept, divided the annual plan into three terms, repeated its studies, and its duties are being achieved by the actual major enforcement administrative organizations of policy and also the City Redevelopment Agency, Park and Recreation Department (P.R.D.), Housing Development Department, Jurong Town Public Corporation, etc. which are public corporations.

3. National land plan of Singapore

3.1 Trunk and concept of national plan

What plays a trunk role forming the national land of Singapore is the concept plan which was introduced in 1971 and has become the policy of strategic development, and there is the "Living the Next Lap" which is also the future development of Singapore.

The current concept plan is the plan that was drafted up in 1971, which aims at the quality enhancement of Singapore people's life and the maintenance of central business center or is the plan with the future needs being divided into 3 stages of 3.23 million population by the year of 2,000, 3.45 million population by the year of 2010 and 4.00 million population by the year of x. Concretely such plans as follows can be enumerated :

1 4 commercial centers and 18 business centers shall be installed at the respective locations inside the island so that the coexistence of central districts may be

alleviated.

2 The number of housings shall be increased to twice the present level by the year of x.

3 The green parks shall be arranged as many as possible.

4 Quality enhancement of living.

5 The number of M.R.T. (subway) and Light-Rail stations shall be increased to more than 130 from the present 42 by the year of x.

Singapore Island has a plenty of island coast beaches from the central area of city, the resort areas in the harbor and also parks as the sight seeing dependent nation, and moreover the plans advocate that they facilitate the connection to these areas. However, the concept plan that is the trunk of national land plan of Singapore described that the foundations for living of the people residing in the nation must be of high quality and that an additional effort is needed because the inferior housings which are appearing without plan here and there at present need to be improved so that Singapore may become the world first class city in the cultural aspect. In addition, it can be seen that there is the enthusiasm that Singapore is desired to be evaluated equal to the world top class city.

3.2 City plan and social capital readjustment

In the above mentioned concept plan, it may be said that the replenishment degree of housing, city and social capitals has been realized parallel to the advanced nations. Among them, Changi International Airport highly reputed over the world, Singapore port which is world top ranking in the container transportation volume and the public housings (M. H. D.) here 87% the national people is residing are its representative infrastructures, and the green zone inside the city which is said to be Garden City is in the top level. Further, not only the sewage popularity percentage at 97% but also the water supply percentage are at the level parallel to the advanced nations at 100% when speaking of the Singapore main island.

At this background, there is the government's clear readjustment policy against the respective infrastructures. An emphasis has been placed on the precedent readjustment for making it sure that the harbors and airports may become the important positions of the traffic in the East South Asia zone, while the government propelled the policy of information foundation readjustment of computer system introduction and the like for the land traffic and information communication. For the public housing, the social democracy administrative power consistent since the independence of Singapore has obtained the national people's support by

eliminating the inferior housing and securing the land suitable for housing while utilizing the land expropriation privilege. Concerning the green areas, the government has conducted the environment forming campaign acceptable to the sight seeing visitors from the reconsideration of previous nature destruction. It is clear that for the sewage and water supply services the public hygiene foundation readjustment has become the important government policy from the regional characteristics called the tropical zone. It is the Ministry of National Development (M.N.D.) as an actual enforcement organization to be propelling the housing, city and society capital readjustment in Singapore. As the internal department inside the said ministry, there is the Public Works Department (P.W.D.) which takes a responsibility for permitting the construction/control of road and road traffic related facilities, the construction of air ports and the construction of buildings and structures, for drafting up the parking lot development plan, whereas the Public Park Recreation Department is responsible for the entirety of construction, control, afforestation measure of public park.

On the other hand, there is the City Redevelopment Agency as an outside department, who is in charge of the city plan and the site disposal at city center and of the parking lot policy. Moreover, there is the Housing Development Department who is conducting the peripheral development of housing and housing development.

Further, Jurong Town Public Corporation as the public corporation aiming at the regional development is in charge of developing the Jurong industrial zone in the west district, while Sentosa Development Corporation (S.D.C.) is responsible for developing the sight seeing facilities on the Sentosa Island.

3.3 Business central area and sub-business central area plans

4 districts of Tampines, woodlands, Jurong East and Seletar are decided as the business center areas by the year of x in Living the Next Lap as the concept plan, aiming at the accommodation population of 800,000 persons in the area of 15 times the present H.D.B. town center. Fig. 3.3.1 illustrates the business center and sub-business center areas. The business center area shall be made the town full of commerce and culture with the M.R.T. (Mass Rapid Transit) station as its center, which is planned in such that the existing housings may well conform to the newly installed housings in the residence district in addition to the plan of business types having the reception property of retail shops, restaurants, hotels, etc.

In addition, the scale of sub-business center area is planned to be about $1/3$ the business center area, and 40% the sub-business center area is planned to be allocated to the hotel, recreation facility, retail business, foodstuff store and the like.

Further, this is also formed in the vicinity of Paya Lebar, Bouna Vista and Bishan stations which are the currently existing M.R.T. station. The candidate sites of the currently existing stations which become the development strategic points are enumerated at 6 stations for the time being.

Moreover, there are Newton, Novena and Lavender districts as the peripheral business center areas in addition to these business center areas and sub-business center areas.

These districts are planned in the vicinity of M.R.T. station in the same manner. Their scale is also small at 0.2km². This is also planned to be made the commercial area of hotels, recreation facilities, retail shops, etc. similarly to the business center area.

Fig. 3.3.2 shows the plan scale until, the year of x for every business type at the above mentioned 3 kinds of center area.

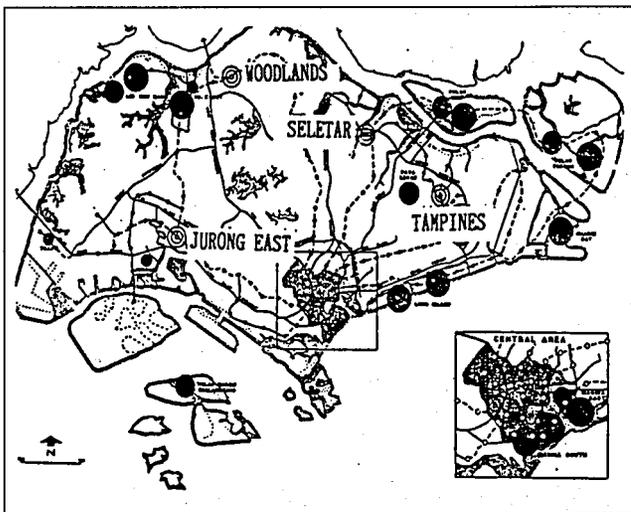


Fig. 3.3.1 : Strategic Point District of Development (Source from Living the Next Lap, U.R.A., 1991)

3.4 "Living the Next Lap" toward the years of 2,000, 2010 and x

In the concept plan until 2000, the development of overall districts of business district and residence district are planned along the M.R.T. station according to the increasing population.

The system-up of network between the district development and routes is planned so that the presently existing M.R.T.

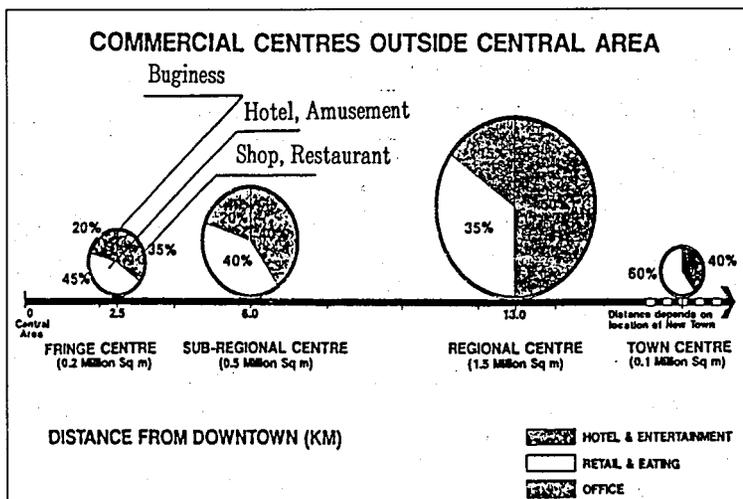


Fig. 3.3.2 :Development Scales of Various Business Types until the Year of x (Source from Living the Next Lap, U.R.A., 1991)

route may be extended and it can correspond to the increased population until then.

The northern area route connect Woodlands with Yishun, and the routes over the entire island will be completed with the connection between Tampines and Seletar. By the completion of this route, Woodlands and Sembawang New Town will prosper as the towns while Kangkar will prosper as the residence area. The hotel system settlement housing will be constructed along the Simpang and Kallang sea coasts. Also, 4 districts are decided for the business center are as, and they have the society function and economy function by themselves. By the year of 2010, Kangkar and Ponggol are connected by the road. The seletar district will be made the strategic point of residence area while the Bukit Batok New Town district will be made the newly developed district, and a wide range of reclamation is planned to be done.

At Sentral Area, the commercial facilities of promenade, public park, hotel, shopping center, etc. are to be installed as a new commercial district, and at the same time the hotel system housing will also be constructed, aiming at the overall environment of commerce and recreation spots.

The northern west trunk line of M.R.T. will be elongated until Marina Bay from Postong Pasir Via Marine Center. Also there is the Light-Rail as a new light rail. This rail connects Tampines Via the Seletar central district with Yishun. By the year of 2010, 4 business center areas (5 areas if the central area should be included) will be completely developed. And by the year of x, the areas move to the east south district from the east area and the south west district that were developed by the years of 2000 and 2010. That is planned to be developed as the recreation district. Fig. 3.4 shows the future route map of M.R.T. which is predicted in the year of x.

The sea area in the vicinity of Changi and Changi harbor are planned to be buried. And, they are called the "Long Island" and made the strategic points of recreation and housing. Further, the south Marina and east Marina will be developed as the business site while they become the housing area as the nucleus area of shopping district.

To the contrary, the long and narrow seacoast vicinities along Loyang and Jurong Rivers become the districts only of housings. And the M.R.T. will be extended to the East Marine from the west Marine along the south west from Changi which is the planned development area. This seacoast vicinity is the recreation area released not simply to the travellers but also to the Singapore people.

And the international line ferry Staying at the wharf will be also adjusted to the system capable of joining the existing ground traffic organizations with 24 hour set-up even during holidays and during nighttime. Pulau Tekong and Pulau Ubin are planned to be protected as

the recreation area as much as possible. If Pulau Tekong and Pulau Ubin should be urbanized, it is desired to provide the chances for occupations for the residents there.

In this way, from the present time until the year of x, Singapore is forming a rich national land with a slow speed. The inferior housings will be readjusted to the housings like those in Low-Rise and Medium-Rise districts, and the green grows luxuriantly everywhere in the towns of Singapore. The comfortable life of Singapore which is an island in tropical zone ends up in utilizing relics and natures of Singapore Island better.

3.5 Land utilization pattern

Table 3.5 shows the land utilization patterns in 1990 and 10 years ago.

Table 3.5 : Comparison of land utilization patterns in 10 years ago and at present

	1980, Area (km ²)	1990, Area (km ²) (up/down ratio)
Total area of national land	633.0	633.0
Building area	275.1	311.6 (13.3up)
Agricultural area	80.9	10.8 (86.7down)
Forest	30.0	28.6 (4.7down)
Others	231.4	266.4 (13.1up)

Singapore was originally the colony of England, and the concept called "the land ultimately belongs to the nation" is settled.

At present, 80% the national land is the nation owned land, and the lease style has been taken when it is to be utilized to the private citizens. The unused nation owned land at the city center is controlled by the City Redevelopment Agency, and the vicinity around the housing area is controlled by the Housing Development Department.

If this land should be disposed to the private sectors, the tender is conducted and the ground right for 99 years is to be transferred, so the government can control the land utilization. The land appropriation system is an important column of Singapore's land policy. The majority of Singapore's nation owned land has been appropriated by the government from 1959 through 1989. The land is appropriated on the basis of the Land Acquisition ACT. The Land is appropriated easily without the enforcement of optional purchase concerning the business having a public purpose. As the concrete enterprises, there are such enterprises being conducted by the Housing Development Department, Jurong Town public Corporation, City



Fig. 3.4 : M.R.T. Route Map in the Future
 (Source from travel Map Singapore for Motorists, Bus & M.R.T Commuters)

Redevelopment Agency, etc. in addition to the road readjustment related enterprise, military facility readjustment, etc. The Housing Development Department has a large contribution to the housing policy because it supplies the majority of housings to the national people.

Further, because the industry corporation readjustment is done like the Jurong Town Public Corporation, the land appropriation is also recognized for the securance of redevelopment land like the City Redevelopment Agency, the land appropriation is widely applied.

Further, the major pattern of redevelopment enterprise in Singapore is such that, after the City Development Agency put in motion the appropriation right and purchased the lands into a large lot, the said agency puts the application of building, etc. into the tender in the form of designated long term lease and makes the developer to develop it. Moreover, as the conservative type redevelopment, the same agency provides a special policy to the land or building high in cultural value.

3.6 Current situation of hygiene facilities

Under the worse conditions that Singapore Island has a plenty of flat land and the rain water is hardly stored though the rain fall volume is much, the service water is supplied to main isolated islands from all the areas of main island and covers the pipe channel network of 4,925km. The water quality falls under the guideline concerning the water quality of world Health Organization (W.H.O.).

For its jurisdiction, the Public Utility Board (P.U.B.) under the Ministry of Commerce and Industry is engaged in the supply of water and the development of water resources.

About half of the water source is from the water reservoir pond in the domestic land and the remaining half is imported from Malaysia through the pipe line. Depending the water on import can become the vital point for Singapore, so Singapore is presently providing various countermeasures. The political negotiations with Malaysia are important for the securance of water, and there is "The Johor River Water Agreement of 1961 to 1962" as the treaty of water supply from Johor in Malaysia, which is now under enforcement. Johor province is to supply to Singapore the water of 113,750,000 liters per day until the year of 2060, while Singapore exports to Johor province the treated water of 140,900,000 liters per day.

On one hand, the sewage service popularity percentage is high 97%. There are 7 sewage service water catchment areas and 6 sewage treatment yards in the domestic land. The Sewerage Department of Environment Ministry plans, constructs and manages the public sewage service system.

For the collection and treatment of drain water, the resident household is levied the

drain water fee of 10 cents per 1m³ while the non-resident household facility is levied 22 cents per 1m³ in accordance with the consumed potable water.

3.7 Public park and forestation plans

3.7.1 Current situations of public park and forestation plans

The tropical zone high trees are finely readjusted in the periphery and at the central split zone of roads and express ways.

In addition, the superb forestation zones can be seen also in the periphery of airport, the business quarters in city and inside the housing corporations. Even the pedestrian bridges, concrete walls and bridge legs are forested with ivies and flowers. Moreover, there is no place where



photo. 3.7 Housing District Rich in Green Zones
(Source from Living the Next Lap, U.R.A., 1991)

the soil is exposed or the weed is overgrown other than the work execution sites.

Photograph 3.7 shows the landscape of street green zones in the area designated to the Low-Rise district (the architecture height being from 2nd floor to 4th floor) and to the Medium Rise district (the architecture height being until 10th floor) by the partial micro zoning plan in the existing housing area.

It can be known that the tropical zone trees are systematically planted along the streets. The public park Recreation Department in the Ministry of National Development is propelling the entire for estation policy as the main propulsion body of forestation policy.

In addition, the Housing Development Agency, Jurong Town public Corporation and public Enterprise Department are also installing and controlling the public parks and forestation inside the respective housing areas, business areas and facility areas. As its background, the plantation campaign was started in 1963, the garden city policy was announced in 1967 and

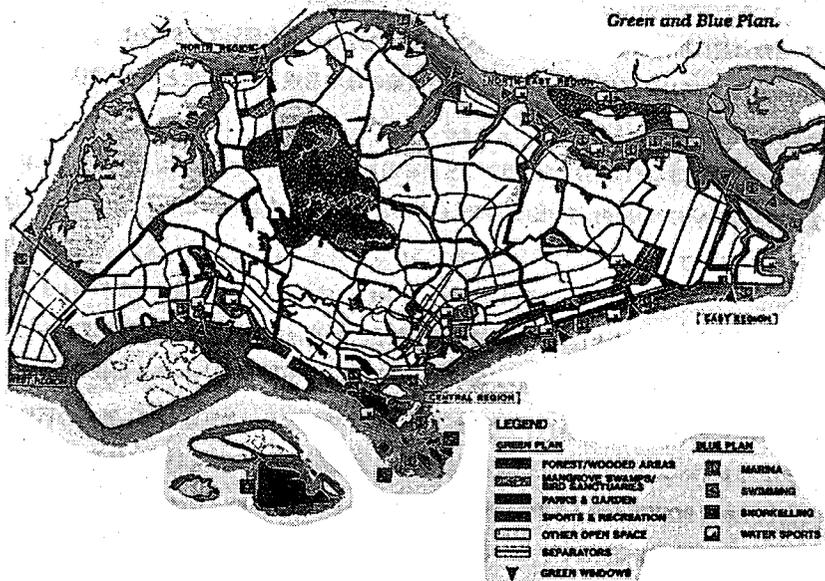


Fig. 3.7 : Fore station Schematic Diagram in Singapore
(Source from Living the Next Lap, U.R.A., 1991)

since then, various policies were put into practice under the clean and green campaign. Fig. 3.7 is the green zone schematic diagram in Singapore.

In conducting the fore station, because the native tree species were less the trees were introduced from various nations in the other tropical zone. In propelling the fore station, the strong support of former premier Lee Quwan Yu who was a consistent leader since the independence has been a major cause. The garden city plan is the important plan in Singapore nation, but its concept is to unfold "the formation of clean city rich in green" toward the realization of city beauty and amenity in the tropical zone from the aspect of environmental hygiene undertaking in addition to the fore station read justment undertaking. And its history consists of the following periods :

1. period for popularization of garden city campaign and for drafting up the policy guideline (1957 to 1967)

Starting from the national plantation campaign (May, 1967) by the former premier Lee Quwan Yu, the clean beautiful campaign was begun (May, 1967), and it was started with the two-stage premise plan concept called the fore station formation and environmental hygiene of garden city policy.

2. The period when the emphasis was placed on the fore station and green zone formation on the city entire level (1968 to 1977)

For avoiding the formation of concrete jungle in the development involved in the rapid industrialization of Singapore, the undertaking contents of garden city policy were enlarged, and the Public Park Recreation Department was organized for reinforcing the function of administrative mechanism.

Further, the Environment Agency was installed (September, 1972) aiming at the enhancement of environmental hygiene, and also the plantation day was established for enlightening the citizen.

3. period for attempting the replenishment of garden city (1978 to the present time)

Availing of the chance of installing the Garden City Enforcement Committee, the green zone was converted into the qualitative green from the quantitative green, and the public park plan is being conducted from the viewpoint of quality design, consideration to the handicapped and ecology.

Concerning the scale and cost of fore station propulsion, the Public Park Recreation Department controls 734,000 trees, and 4,400ha of public parks and green zones, while the Housing Development Agency controls the site of 1,739ha, the Jurong Town Public Corporation controls the site of 49ha, and the Public Enterprise Department controls the public parks and green zones of 48ha.

500,000 trees are planted each time, and each tree is controlled by a computer. The majority of Public Park Recreation Department's entire budget is allocated to the maintenance and control of public parks and green zones, and the staff close to 70% are engaged in the maintenance and control businesses.

On the other hand, concerning the regulations and standards relating to the fore station, the green zones are protected before starting the development by Parks and Tree ACT in 1975). The preparation of plan drawing of landscape including the fore station is obligated in the development plan, and the authoritative department examines the plan. For example, even a private citizen needs to obtain the written permit from the Public Park Recreation Department before cutting down the tree whose trunk circle size is longer than 1m, and the vacant land along the road must be planted with the lawn as a rule, and if this rule should not be obeyed, the Public Park Recreation Department can give an advise.

Such items as providing the green zone of at least 2m wide along the road, providing the plant cutting belt in front of the concrete breast wall and so forth are stipulated into details as the "Fore Station Guideline".

3.8 Traffic plan

3.8.1 Land traffic

The road total length in Singapore is 2,882 km as the readjustment situations of road, and the paved roads out of them is 2,798 km or at the pavement ratio of 97%. Almost all the trunk roads are in the left turn exclusive-use lane, and almost all the exits to the trunk road from the block roads are prohibited to turn to the right.

Further it is convenient for all the roads to have their names, and the road marks to be readjusted to a considerable extent.

The main body of construction, maintenance and control of road is the Public Undertaking Department of the National Development Ministry. Because no regional public bodies exist in Singapore, the national administration controls even the block roads. The expressways which are presently been readjusted is 104km in the overall length, and there are 7 routes of express ways including the block roads. All the express ways are free from toll, and the maximum speed per hour is 80km, but the code of roads is lower than that of Japan, and waves of road face becomes the technical problem.

As the latest readjustment situation, the underground portion of Central Express way (C. T. E.) was opened in September in 1991. Further, the project which becomes the readjustment main work of the present express way network is the extension work of Pan Island Express and Central Express connecting the Singapore in the east west and the south east. Satoh Industry in Japan is enforcing this work.

As the henceforth topics, there is the tunnel network concept at the city center. The Public Undertaking Department drives out the concept of 1 billion S\$. As its effect, such points are enumerated to alleviate the increase and stagnancy of traffic volume at the central area, to alleviate the noise against the environment and to smooth the land utilization. This concept is referenced to that in Paris in France, and the study is being advanced at present with a research consultant being designated. Singapore is a city nation with its national land area equal to Awaji Island in Japan, and not only the population density is high but the elongation of automobile traffic demand is also great with the high level economic growth in recent years as its background. Therefore, for avoiding the traffic congestion which becomes the cause for the fall in aspect of efficiency of city function, the road traffic policy is strongly propelling the automobile traffic demand suppression policy.

The tax as listed below is to be levied when an automobile is being purchased. For this reason, the purchase price of new car in Singapore is more than three times that in Japan. This

policy is imagined to function considerably for suppressing the number of vehicles in Singapore.

1. Automobile registration fee and additional registration fee.

When registering an automobile, the tax of 1,000\$ is levied to a personal car and the tax of 5,000\$ is levied to a corporate car as the registration fee. Further, as the means of drastically enhancing the automobile acquisition price, the additional registration fee of 150% the market price is levied at the initial registration time of automobile.

The collection of this kind of additional registration fee generates such a trend as its side effect as only its owner to use its automobile for a long period of time. For this reason, such a disposal is taken as alleviating the additional fee against the personal automobiles, if the automobile of less than 10 years should be discarded and a new one is to be bought.

Table 3.8.1.1 Tax Levied Amunt by Displacement Volume

2. Road Tax

The road taxes shown in Table 3.8.1.1 are levied against the personal automobiles by their displacement volume.

Displacement (cc)	Tax levied amount per cc (S \$)
~ 1,000	0.75
1,001 ~ 1,600	0.90
1,601 ~ 2,000	1.05
2,001 ~ 3,000	1.25
3,001 ~	1.75

3. Import Tax

The import tax of 45% in addition to the market price is levied to the personal automobile and the corporate automobile. For information, all the automobiles are imported in Singapore.

There is the riding restriction to the city center, which is the system that has been introduced for solving the congestion of automobiles at the city center in the morning and in the evening. First, the restriction only during the morning was introduced against the automobile from May 2,1975. The restriction was expanded also to the evening from June 1, 1989, and its object was also applied to all kinds of automobiles.

4. Restrictive districts

The area of 725ha where the traffic is most congested at the Shayton Way at the business central zone, Orchard Road in the shopping and hotel zones, etc.

5. Restrictive hours

In the morning : 7:30 to 10:15, Mon. to Sat. (excluding the holidays)

In the evening : 4:30 to 6:15, Mon. to Fri. (excluding the holidays)

6. Car models in object of the restriction

All the car models exclude the route bus, police and military vehicles and emergency vehicle.

7. Restrictive method

The vehicles in object of this restriction is obliged to buy the license and to display it on the front glass. The registration number, color and model of infringed car which has invaded into the restrictive zone will be checked by the police at the entrance of restrictive zone, and the punishment payment notice of 30S\$ will be forwarded within 2 weeks.

8. Sales of License

Table 3.8.1.2 License Price

The licenses are available in 1-day ticket and monthly ticket, and their fees are shown in Table 3.8.1.2.

Car model	S\$ of 1 day ticket	S\$ of monthly ticket
Individual, taxi, etc.	3	60
Corporate car	6	120
Auto bicycle	1	20

9. Effect

The passenger cars invading into the restrictive zone during the restrictive hour decreased vastly to 75% and all the vehicles decreased to 45% immediately after the introduction of commutation automobile restrictive rule in 1975. The vehicle average speed during the restrictive hour increased by 20% to 33 km/hour in the restrictive zone, but the speed fall appeared also on the other roads than the restrictive zone.

On the other hand, the subway M.R.T. connecting at high, speed the Singapore Island is the city high speed railway by the electric motor whose business was opened in 1987, and is the trunk mass transportation system of Singapore. This subway was constructed with the cost of 5billion S\$. In 1992, there are 3 routes of the South-East Line, the East-West Line and the branch line connecting the western district. The overall length is 67km, consisting of the 19km underground portion and 48km land portion. There are 42 stations in total consisting of 15 city center stations, 26 highly elevated stations and 1 ground-level station.

The vehicle being used at present is the aluminum vehicle manufactured by Kawasaki Heavy Industries, Co.,Ltd., and 1,800 passengers can ride on a train consisting of 6 locomotives. The electric distribution installations are delivered consistently by Meidensha.

In 1992, the M.R.T. transports the passenger of 350,000 persons every day. The running hour is from 6:00 AM to 12:00 and the run interval is 3minutes during the peak hours and 6minutes during the non-peak hours. The average speed is 45km/hour. The owner main body is the M.R.T. Corporation, which is one of governmental organizations, and is in the committee organization.

The management main body is a private sector called the Singapore M.R.T.-Limited that was established in 1987 when the subway business was started. The Ministry of Communications supervises this private sector.

The M.R.T. was started from October 1987 after the survey and research of previous traffic needs for more than 10 years. The subway operation was partially started in November 1987, and all the lines were opened in the middle of 1990. The government is proud of the M.R.T. for its attractive fee, speedy transportation and high quality transportation. During this period, the Japanese system corporations embarked on Singapore one after another.

A large scale extension work plan is clearly indicated on the future development concept plan of Singapore entirety, and has a plan of connecting whole the islands with the network.

3.8.2 Aircraft/Marine traffics

Changi International Airport which is the entrance hall from the air route of Singapore was opened in June 1981 as the air port for 24 hours. The site area is 1,663ha with two run ways. 53 air lines are utilizing this airport, connecting 110 cities with each other in 52 nations at present. The annual passenger disposal capability is 24 million persons, which is proud of the largest in the Asia and Pacific Ocean areas. The airport itself is controlled and administered by Singapore private Sector Aircraft Agency (C.A.S.S.) which is participated by the Ministry of Transportation and Communication.

The C.A.S.S. is staffed with 1,400 persons and has the administrative privileges of granting the aircraft negotiation, route license, etc. The traffic volume is anticipated to become twice by the end of this century, the site for the 3rd terminal in addition to the presently existing 2nd terminal has already been secured. The passengers of 36million persons in total can utilize the terminals with 12million passengers at each terminal.

The investment of 160billion S\$ is planned to be done in the henceforth 10 years since 1990.

As regards the harbors on the other hand, Singapore is located at the geographical strategic point in view of the world trade.

The Malacca/Singapore Channel is the great vein of the commercial vessels of Japan beginning with the tankers. Singapore is the central harbor of about 7,000 routes and is connected with more than 850 ports over the world.

Singapore port is the world top ranking in the number of ships calling at the port since

1986, and also becomes the world 1st rank in 1990 in terms of the number of handling the containers in the unit of port.

For expanding the container handling capability, the Singapore Harbor Agency (P.S.A.) is presently constructing the terminal on the Brany Island. According to the news report on May 23,1990, this agency plans to perform the development of 3.4billion S\$ in the coming 5 years. The self fund out of its fund is the gross black figure of business amount totalling 313million S\$ and the deposit of 2.24billion S\$ by the end of 1989.

The secret of competitive force of Singapore Harbor can be said to be the presentation of speedy and high level services against the utilizer by the realization of computer system.

A new computer was introduced in 1989 with the cost of 10million S\$, and the operation of PORTNET was started since January 1989. Its object is for attempting the realization of on-line real time of business disposal and information exchange between the Singapore Harbor Agency and the harbor utilizer.

4. Conclusion

The readjustment situations of present social capital in Singapore are high, and can be said to equal to the advanced nations. Not simply the fact that the government's clear policy has been driven out against each infrastructure, but also the presence of former premier Lee Quwan Yu contributes greatly to this matter.

The vast introduction policy of foreign investment which was started from 1968 has wonderfully succeeded, and the industry policy with the heavy chemical industry as its center has raised the Singapore people living level, while the garden city policy has formed the hygienic national land rich in green.

On the other hand, the garden city policy was enforced for preventing the nature destruction involved in the industrialization, and the nature protection and the forestation inside cities not simply build up the excellent landscape but exhibit its effects in the alleviation of heat island phenomenon of cities entailed in the population increase.

The national enrichment policy and the nature protection policy can be understood to be the spirit of various policies in Singapore.

As the sight-seeing dependent nation and a newly risen industrialized nation in Asia, and an important relay port of world trade, Singapore will make use of its strong administrative privilege for putting into practice the population enlargement plan, domestic traffic plan, business central area plan, foreign investment introduction policy, etc. by the year of x.

The persons living in Singapore consent to and won't deny these national enrichment

policy and nature protection policy. Rather, a great majority of people desire that "these policies should be propagated much more" and that "Singapore should continue its efforts as it is".

The writer summarizes the report of regional plan/traffic plan in Singapore by reporting that Singapore began from the strong leadership of former premier Lee Quwan Yu, and the concept plan advocating the clear readjustment policy against the government's infrastructure is the recipe where the consents of planner and the living persons enjoying the by-products by plan have been entrusted to the future of human being life with the sublimated amenity, and promises the "Living the Next Lap".

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