



MEGACITIES LECTURE

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Urbanising Singapore: optimising resources

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november 2002

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Why is Singapore so fascinating?

GOVERNMENT INVESTMENT IN THE NETHERLANDS

Government investment in spatial development declined steadily in the Netherlands during the 1970s and 1980s. This was due to the increase in the government's current expenditure, in particular for income transfers related to the sharp rise in unemployment and the numbers receiving invalidity benefits. At the beginning of the 1990s, annual investment by central government had fallen to 2.3 billion EURO, less than 1% of the national income at that time. It became increasingly apparent that this trend could not continue without posing a serious threat to economic development in the longer term. The turnaround came towards the end of the last government period of Prime Minister Ruud Lubbers, with an initial 'investment impulse' that raised the level to 2.7 billion EURO a year for the period 1995-2000. This initial boost to investment was followed by a second, and then a third, coinciding with the coming to power of Wim Kok's first and second governments, ultimately raising the level of investment to a projected 6.3 billion EURO a year over the period 1998-2010, or almost 2% of the national income at the beginning of that period. The sharp increase was directly connected to the healthy economic outlook that existed in 1994, and even more in 1998. Economic prospects were distinctly less promising when the new government took office in 2002. This had a direct impact in the form of renewed cuts in investment within the constraints of a smaller overall government budget. For the period 2002-2014, investment is now projected at 5.8 billion EURO a year, or 1.3% of the current national income.

DISCUSSION OF PRIORITIES FOR INVESTMENT

When it came to implementing the successive investment impulses, there was a constant debate between ministers and departments and between central government,

other tiers of government and stakeholders about the best way to spend the extra money that had been earmarked. The initial intention was to spend it solely on strengthening the economic structure, but even then it was unclear what would be most effective. The aims were later extended to include sustainability and social justice, as well as spatial quality, and this complicated the debate about priorities even further. The government was unable to resolve the issue and therefore asked the various planning agencies to draw up an objective method for setting investment priorities. The planning agencies were only partially successful, to some extent because many projects were not worked out in enough detail to properly assess them, and to some extent because the agencies did not have a proper theoretical understanding of the causal relationships between specific projects and the achieving of goals. The conclusion was that many projects could not be properly assessed and that those cases therefore required an intuitive political choice.

This unsatisfactory situation in priority-setting for government investment can, I feel, be improved in two ways. First, politicians should rely less on experts and have the courage to make their own choices on the basis of the principles of their political programmes. The 'de-ideologisation' of the last two governments is part of the problem. Secondly, there is a lot to be gained by looking for similar situations in other countries. Such a comparison will show that there is no single answer to the question of which investments are most effective. The correct answer varies depending on the stage of development of a country. In a country where many of the people are illiterate and there are few cars, investment in primary education will produce a greater return than investment in roads and bridges. In a country whose population is made up mainly of knowledge workers and rentiers, investment in recreational facilities or cable networks is more useful than constructing sites for heavy industry. These may seem like simple truisms, but it is not only developing countries with governments that are hungry for prestige that ignore them. Japan provides a good example of a country which tried to kick-start the economy - which has been stagnating for more than a decade now - with repeated packages of investment in the physical infrastructure, even though it was clear that the Japanese economy is well beyond the stage where such investment will have any effect. The example of Japan raises the question of whether the Netherlands is adopting the right course with its investment programmes, which also focus strongly on the physical infrastructure.

THE INVESTMENT POLICY OF SINGAPORE

There are few countries that have passed through successive stages of economic development as quickly as Singapore. And there is perhaps no other country where the government has addressed so actively - in the past and in the present - the question of where investment should be targeted to ensure smooth progress to the next phase of development. This is what makes Singapore so interesting for anyone who is looking for the answer to the question of what the Netherlands's investment policy should look like in the years ahead.

Like the Netherlands, Singapore is a small, almost completely urbanized, and very prosperous country. It is even smaller than the Netherlands, with no more than a tenth of its surface area and just a quarter of its population.

Until the end of the 1950s, Singapore was part of the British Empire. It then first

formed part of a federation with Malaysia and North Borneo. Tensions arose within this federation between the Chinese and Malay populations, which were roughly equal in numbers although not in economic power. In 1965, this situation led to Singapore's secession (from the Malaysian perspective) or expulsion (from the Singaporean perspective).

At the time of the separation Singapore was already an important port in South-East Asia. But the port activities were not very advanced and there were scarcely any port-related industrial activities or commercial services. Its economic base was extremely small and the per capita income was low. In economic terms, Singapore was a Third World country. During the 1980s, within a period of just 20 years, Singapore achieved a level of prosperity and a mix of economic activities equivalent to a First World country. This was due in part to its favourable situation in economic and geographic terms, but even more to the government's planned approach.

THE NETHERLANDS AS A MODEL FOR SINGAPORE

When Singapore became independent in 1965 it faced the challenge of building a modern economy by its own efforts and in a fairly hostile environment. The government at the time looked for countries that had successfully resolved a similar problem. They chose the Netherlands, and appointed the former director-general of the ministry of economic affairs, Winsemius, who had overseen the post-war construction of a modern industrial sector in the Netherlands, as advisor. He fulfilled this role until the 1980s. The Netherlands also played a role in Singapore's economic development in other respects. Philips was the first of many multinationals to open a production site in Singapore, and later established its Asian headquarters there. The new airport was designed by the same consultant who drew up the plans for the new Schiphol airport, incorporating lessons he had clearly learned in the process. Huge container flows travel between Singapore and the Netherlands, and they account for a substantial share of the goods traffic between Europe and Asia.

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SINGAPORE AS A MODEL

Meanwhile, Singapore itself can serve as a model. Even more than Japan, Korea or Taiwan it has shown that an economy can, to a large extent, be engineered. It is worthwhile exploring the different stages of development that Singapore's economy has passed through and the strategies the government adopted at each stage of development. Broadly speaking, there have been four phases of economic development up to the present:

- (1) a simple port economy with little added value;
- (2) industrialisation based on low wages, a relatively low standard of education and a highly disciplined workforce;
- (3) knowledge-intensive industry in association with technologically advanced distribution, based on a high level of education, especially in technical disciplines;
- (4) a shift to the service sector, especially commercial services for the whole of South-East Asia.

The hand of the government can be clearly seen for the first time in the transition to knowledge-intensive industry with advanced distribution. This involved a very

ambitious programme to improve education, a higher minimum wage to force industry to increase labour productivity and knowledge intensity, and a programme of investment to improve the infrastructure, make the city more attractive and expand the housing stock in order to provide foreign multinationals with an ideal investment climate.

A statutory save-as-you-earn scheme also ensured that there was always a surfeit of capital available at low interest rates both for local companies looking to invest and for people who wanted to buy their own home.

It quickly became clear that high-tech industry could not remain the basis for economic development. Neighbouring low-wage countries such as Malaysia, Indonesia, and now above all China, also began to raise the level of their knowledge and were increasingly attractive alternative locations for the production facilities of multinationals.

Continued growth would have to be generated by the service sector, which not only meant that the standard of education had to improve further, but that the nature of education would also have to change. Instead of the diligence and discipline of the industrial workplace, what was needed now was the analytical and synthetic thinking, creativity and innovation, entrepreneurial spirit, directness in personal relations, and similar traits. To start with, this was difficult to reconcile with the renowned 'Asian values', which were held up as an example to the decadent West, but the change was ultimately achieved, again as a result of intensive government programmes. For instance, there is now a ministerial committee whose task is to convert the public from a materialistic (the four Cs: career, car, condo and club) to a more spiritual outlook.

There is also an extensive programme designed to encourage people to choose entrepreneurship rather than seeking the security of a salaried job with the government or a large company. Another area where the government is very active is the digitalisation of the economy and society, although here it faces the dilemma that widespread access to a medium like the Internet can lead to the corruption of social values. The government would like to close off large parts of the World Wide Web but, at the same time, it realises that this would severely curb the Internet's effectiveness for economic development. Yet another area of government intervention is the level of education of the Malay and Indian minorities, whose potential contribution to economic development the government does not want to lose.

Its size meant that Singapore was far more vulnerable to the Asian crisis than Japan, with its huge domestic market. However, with the exception of just one year of recession, Singapore's economy continued to grow. This is in contrast with Japan's economy, which has now been stagnating for more than a decade.

CONCLUSION:

FROM A FOCUS ON BUSINESS TO A FOCUS ON THE INDIVIDUAL

What the example of Singapore clearly shows is the extent to which an effective development policy for the current phase differs from an approach that might have been successful in a previous phase. Investments in heavy infrastructure no longer provide the driving force they did at first. This does not mean that infrastructure has become unimportant; on the contrary, its quality remains an essential condition for further development. But now, maintenance, expansion and modernisation follow economic development rather than steering it. And there is a shift from heavy to light infrastructure. Singapore has built an excellent underground rail system in the

last ten years. It has established a huge lead over its neighbours when it comes to infrastructure for digital communications.

The main focus of its policy is no longer on attracting investment by multinational companies in the form of production facilities. There has been a shift to pulling in regional head offices, and on various forms of support for them. And, as already mentioned, the aim of the policy is the creation of an innovative and enterprising population. Investment is now concentrated mainly on the quality of environment that is needed to keep these people in the city. In overseas Chinese communities, migration has always been a common alternative for people who want to get ahead. The opportunities for highly educated citizens of Singapore to find employment elsewhere in Asia, not to mention North America or Australia, are now greater than ever. Housing, recreation, the standard of education and care, shopping and the general cultural climate are now the priorities of a spatial development policy aimed at making Singapore attractive for a highly educated, critical population that can go where it likes.

BACK TO THE NETHERLANDS

I am convinced that the government's investment policy (as well as the education, care and cultural policies) in the Netherlands should also focus far more on individuals than on companies. Attracting corporate investment is less and less important. What matters now is, increasingly, the production of well-educated, critical, inventive, innovative and enterprising citizens, who will then have permanent ties to the country. This implies a shift in investment from heavy to light infrastructure. From infrastructure to other aspects of the quality of life. From isolated large-scale projects to a network of small initiatives. From new building to maintenance, improvement and modernisation. From supply-driven investment to demand-driven investment.

If international comparative research can provide a solid foundation for ideas like these and we are able to return to a more audacious political leadership, one that is inspired by ideals, it must be possible to revive the currently ailing investment policy.

PART 1

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Urbanising Singapore: optimising resources

CONTEXT

Purpose

This paper is written to present and discuss the urbanisation experience of Singapore in the Asian context. It makes reference to two issues: creating conditions for the continuous process of urbanisation; and public investment strategies for urban development.

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Pacific Century For Urbanisation

The 21st century may very well be the Pacific Century for urbanisation. There will be many rapidly developed urban centres. Among them, a large number of mega-cities will be in Asia. These centres share several common characteristics. To name a few:

- large and rapidly increasing urban population
- limited land and land scarcity
- rapidly increasing population density
- rapidly rising land value resulting in higher-rise buildings

Sub-Optimal Response

Given these conditions, quite understandably, land to most people means profit through development or an opportunity to gain personal prestige by building an impressive edifice. Land is less often associated with opportunities to create good environment. Under these circumstances, the Asian urbanisation process takes on its own distinct course. Typically, development projects are:

- Planned and designed in unreasonably short time
- Styled after imitation Western urbanscape as a mark of progress
- Built to maximum permissible heights and densities, also in unreasonably short time.
- Often accompanied by insensitive demolition of historical districts and scenic areas.

Position of Singapore

Against this Asian background, Singapore made an early start in urbanisation and has managed to steer a course, not necessarily according to the popular trend, but effective in tackling our own urban problems in a commonsensical way.

The experience of Singapore in the last four decades tells a story of clarity of purpose and priority, coupled with a pragmatic approach and careful management of resources, in a place not unlike an urban laboratory. In the process, Singapore has created a virtuous circle for urbanisation to achieve the twin objectives of rapid economic development and rapid environmental improvements.

TRANSFORMATION

Key Challenges

In the early 1960s, Singapore was mainly about poverty, urban dilapidation, and a low level of industrialisation. The challenges were particularly immense to the small, new and heterogeneous Republic, with no natural resources, except total dependency on human resources.

There are positive attributes. Our strategic geographic location enables us to create an airport among the best in the World, and a seaport among the busiest in the World. These attributes in turn helps attract foreign investment. On account of our smallness, we tend to be receptive to new ideas, to be outward looking and to be keenly aware of the great need for constant self-renewal. While resources are limited, Singapore can be beautifully nimble in responding to or even staying ahead of domestic or international challenges. These advantages are augmented by a government – clean, logical, pragmatic, focussed – and by a cooperative and hardworking population.

The following brief account of the transformation of Singapore in the last four decades touches on two key aspects: physical environment and social-economic characteristics.

Physical Environment

A good way for a visitor to be acquainted with the physical environment of Singapore today is to take a drive from the airport to the city centre. What unfolds is:

- An efficient airport and a busy seaport with world class infrastructure and reputations.
- The tree-lined Parkway, with smooth flowing traffic, while the bus and mass transit services are both good and comfortable.
- The ubiquitous public housing, signaling high home ownership and high-rise high-density communities.
- The modern downtown, with its wide range of excellent hotels, office towers and shopping centres as well as ample other quality amenities. At the same time, historical areas exist in impressive quantity.
- Singapore River, the soul of the city, providing a link between the man-made environment and the natural world.
- Cultural institutions, including the newly completed Esplanade-Theatres on the Bay, standing as articles of faith of the community's increasing emphasis on arts and culture.



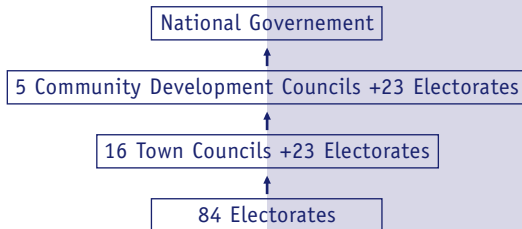
The Island devotes a third of its limited land for the preservation of the natural environment in the form of a nature reserve, water catchment areas, swamps and rivers, a 1.5 kilometre stretch of original sandy beach, colourful underwater seaworld of corals and tropical fishes, as well as sea spaces for windsurfing and water skiing.

The overall effect is a vastly improved environment, a clean and green, tropical

and Asian city where there is space for the needs of every citizen. Singapore is often referred to as an intelligent, energetic and prosperous island, environmentally dense but deceptively spacious.

Social-Economic Characteristics

Singapore has a one-tier government, where national, regional, city government are rolled into one. In the 2001 election, there were 84 electorates. In order to more effectively serve communities, the electorates are grouped together. Five Community Development Councils made up of three to four Town Councils each were formed. Most public housing estates, which have been built by the Housing and Development Board (HDB) are managed under the sixteen Town Councils. Each Town Council is composed of four to five electorates.



The following 4 tables provide the social-economic profile:

Reality of High Density Development					Year X	
Items	Units	1970	1990	2000	1991 Plan	2002 Plan
Population	Millions of People	2.1	3.0	4.0	4.0	5.5
Total land	Km2	586	633	683	736	760
Overall Density	People/km2	3,580	4,814	5,885	5,400	7,200

The table above shows that the population has doubled in 30 years, while density will become twice as high by the time we reach Year X- a master plan time horizon, about

80 to 90 years in practical terms. The challenge is to create a good environment even under the pressure of rapid development, with predominantly high-rise high-density buildings.

Multi-Ethnic Culture

Chinese	75%
Malay	18%
Indian	7%
Eurasian and Caucasians	3%

In our heterogeneous society, maintaining social harmony is essential. On the other hand, Singapore enjoys the privilege of being a melting pot for multicultural richness, and a crossroad of East and West.

Rapid Economic Development

Items	Units	1979	1990	2000
Employment	Thousand People	644	1,563	2,192
GDP	Million S\$	5,804	66,464	139,840
Per Capita Income	S\$000's	2,798	21,812	39,585
Tertiary Education	%	-*	8	18

Source: Department of Statistics

* Only 2,337 out of a total population of 2,074,000

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Constant Revision of Economic Thrusts

Sectors	1960	1970	1980	1990	2000
	%	%	%	%	%
Manufacturing	16.5	26.3	29.5	27.2	26.4
Construction	5.2	9.5	7.1	5.2	6.8
Commerce	24.5	22.0	18.9	17.9	16.7
Transport & Communications	8.7	7.3	12.5	12.2	14.0
Financial & Business Services	14.0	17.0	20.5	25.0	22.1
Others	25.0	19.3	14.9	12.4	13.7
Total GDP	100	100	100	100	100

Source: Basic data from Singapore Department of Statistics, *Yearbook of Statistics Singapore (various years)*; For 1960 to 1990 from "Competitiveness of the Singapore Economy: A Strategic Perspective", Toh Mun Heng and Tan Kong Yam (Eds.), Singapore University Press and World Scientific Publishing Co Pte Ltd, 1998, Singapore.

The substantial rise in GDP and per capital income bear testimony to the benefit of prudent government management and investments as well as the constant adjustment of our economic sectors according to shifting world trends. These changes have necessitated planning strategies to keep pace with the increasingly better educated and affluent population, as well as a heightened level of national self-confidence. Consequently, between 1989 and 1991, it was necessary to carry out a major revision of the 1972 Concept Plan.

URBANISING SINGAPORE

The key document guiding our development is the Concept Plan. The vision for the 1991 revised Concept Plan was “Toward a Unique Tropical City of Excellence”.

In the plan, our city was subdivided into corridors, regions and districts. Five urbanised corridors radiate from the central region towards the outer four regions. All five regions are subdivided into 55 relatively self-sufficient districts, of which 23 are HDB new towns. The detailed plans for these districts and towns are known as Development Guide Plans. The DGP, once commented upon by members of the public and endorsed by the government, are incorporated to become the updated version of the Master Plan.



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Development Track Records

Singapore’s development track record, since self-rule in 1960 and independence in 1965, has been impressive in both quantity and quality. In chronic land-scarce Singapore, extra care was taken to quantify virtually all conceivable floor spaces for all kinds of uses needed in the city, so that appropriate densities were set to accommodate them. In other words, we sought a quantitative balance between container (the city) and contents (the floor areas) as well as to optimise land use and economies of scale through comprehensive planning.

The following six tables give a broad brush view of the pace of urbanisation

Balanced Land Use Distribution in Concept Plan 2001

Land Use	%	Km ²
Infrastructure		
<i>Transportation, airports, seaports, utilities, telecommunication</i>	21	155
Living Space		
<i>High & Low rise housing</i>	19	140
Working Space		
<i>Office, factories, warehouses, retail centres</i>	19	140
Recreation & Community Space		
<i>Parks & gardens, reservoirs & water catchment, sports complexes, schools & libraries</i>	23	169
Other Uses		
<i>Military camps & training areas, live firing areas, undeveloped land</i>	18	132
Total	100	736

Substantial Development

Items	Units	1970	1990	2000
Permanent Residential Units	'000	201	274	326
Population in Public Housing	%	32	87	86
New Towns Lived In	Towns	1	16	23
Commercial Floor Space	Million m ²	0.6	5.2	9.3
Industrial Floor Space	Million m ²	1.7	13.3	24.0

Source: URA

The city experienced rapid transformation through development in residential, commercial and industrial buildings.

High Magnitude of Change

Items	Units	1970-1990	1990-2010	1990-2030
Residential	Units	2.5 times	1.5 times	1.75 times
Shops, Office & Hotels	M ²	5 times	1.8 times	2.5 times
Industrial	Ha	9 times	2 times	2.5 times
Squatters	Units	0.04 times	-	-

Source: URA

Despite the haste to catch up with lost time, sound principles and practices were adhered to in planning and development.

Comprehensive Transportation Facilities

	Units	1960	1970	1980	1990	2000
Cars	Number	66,800	147,600	164,500	272,560	395,200
Other Vehicles	Number	216,687	228,065	206,800	269,900	297,600
MRT Lines	Km ²	0	0	0	67	91
LRT Lines	Km ²	0	0	0	0	7.8
Airport	Million Passengers/Yr	0.26	1.03	2.47	15.6	23.6
Seaport	Thousand Freight Tons/Yr	14,400	43,500	81,000	187,800	325,000

Development is not confined to just buildings. Government investment includes both road and mass rapid transportation systems which effectively helps curb the increase in car ownership and usage, so as to keep traffic flowing at a good speed even in busy commercial areas.

Investment in education and cultural development, as seen in the following two tables, has been steady and increasing:

Attention to Education

Education Institutions	1970	1990	2000
Primary Schools 427*	203	197	
Secondary Schools & Junior College	123 *	164	174
Institute of Technical Education (ITE)	3	13	10
Tertiary Education	5	7	7**

Source: URA (Data for 2000 provided by MOE)

* Mostly sub-standard schools, now all replaced

** Not including foreign institutions

Intensifying Cultural Developments

Items	Units	1980	1984	1985	1990	1995	2000
Arts Housing	No	0	0	1	5	12	32
Museums	No	1	1	1	1	2	4
Performing Arts Venues	No	7	8	8	14	18	24
Performing Arts Activities & Exhibitions	No	NA	1,000	1,000	1,900	2,300	4,400
Audienceship for Performing Arts Activities	People	NA	248,100	239,000	721,600	749,600	857,900



Contributions from Public Housing

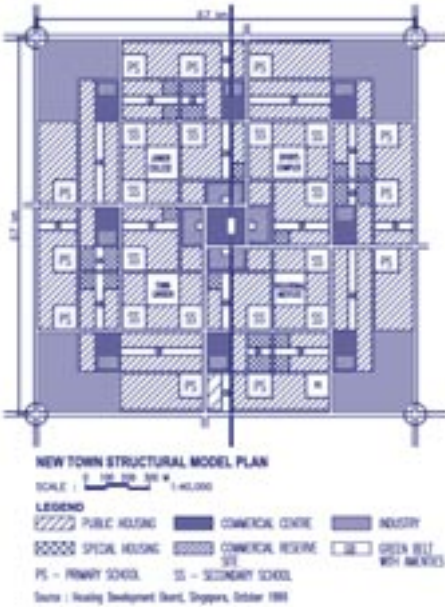
Working through the Housing and Development Board, the vision of home ownership for all was realised. It is onerous enough to provide a roof over the head of every citizen. Singapore simultaneously promotes affordable universal home ownership to help every citizen become a stakeholder in the country. Some useful information:

Extent of home ownership

- 85% of people live in public housing
- 13% in private apartments and landed properties
- 92% Home ownership among all citizens

A typical new town

23 new towns have been planned. Virtually all are high-rise, high-density. New towns can best be described by the prototype new town model as shown below in the diagram and accompanying land use table. Each new town enjoys a high degree of self-sufficiency while at the same time is integrated with road and mass rapid transit system.



Highly self-sufficient land use in a new town

Landuse	Area (ha)	%
Residential	250	42
Commercial	71	12
Institutions	77	12.5
Parks & Recreation	39	6.5
Industry	55	9
Roads & Utilities	108	18
Total	600	100



OPTIMISING RESOURCES

Commitment to the creation of a good urban plan and the commitment to making wise investment strategies in urban development are like two sides of the same coin in a successful urbanisation effort. In both cases, Singapore has made a conscientious effort to optimise all available resources.

Creating Critical Success Factors

There are four critical success factors. The first factor is the political commitment to making a good city. These should be supported by sound policies, strong delivery and superb credibility – the second factor. However, whether the work is done well still depends on the right yardstick to assess achievements, thus the third factor. Finally, all these ideals need to be brought to fruition by competent professionals with vision, whose recommendations should not be subject to undue political interference.

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In Singapore, political leadership is clearly committed to the following strategic directions:

- Give equal emphasis to economic growth and environmental improvement, in order to target for 1st World economy with 1st World environment.
- Ensure urbanisation leads to an improvement in the quality of life of people, and in the process, earns the trust and cooperation of citizens.
- Emphasize sustainability, and adhere to sound principles and do the right things from Day One.
- Take a pragmatic approach to solving problems while open to sound sophisticated ideas. Decisions are more guided by rationality and sensibility, rather than by fashionable trends.

These strategic commitments are supported by sound policies, strong delivery and superb credibility. For example:

- Concept Plans of 1972, 1991, 2001 are both environment and business friendly. Detailed zoning plans are accompanied by clear and transparent planning rules and regulations.
- Procedures for approval of the various urban plans are clearly spelt out.
- Effective legislative supports are passed to facilitate land acquisition and resettlement for public projects

- There is an agency to every task. Authorities and responsibilities of each agency are clearly defined.
- With the above-mentioned safeguards, respect for and adherence to the authority of the master plan, its detailed plans and rules are effectively upheld. The various urban plans are faithfully implemented, except for some periodic modifications to keep up with changing circumstances and to tie in better with market forces.

Another crucial factor for a successful urbanisation is to have the right assessment criteria to evaluate the achievements of those in charge. These measures have to be rational, objective and for the right purposes, as distinct from arbitrary, subjective and un-researched opinions. By and large, in Singapore, we measure:

- Hardwork, not by the amount of floor area indiscriminately built, but by the accurate diagnosis of the needs of the city and its citizens, as well as the legacy of a visionary, functional and workable master plan.
- Progress, not by the number of hills cut and old city quarters levelled but by the conservation of nature and heritage as well as the sensitive choice of new sites for development.
- Development, not by the amount of land hurriedly disposed of, but by the careful management of the optimal use of land as a scarce and precious resource.
- Improvement to transportation, not by the widths and lengths of roads, but by the effective substitution of cars with mass transit systems, and by maintaining reasonable average car cruising speeds in busy areas.
- Beautification of cityscape, not by the height of buildings but by the visual coherence and uniqueness of the place, embellished by good architecture.
- Environment amelioration, not by counting the size of over-designed parks, but by attractive housing estates, clean and green environment.

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A fourth important factor is to assemble the best possible team of creative professionals to bring ideas to reality. These professionals are expected to:

- Interpret, add value and translate political directives into workable, imaginative and beautiful plans, rules and strategies.
- Develop suitable principles, guidelines, goals and models to create a unique Asian tropical city. In the process, one could selectively adapt useful western theories to suit Asian conditions.

Optimising Resources in Urbanisation

A favourable working condition, as discussed in the previous section, facilitates but does not guarantee successful urbanisation. Good urban plans are critically needed, with an eye to optimising the use of the limited land resources of Singapore and in the process, creating synergy beyond the physical environment to touch on improving the quality of life. In Singapore's urban plans, therefore, conscious efforts have been made to maximize land potential, minimize wastage and loss of productive time.

- Some examples of maximising land potential, in the context of:
 - *Use of land earmarked for development*

Through an appropriate mix of land uses, densities and building heights in the interest of optimal economic, environmental and visual effect.

- *Benefits of major investments*
Through careful choice of locations of airport and seaport, as well as alignments for highways, MRT, LRT in relation to land use and densities. One illustration is by placing the CBD at one end and regional centres at the other end of MRT lines, which go through town centres along the way; this helps keep passenger load high in both inward and outward bound directions.
- *Conservation of Natural Resources*
These include important forests, swamps, waterfront, beaches, offshore islands, underwater flora and fauna. Admittedly, in the early days, there had been some hasty hill cutting and conversion of rivers to drains. Waterfront is safeguarded for public enjoyment except where required for port usage and marine-related industries.
- *Conservation of Heritage*
Large areas of historical districts and major monuments have been protected to retain the memory of our city and boost tourism. There was, nevertheless, some initial loss of beautiful old districts and monuments.
- *Visual effects*
The efficient expressway network makes tiny Singapore feel even smaller. As a counterbalance, a conscious attempt was made to enhance the sense of size, variety and greenness of the city. Zonal plot ratio is used to specify the density and range of building heights from district to district, in order to increase visual variety and create an illusion of the city larger than its physical size. Landscape areas are strategically located, especially where people most need shade and maximising the garden city image.

- Some examples of minimizing wastage; in the context of:
 - Correctly identifying deserving target beneficiaries
for government assistance to go where most needed
 - Create new developments contiguously to existing projects
to minimise infrastructure investment cost.
 - Picking best time for development
to ensure good usage, minimum carrying cost and early investment return
 - Building in the possibilities for continuous renewal through good planning and design. A good example is the HDB upgrading programme. With few exceptions, most HDB blocks are planned, designed and constructed well enough to be retained for a long time. Without resorting to painful and costly demolition, these residential blocks can be upgraded to meet today's needs.



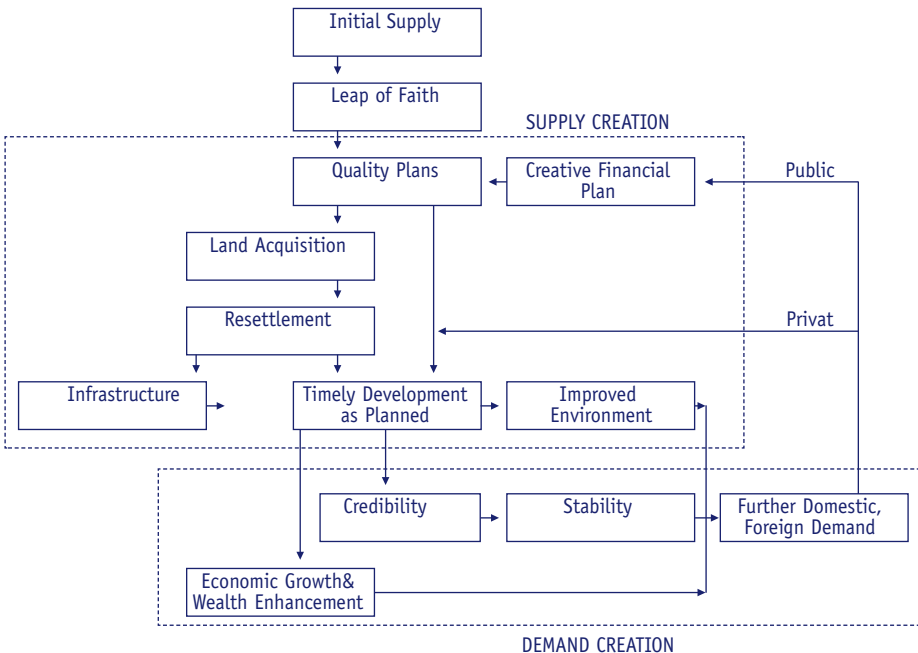
- Further examples of minimising Loss of Productive Time, in the context of:
 - Curbing Downtown Traffic Congestion
Highly self-sufficient new towns reduce unnecessary trips. Draconian measures help curb car ownership and usage. The Area Licensing Scheme, which requires payment electronically at tollgates erected around central area, effectively reduces the number of cars entering.
 - Environmental Pollution Control
Industries with some degrees of hazard and pollution are located far away from residential areas or even on offshore islands. Air pollution level on the main island can thus be maintained at well below the WHO critical levels. The general level of health is kept high; absenteeism at work and schools thus minimised.
 - Environmental Disaster Avoidance
Good design and maintenance keep our water and electricity supply highly reliable. Through heavy investment into drainage systems, floods created by tropical storms are under excellent control. Therefore road traffic and economic activities are rarely interrupted.

ECONOMIC-ENVIRONMENT TWINS

The story of urbanising Singapore and optimising resources can be summarised in a casual-effect model of virtuous circle for simultaneous improvement in environment and economy.

Casual-Effect Model of Economic-Environment Twins

After an initial ad hoc development, Singapore soon evolved a sustainable system for economic and environmental developments.



Model of Virtuous Circle Equal Emphasis on Economic Development and Environmental Improvement

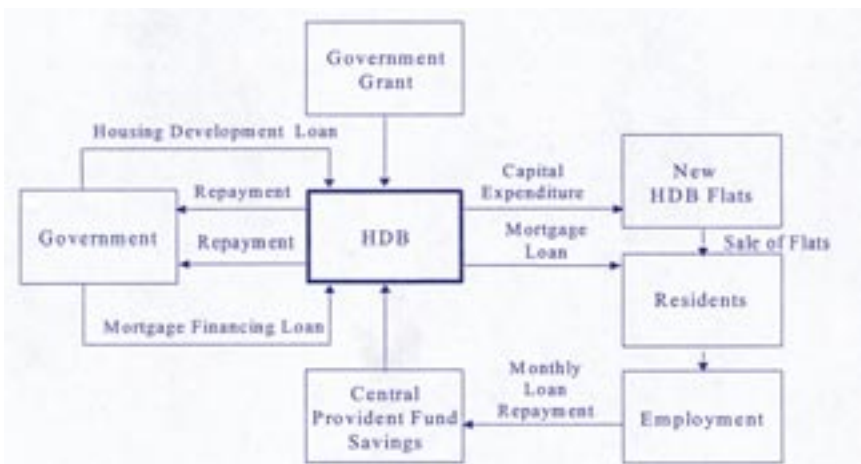
In the model on page 24, there are two main parts: supply creation and demand creation. This can be a model of a virtuous circle provided that meticulous efforts are made to optimise resources. Many of the boxes are quite self-explanatory. Some have been dealt with at length earlier. A selected few are elaborated as follows:

Creative Financial Plans

An important element of this plan is the public housing finance scheme.

- HDB Homeownership Model

This explains how HDB serves as the key-coordinating agency, handling the flow of funds from different sources.



Financing of Public Housing

The amount of transactions is very large, as shown by the following table:

Scale of Homeownership

HDB Status	Unit	1970	1980	1990	2000
Population of Singapore	Million Persons	2.1	2.4	3.0	4.0
Population in HDB flats	%	35	67	87	85
Population in owner					
Occupied HDB flats	%	21	64	87	95
HDB capital expenditure	S\$m	75	862	1,016	2,273
As proportion of GDP in					
Construction sector	%	18.8	55.2	28.1	22.8
As proportion of overall GDP	%	1.3	3.4	1.5	1.4

- Affordable housing assisted by cross-subsidies

One key reason for public housing to grow to such a large scale is that the HDB tailors the apartment sizes and construction costs according to the affordability levels of the population. The priority is on housing for everyone at the right cost in the right time, while keeping architecture design standards as high as possible under these circumstances.

Even then, government subsidies are needed. But the amount is set at a level affordable by the government, so that the public housing programme can be sustained.

Government subsidies to public housing are slightly reduced by cross subsidies from the profitable commercial and industrial developments in the new towns. The government, as a matter of principle, does not provide cash handouts, but in special circumstances gives financial assistance to individuals for asset building, such as supplementing payments for purchasing and upgrading of apartments in public housing.

Given such a large-scale of development with such a high degree of home ownership, one would wonder whether public housing activities unduly tie up capital otherwise available for investment. Economists do not believe so. This can be explained from the following three angles.

- Singapore regularly experiences strong net domestic savings. These are made possible from:
 - Sustainable net export of overseas investment earnings
 - Favourable current account surpluses and foreign reserves
 - Relatively moderate expansion of domestic investments
- Singapore households have not over invested in home ownership purchase. The scenario at the end of March 2002 is:
 - Conservative and prudent ratio between CPF savings used for homeownership purchase : total CPF savings
= S\$ 92.2 billion : S\$ 214.4 billion
= 0.43 :1
 - A non-excessive ratio between Balance in CPF mortgage loan for homeownership : balance in CPF
= S\$103.4 billion : S\$93.7 billion
= 1.10 : 1
- Economic spin-offs from public housing. A subsidised public housing programme, carefully managed, can increase wealth.
 - Developments stimulate demand throughout various economic sectors in successive rounds. Industrial outputs of one sector become the inputs of another. Construction sector has greatly expanded by virtue of the massive public housing programme.
 - These activities generate sustainable employment with continual upgrading of the domestic skill pool and selective induction of foreign talent, in a flexible wage structure.
 - The multiplier effect of the construction sector is around 1.4 for the Singapore economy.
 - Progressive corporate, property and personal tax regimes generate further income for the government.
 - Housing activities stimulate sustainable expansion of domestic firms and the formation of new firms with growing opportunities for foreign direct investments. These growths are enhanced by a combination of open competition and friendly policies towards investment promotion.

Land Acquisition

A great deal of legislative effort has been given to facilitate land acquisition on a massive scale, but at an affordable level.

- Earn land acquisition power.
 - Land acquisition power is earned through transparent procedures, clear promises of specific uses of land acquired and timely delivery of such promises.
 - Once the cabinet has endorsed, appeals are allowed for higher compensations but not against acquisition.
 - This power enables the government to assemble land to invest in infrastructure, housing, commercial, industrial as well as social and cultural projects.
- Keep compensation low and fair.
 - The key concept of compensation is that land value appreciation is mainly the credit of the government through zoning changes, not land owners' rights.
 - Government compensation for land acquired should therefore be based on the market value of existing, not potential zoning.
 - The net effect is that the government's financial burden is lower. Owners lose out part of the potential benefit from land value appreciation. It is part benefit because in any increase in land value due to zoning change, the government creams off 50% at the time of development or transaction.
- Minimise land profiteering and price increase.
 - In the event of a government land acquisition, compensation is based on the lower of either present market value or value of a specific past date. This helps cut down land speculation and maintain more realistic land prices.
 - Exceptions are given to single property owners who get full current valuations.

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Resettlement

The government successfully turned resistance to resettlement into requests to speed up resettlement. This was achieved by providing an attractive push factor; that is, a comprehensive compensation scheme based on fair market values. It is complemented by an attractive pull factor; that is, priority allocation of alternative accommodations, supplied mainly through public housing programme, for housing, commerce, industries and even agricultural activities.

ASIAN URBANISATION

The urbanisation experience of Singapore has attracted much attention from other countries, particularly in Asia. This paper concludes with a discussion on the common problems, outlines some ameliorative measures for Asian cities and, based on the Singapore experience, suggests a new planning concept for megacities.

Common Problems in Asian Cities

Many Asian cities, in their haste to cope with economic and environmental challenges, unfortunately turn to the easier but not necessarily the most sustainable solutions. The results are less than satisfactory. The common problems among them are:

- Large populations, high densities, often associated with decimated heritage and ravaged nature.
- Incompatible land use mix, spread over unnecessarily wide area and often accompanied by pollution.

- Uncoordinated multi-nodal commercial centres in central area and ribbon developments made worse by
 - Developing central areas as suburbs, with undue reliance on cars
 - Corresponding disappearance of street blocks often causing visual discord.
- Sub-optimised road and transit systems, leading to constant traffic congestions through most parts of the city.

Ameliorative Measures for Urbanisation in Asia

Singapore is one of the very few Asian cities successfully conceived, implemented and managed by Asians. It demonstrates its ability to attain a first world economy with first world environment. And its most dramatic transformation took place within the memory of one generation, from 1960 to 1985. The Singapore urbanisation experience therefore is a good starting point when considering ameliorative measures for other fast expanding cities with many urban problems. The measures suggested here simultaneously serve as a summary of the key points of this paper.

- To create critical success factors, especially regarding:
 - Eradication of corruption.
 - Use of appropriate yardsticks to assess achievements of urbanisation.
 - Engagement of competent professionals to translate political leaders’ strategic directions into workable plans and reality.
- To optimise resources, especially regarding:
 - Creation of a well-balanced master plan to guide development.
 - Upholding the authority of the plan.
- To create a virtuous circle for simultaneous economic development and environmental improvement, especially regarding:
 - Identifying clear objectives and priority.
 - Formulation of creative planning and financial plans.

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Constellation city – a new concept for a mega-city

As the world population grows relentlessly, aggravated further by the rural-urban migrations in the 20th century, many more megacities are emerging.

A mega-city enjoys the advantage of concentration of talent, opportunities and resources. However, these cities are often associated with high stress and alienation of nature in the daily lives of people. The unavoidable reality is that the rise of world population in the 20th century was phenomenal, as shown in the following table. There is therefore a need to re-examine the tools available for planners, to meet the need of massive urbanisation in the world today. It is in this light that the idea of Constellation City is conceived.

World population growth in 20th century

Years	World Population in Million People	%Urbanised	Population in Urban Centres in Million People
1800	906	3	25
1950	2,400	12.5	300
1996	5,777	45	2,600
2015	7,400	54	4,000

There is a mismatch between the rate of population growth on the one hand, and available solutions for the massive urbanisation needs of cities on the other. A quick glance into history shows that the evolution in the size of urban cells, such as new towns, is far from adequate to meet today's planning needs.

Urban Cells		Year Proposed	Persons
Garden City		1902	32,000
British New Towns-	Mark I	1946 – 1950	60,000
	Mark II	1951 – 1959	70,000
	Mark III	1960 - 1980	250,000
Singapore New Towns		Since 1970	200,000 - 350,000

The proposed Constellation City however, should be to cope more adequately with the needs of megacities.

- The concept:

It is a collection of several fully independent cities within a megacity, each with a population size of around 1.5 million to 2.5 million people with its own CBD, new towns, mass rail transit system, cultural and institutional facilities. Situated in close proximity, these cities can be connected to one another by MRT or commuter trains.

- Nearest precedents

- The Hague, Rotterdam, Amsterdam cluster, totalling 4 million people.
- Osaka, Kobe, Kyoto cluster, totalling 18 million people.

- Advantages:

Constellation cities give inhabitants the best of two worlds:

- By virtue of its size, a constellation city attracts talents, technologies and finance to generate powerful synergy.
- Relative independence of each city within a megacity provides less stressful, more convenient and simpler lifestyle.

- Applications

- to new emerging megacities, plan them at the outset as constellation cities. New towns are too blunt a tool for such a challenge.
- For existing megacities, upgrade regional commercial centres as full-fledged CBD's, carve out land areas surrounding each CBD to create a city of 1.5 to 2.5 million people. Within each city, there are still regions and new towns. Between cities, there should preferably be green belts.
- This threat of megacity may seem remote in Europe, but is a pressing issue in the rapidly urbanised Asia with its huge population.

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Acknowledgement to:

*Dr. David Ho K.H., Associate Professor
Department of Real Estate, National University
of Singapore for his research support and advice
regarding casual-effect model of the Economic-
Environmental Twin Concept and
Mr Javier Cuervo, Research Fellow for his
assistance in data compilation.*