Global Urban Development

Singapore Metropolitan Economic Strategy Report

Singapore's Economic Transformation

Gundy Cahyadi, Barbara Kursten, Dr. Marc Weiss, and Guang Yang

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Outline

1 Introduction

The past few decades have witnessed the rise of the East Asian newly developed countries of South Korea, Taiwan, Hong Kong and Singapore. Government planners all around the world, especially in Latin America, Central and Eastern Europe, Africa as well as in other parts of Asia, pay a lot of attention to the economic strategies developed in these 'four tigers', in the hope of learning from their experiences. Similarly, economists in the field of economic development have tried to identify the relevance of the lessons from these countries.

Among them, the phenomenal case of Singapore's economic growth has seen the most attention [2]; both praise and skepticism. After all, over the past few decades, Singapore has achieved astonishing economic achievements. Singapore's annual GDP growth rate from the 1960s to the 1990s has averaged about 8%, more than double of the 3.3% average of the OECD growth rate and more than three times of the US growth rate [2 and 31]. Currently, Singapore ranks as the top Asian country with the highest standard of living. About 90% of Singaporeans live in proper houses with modern facilities, while the city itself is virtually slum-free [11]. It is also a base of more than 3000 multinational companies from the developed world [11]. All of these achievements have been realized in a country that is no more than 685 sq km and with no fortunate endowment of any natural resource. How is it possible then for Singapore to attain and maintain such amazing economic growth as it has experienced over the past forty years?

This paper intends to provide a short history and background of Singapore that will lead into an explanation of the main economic strategies, which Singapore has implemented ever since it claimed self-governance. More importantly, this report offers a comprehensive account of Singapore's economy from the 1960s to the present, highlighting the different challenges that Singapore came across, as well as the variation of strategies that Singapore's government has used. The paper will conclude by briefly summarizing the lessons and significance of Singapore's metropolitan economic strategies, which can be useful to other developing nations in the world.

2 Overview of Singapore

The modern history of Singapore started in 1819 when Sir Stamford Raffles from the British East India Company arrived on the island at the southern tip of the Malayan Peninsula. After being bought by the British in 1824, Singapore grew to be an important port by 1825, with its amount of trade exceeding that of Malaya's Penang and Malacca combined [30]. 1826 saw the merging of Singapore, Penang and Malacca into the Straits Settlements, an outlying residency of the British East India Company. Only in 1867 the Strait Settlements were formally made into a British Crown Colony [30].

The opening of the Suez Canal in 1869 boosted the importance of Singapore as the regional port of South East Asia. Singapore claimed its identity as one of the major ports in the world by the beginning of the 20^{th} century due to the increased demands of rubber and tin, which are abundant in the region, resulting from the expansions of the

automobile and packaging industries in the developed world [30]. In 1921, the British built a naval base and soon supplemented the island with an air base.

Singapore was under Japanese occupation from 1942 to 1945 before returning to become a separate British Crown Colony in 1946. It first gained self-governance in 1959 before joining the Federation of Malaya, Sabah and Sarawak to form Malaysia in 1963. During the same time, Indonesia adopted a policy of confrontation against the formation of Malaysia by prohibiting trade of goods involving Indonesia within the region. This affected Singapore greatly since Indonesia had been the island's second largest trading partner [30]. Singapore separated from Malaysia on August 9, 1965 and has been an independent republic since then. Political disputes with Indonesia soon ended and trade resumed from 1966 onwards.

Http://www.infoplease.com/atlas/country/singapore.html (retrieved May 31, 2004)

Singapore's fast economic growth from the 1960s triggered its transformation into a modern city-state today. It has now a population of more than four million people (including foreign workers and permanent residents) living in an area of approximately 685 sq km [30]. Its GDP in 2003 was about US$91 billion, measured in 1995 prices [30]. Trade still constitutes the bulk of the economy with exports amounting to more than US$120 billion and imports are estimated at about US$117 billion [30]. The main trade markets for Singapore are Malaysia, the US and the EU. Although the manufacturing sector, particularly in electronics, still constitutes the bulk of earnings, the GDP share of

business and financial services has increased notably from 20% in 1982 to about 27% in 1995 [30]. Singapore has switched its gears into a system of twin pillars of economic growth based on its manufacturing and services sectors.

3 Tracing Singapore's Metropolitan Economic Strategy

Singapore's key strategies have been to adopt a pro-business, pro-foreign investment, export-oriented economic policy framework, combined with state-directed investments in strategic government-owned corporations [9]. Without the presence of any natural resource, Singapore has long relied mostly on its human resources as well as its infrastructure. Contrary to the previous belief that Singapore's growth had resulted from an increase in human productivity, it is now commonly agreed that Singapore's early high growth has resulted from an extensive use of its resources, as what Paul Krugman termed "a mobilization of resources that would have done Stalin proud" [2]. Indeed, a number of academic publications in the early 1990s showed that there was little factor productivity growth in Singapore from 1967 onward [6, 7, and 8]. What Singapore had done was really basic in that it understood well enough that its own people should be the most important factor in its economic development. Moreover, the established infrastructure left by the British was also a major plus factor in Singapore's developmental path [5].

At the very core, Singapore's economic strategies can be summarized into three basic categories: (1) The government's strategic role, (2) Mobilization of its human capital, and (3) Continuous development of infrastructure. Together, these three factors contributed to the high level of economic achievements that Singapore has enjoyed for the past four decades. Yet, a variation of these three factors was specifically used in the different periods from the 1960s onward. In the early period, Singapore used its sufficient physical infrastructure as well as the semi-skilled workforce to attract foreign investors to the island. From the 1980s, due to the increasing pressures on the labor market, Singapore could not maintain the low wages of its workforce. As a result, Singapore switched its strategies into establishing a modern 'infostructure' as well as a dynamic high-skilled workforce to enable Singapore to become the financial and business hub of the region [9]. In both periods, the role of the government institutions has been crucial. The government has adopted different policies to suit the different needs of the Singaporean economy, which would attract continuous foreign investment and thus, maintaining Singapore's economic excellence.

3.1 The 1960s

What was the main economic challenge?

The main challenge for Singapore in its early years was to overcome its high unemployment problem [28]. The Singapore government understood that the only way to increase employment was through extensive growth in its manufacturing industries. But in its early years, the economy was still too dependent on the *entrepot* trade for the East

India Company, and as a result, the manufacturing sector was undeveloped. Moreover, there was little capital needed to finance the growth of the manufacturing sector [9].

What did the government do to improve the economy?

The role of the Singaporean governmental institutions was crucial at this time. Early in its self-governance years, the Singapore government asked the United Nations to send economic advisors who had been working in countries which had similar conditions to Singapore in 1960, especially in terms of size and economic stage. Dr. Albert Winsemius, a Dutch industrialist who had previously advised Portugal and Greece, led the United Nations team [5]. One of the first initiatives was to establish an institution that would take overall care in establishing easy foreign investment on the island. The institution was to provide a one-stop general and procedural information to the foreign investors about investing in Singapore. This was to ease the transfer of investment into the country by allowing foreign investors to bypass a lot of government bureaucracies.

The Economic Development Board (EDB) was established in 1961 with the main purpose of attracting foreign capital to enter the Singapore market [28]. This was at a time when many firms in the developed western economies were coming under the threats from the expansion of many Japanese firms. EDB officers went around the US and other countries in Western Europe, promoting Singapore as the right place to build low-cost manufacturing bases for the big corporations [9]. Singapore was politically stable with a great workforce who spoke English fairly. In addition, to attract the MNCs, the EDB went on to provide a manufacturing base in Singapore with the development of the Jurong Industrial Town and its ready-to-move-in factories [28]. In 1967, the Economic Expansion Incentives Act was passed, granting the EDB the right to give ‘pioneer’ status to foreign corporations, with tax benefits up to a period of five years. As a result, most foreign investors found that their production costs were lowered by about 20% [1]. Soon, many foreign corporations came into Singapore [9]

What were the economic results at the end of the period?

During the 1960s, Singapore’s GDP grew at a relatively high average of 6% per year. In the same period, the manufacturing share of the GDP grew from about 10% in 1960 to about 15% in the late 1960s [28]. More importantly, the entry of foreign corporations into the island has enabled Singapore to adopt the technology brought in by the investors.

3.2 The 1970s

What was the main economic challenge?

Although, significant growth has been achieved in the 1960’s, Singapore’s economy was still far from being a success. The unemployment rate was still high around 10% and there were economic challenges mainly from skepticism over British withdrawal from the island and the Indonesian policy of confrontation. Unlike Hong Kong, the Singapore government had no more backing from the British. And the separation of Singapore from

Malaysia had destroyed the original plan of forming a common market in the region, which would have made Singapore even more attractive to foreign investors. The Singapore government had to continue its hard work to improve the economic conditions of the nation.

What did the government do to improve the economy?

The EDB continued to review its tax incentives scheme in order to keep Singapore attractive in the eyes of foreign investors. The 'pioneer' status was amended in 1970, extending the tax relief to a fixed five-year period, before it was amended again in 1975 to a fixed ten-year period [1]. Then in the late 70s, the tax incentives scheme was extended to support Singapore-owned small manufacturing firms, as well as providing benefits for firms who provided services to the existing firms [1]. The tax incentives and benefits significantly cut production costs by more than 33% [1].

Apart from working through the provision of tax incentives and other benefits, the Singapore government worked to establish other supporting institutions. The government took over investments in areas lacking of local private expertise. Nationalized companies emerged in the financial and transportation sectors, with the births of the Development Bank of Singapore (DBS), the Singapore Airlines (SIA) and the Sembawang Shipyard [28]. These institutions played supporting roles in establishing financial services as well as continuing the progress of physical and non-physical infrastructure development in Singapore.

To help finance the public investment in Singapore, the government continued the Central Provident Fund (CPF) social security scheme, which was already in place since 1955 [1]. Although there were several changes to the scheme such as the more diverse use of the CPF funds for housing purchases and medical benefits, the CPF scheme remains compulsory for all working individuals. What it did to the economy was to help build a workforce that was based on hard work, thrift and self-help [1].

The Singapore government also oversees the labor conditions in the country, aiming to provide a positive labor environment that would attract foreign investors. In the early 1970s, the Singapore government through the Employment Act formed standards of employment to prevent and solve problems between employee and employers. Also, in 1972, the Singapore government formed the National Trade Union Congress (NTUC) as the single national labor union to oversee employment and wage problems [28].

What were the economic results at the end of the period?

All these different initiatives by the government worked well up to the end of the 70s. By the end of the 1970s, the unemployment rate was as low as 3.5% while the manufacturing sector continued to grow to about 25% of GDP. Singapore was beginning to gain international recognition with its annual GDP growth rate of 10% [31].

3.3 The 1980s

What was the main economic challenge?

While the early years of Singapore presented a problem of lack of capital, the 1980s saw a different Singapore with a different set of challenges and economic problems. Following the relatively fast pace of industrialization with high capital inflows, Singapore in the 1980s faced a very tight labor market with increasingly high pressures on workers' wages [10 and 28]. At the same time, the world saw a growing number of other emerging economies in the South East Asian region. Singapore's economy was not branded as one which could provide low-wage workers anymore, and thus, to remain competitive in the global market, Singapore shifted its strategy into one that would ensure a development of high value added industries. Singapore's workforce needed to upgrade its employment skill level to enable the country to move out of the manufacturing into the service industry.

What did the government do to improve the economy?

In order to realize its aim of having a highly-skilled workforce, the Singapore government formed the National Computer Board (NCB) in 1981 to establish good knowledge and training of workers in the IT-related industries [5]. This was at the same time necessary to provide a sufficiently IT-savvy workforce required to attract global IT firms to produce and sell their software through Singapore. The NCB continued from 1981 onward to oversee the development of implementation of IT as part of the growing infostructure in Singapore. Among some of the initiatives in the late 1980s, the NCB developed a plan to implement a culture of IT use and application all throughout Singapore's firms as well as to increase the local IT development such as to enable businesses in Singapore to be linked up with others in the West [5]. During the same period, the Singapore government spent a huge amount of money on building and developing the new infostructure. Government spending on infrastructures went up as high as 3 times the amount of direct foreign investment in the 1980s [1].

The role of the EDB has not diminished in the 1980s onwards. An extension of the pioneer status scheme was reviewed in 1983 to ensure that continued tax incentives were to be provided to the pioneer companies. The 1980s saw the EDB beginning to grant the pioneer status not only to manufacturing firms, but also to the financial service providers. In addition to that, the EDB was also instrumental in providing schemes for benefits and other tax incentives for MNCs who wished to set up their headquarters in Singapore.

What were the economic results at the end of the period?

As a result from these various economic strategies, Singapore saw a continuously high growth rate in GDP at an average of 7.3% during the 1980s [31]. At the same time, the proportion of skilled employees had risen from 11% in 1979 to 22% in 1985 [11], while the amount of IT domestic and export sales had increased by more than 10 times by 1990 [11].

3.4 The 1990s

What was the main economic challenge?

Similar to the 1980's, the main challenge of Singapore's economy in the 1990s was to ensure that the nation would adopt high-technology. This was necessary for the economy to shift from having productions that need abundance in low-skilled labor to one that requires more skilled labor in high-technology industries.

What did the government do to improve the economy?

The 1990s saw continued high spending by the Singapore government in efforts to develop the high technology of the country. Through the NCB, Singapore had committed about S$ 2 billion from 1991 to 1995 and S$ 4 billion from 1996 to 2000, for the purposes of the development of high technology plans. The clustering of high technology institutions was done mainly by the formation of high-technology parks, which among them constitute the National University of Singapore (NUS), the Nanyang Technological University (NTU), the Institute of Systems Science and other tertiary institutions. The government also deepened the level of technological research of the country through NUS global cooperation programs with highly established tertiary institutions in the US, Australia and in Europe.

Another important strategy adopted by Singapore in the 1990s was the realization of a need to expand its economic activities in the region. Singapore was no more the low-wage economy that it had promoted in its early years. However, the surrounding regions of Malaysia and Indonesia were still mostly made up of low-skilled and low wage workers. The Singapore-Johor-Riau (SIJORI) growth triangle was initiated in the early 1990s to relocate Singapore's investments in manufacturing to the nearby areas of Johor in Malaysia and the Bintan and Batam islands of the Riau province in Indonesia [4]. Singapore acted as the main financial center of the triangle, while the Johor and Riau areas provided the labor force for the manufacturing processes.

A plan for the creation of an economic cooperation among Indonesia, Singapore and Malaysia was first expressed in 1989 [13]. However, the SIJORI initiative started only in the early 1990s, led by the Economic Development Board (EDB) of Singapore [25]. Its original members were Singapore, Johor (Malaysia) and the Riau province of Indonesia. Singapore would benefit from the regional cooperation because both Johor and Riau would provide Singapore with the much needed space, resources (food, natural gas and water) and workforce. Malaysia and Indonesia would benefit from the initiative because of the infrastructure development, economic growth, and lessons from Singapore's financial expertise as spillover effects in both places. Under the agreement, Singapore would provide the network and financial services for foreign investors to set up their manufacturing bases in both Johor and Riau [13]. The state of Johor and the province of Riau would provide tax and financial incentives for foreign firms to relocate their manufacturing bases from Singapore [13].

Early political agreement had made it easy for all parties involved to cooperate in building manufacturing and industrial zones in the Johor and Riau regions, especially in the islands of Batam and Bintan. The Singapore-Riau cooperation was more structurally formal than the Singapore-Johor plan, with the creation of an official bilateral arrangement between Indonesia and Singapore for the joint initiatives in Batam and Bintan [13]. With no apparent cooperation between Johor and Riau, it was clear then that the triangle had evolved because of extensive work from the Singapore government in trying to develop Johor and Riau as its external economic wing to establish Singapore's position as the financial hub in the region.

From 1996 onward, the SIJORI triangle expanded with the addition of more states and provinces from Indonesia and Malaysia. The triangle then was known as the Indonesian-Malaysia-Singapore Growth Triangle (IMS-GT) with the addition of West Sumatra in Indonesia, and South Pahang, Negri Sembilan and also Malacca in Malaysia. Among all the different pairs of collaborations, the cooperation between Singapore and the Riau province (including Batam and Bintan islands) of Indonesia still has the strongest economic link [25]. By 2003, the number of manufacturing bases of MNCs in both of the Riau islands has reached 70, including that of companies like Phillips, Siemens and Thomson, which still maintain their regional financial operations in Singapore [25]. Batam Island alone has grown to having investment totaling more than US$ 2 billion from a start of US$ 573 million in 1990 [28]. The Bulk of the investment comes from companies based in Singapore.

Table 1: Singapore net Manufacturing Fixed Asset Investment in US$

Year	Riau	Batam	West Sumatra	Johor
1995	11,520,000	87,510,000	1,090,000	198,213,962
1996	16,600,000	109,580,000	-	1,284,710,926
1997	21,180,000	22,430,000	880,000	127,786,122
1998	22,450,000	10,690,000	-	96,659,962
1999	12,012,700	21,275,000	229,525,775	68,393,199
2000	99,543,000	61,188,000	3,100,000	238,225,603
2001	762,096,000	-	-	180,946,736
Total	945,401,700	312,673,000	234,595,775	2,194,936,510

Source: ASEAN Statistics of Foreign Direct Investment in ASEAN 2002 Edition
Http://www.aseansec.org/14549.htm (retrieved May 27, 2004)

What factors contribute to the formation of the SIJORI growth triangle?

Location and Infrastructural Advantages

The geographical location of Singapore, Johor and Riau contributed to the initial formation of the growth triangle. With ease of transportation among the three areas, cost of forming the economic triangle was relatively low. Singapore and Johor were linked by a 1.2 km causeway, which has the capacity of carrying more than 40,000 vehicles per day [13]. Meanwhile, Singapore and Batam are only 20 km apart, and are linked by an efficient ferry ride that provides services amounting to about 70 trips per day [13].

In the early 1990s, among the three areas, Riau was the only one left without good physical infrastructure. Due to the economic growth in the 1980s, Johor had developed a fine physical infrastructure, including that of sea and airports [15]. Singapore had already established itself with a world-class system of infrastructure. The expansion of Singapore's external wing to Riau included the joint venture between the governments of Singapore and Indonesia to develop the infrastructure of Riau, especially that of the Batam and Bintan islands.

Complementary Economic Factor Endowments

The different factor endowments in 1990 between Singapore and Johor and between Singapore and Riau were proven to be complementary to each other's economic need. Hence, there were good collaborations in the Singapore-Riau and Singapore-Johor pairs. On the other hand, Johor and Riau did not have factor endowments that were too different, and in fact, in some ways they were competitive [13]. As a result, the Johor-Riau economic collaboration was, for the most part, inexistent.

In the 1990s, Singapore has an established system of transportation, finance and communications, as well as a sound track record in managerial expertise after having undergone fast economic growth since 1960. Singapore had abundant experience with the management of foreign investment, and was on the course of moving into the production of high-technology products. With rising wages and a tight labor market, Singapore had to look for cheap wages in its surrounding region, to maintain its competitiveness.

Both Riau and Johor provided Singapore with the much needed cheap workforce [13 and 25]. Johor and Riau had plenty of resources and cheap laborers. Between the two of them, Johor and Riau had more than 100,000 sq km in total area, with a total population of about 3 million each [13]. In the 1990s, most employees in Johor worked in the manufacturing sector and due to the economic development in the 1980s, Johor was moving more into medium-skilled manufacturing industries. On the other hand, Riau provided a mostly cheap workforce in manufacturing industries (mainly electronics) in Batam, and had the fortunate endowment of natural sceneries of Bintan to transform it into a resort island.

Policy Changes and Government Cooperation

The most significant drive towards a successful regional cooperation between the three regions was done by the Indonesian government in 1990 with foreign investment policy changes in the Batam Island of the Riau province. The 1990 policy change by the Indonesian government had allowed for 100% foreign ownership of private companies and foreign development of industrial estates in Batam [13]. The Indonesian government also allowed all business negotiations to be done directly with the Batam Industrial Development Authority (BIDA), instead of dealing with the National Investment Coordinating Board in Jakarta.

In response to these policy changes adopted by the Indonesian government, Batam continued to be the centerpiece of the Singapore-Riau collaboration, with efforts by the

Singapore government to help the economic development in Riau. Singapore's government initiated heavy investment into the Riau islands from the early 1990s onwards. By the mid 1990s, there were over 400 foreign manufacturing plants in Batam, over 70% of which were connected with Singapore firms [13 and 15]. Furthermore, the Singapore government helped to develop the infrastructure in Batam. In 1991, the Batamindo Industrial Park was opened, jointly developed by Singapore's government-linked companies, and Indonesia's Salim Group. Further development in the Riau islands included the developments of the Bintan International Resort Complex, the Bintan Industrial Estates, and Karimun Island Industrial estate, which in overall had attracted over US$ 4 billion in foreign investment into the islands [13].

For Johor, there was less apparent government involvement in supporting the growth of the SIJORI triangle. Despite the many existing ideological conflicts between the government in Kuala Lumpur and Singapore, Malaysia recognized the importance of good Singapore-Johor cooperation in Johor's and the overall Malaysia economic growth. From the start of the SIJORI initiative, the Malaysian government had introduced measures, which would help to ease the transfer of multinational firms from Singapore into Johor. New industrial estates as well as workers' training institutes were built in Johor [13]. The Malaysian government also took the role of improving the transportation infrastructure in the Johor area.

What were the economic results at the end of the period?

By the end of the 1990s, the share of financial services had risen to about 30% of its GDP, significantly higher from the 20% level in 1980s [28]. The number of research scientists has also grown to more than 10,000 by the late 1990s. Singapore's economy grew at an average of 8% in the 1990s until it contracted by about 1% in 1998 due to the Asian economic crisis [28].

3.5 Other Efforts to Support Economic Growth

What did the government do from the 1960s to develop human capital?

The Singapore government has always understood that Singapore's only available resources since its self-governance time are the people of Singapore [10]. As such, the development of human capital throughout the years has been another crucial role that the Singapore government plays in ensuring that the various economic strategies could work well in the nation. From 1960, the Singapore government has implemented various policies in order to maintain a high quality of workforce in the nation. In maintaining the quality of human skills, the most important government institution has always been the Ministry of Trade and Industry (MTI). Yet, the MTI has always been actively supported by a wide range of other government institutions, with the EDB leading in charge of ensuring the necessary skills for transfer of technology and the Ministry of Education (MOE) providing the long term investment through continuously revising the system of education [3]. It is important to note that these different government institutions have always worked together in coming out with the various policies throughout the years,

often with the different institutions having the same policymakers. The level of transparencies among the different institutions proved to be crucial in Singapore's efforts to put up a cohesive strategic team in human capital development.

In the early 1960s, the main concern for the development of human skills was the need to have a standardized education system, concentrating not only in mathematics and the sciences but also in the ethnic languages (mostly Mandarin and Malay), while keeping the importance of English as a formal language [3]. Most schools in the early 1960s were bilingual in nature. The manpower development unit of the EDB was established in 1961 and was in charge of developing programs to support vocational training necessary for the manufacturing processes. These trainings were mostly done in the various polytechnics and technical training institutes in Singapore.

The importance of the technical institutes grew from the late 1960s to the early 1970s, at the same time when Singapore was becoming more active in attracting foreign investors as part of its export-oriented strategies. During this period, the urgent need was to have a technically-able workforce, who would be important in the manufacturing process [9]. Government investment in the establishments of technical institutes increased, but more than that, the EDB began to provide funds for overseas training for the selected workers to fasten the transfer of manufacturing skills to the Singapore workforce.

To complement the transfer of skills and technology, the EDB was also active in providing incentives for foreign firms to set up local training schools for the Singapore workers [9]. During the late 60s and early 70s, a number of small scale initiatives to establish training centers came about with the EDB targeting a few companies like Phillips (Netherlands), and Rollei (Germany) [9]. In exchange for the companies' agreement to set up technical training schools in Singapore, the EDB promised government protection on these firms, for example by preventing other companies of the same line from establishing bases in Singapore. Moreover, the EDB overtook the management of these schools, adding to its knowledge of how to train workers [3].

The late 1970s and the 1980s saw the EDB increasing its role in vocational training by varying the sectors in which it established training centers. More training centers were geared towards the higher-skilled industries such as electronics. The EDB extended its joint cooperation with other developed nations to establish various technical training centers. The German-Singapore Institute of Production Technology, the Japan-Singapore Institute of Software Technology and the French-Singapore Institute for Electro-Technology were all created within this period [9].

During the same time that the EDB was shifting its focus into higher-skilled industries, the MOE had created a new system of education in 1979 [3], in which it intended to provide the necessary workforce in the science and vocational fields. The reformed system was to ensure that Singapore could form a very high quality and skilled workforce out of the universities and yet at the same time, ensuring that technical training was still available to those who could not excel in the formal education system. The system was modeled similar to the German education system, although the standard of the formal

education in Singapore was still based on two main British examinations: the Ordinary or 'O' level and the Advanced or 'A' level.

The Singapore education system has been through many changes ever since the MOE reform in 1979. The goal of the education system has been clear from the start. Singapore wanted to build a system, in which, through tough competition, students are elected and categorized into their academic qualities [14]. Yet, the Singapore system wants to emphasize that the country will make use of every single student in the country. Hence, although as selective as it is, the Singapore education system ensures that there will be a use of every student entering the workforce.

What the Singapore education system aims at is that it selects only its best students to be able to go to the university, and thus, would most likely make up the bulk of its higher-skilled workforce while the graduates from the practical training school would make up the semi-skilled trained manufacturing workforce. Thus, this very selective system of education would ensure that the high-skilled workforce in Singapore's economy has been selected through the process of a competitive education system, which makes them more attractive to the foreign investors.

In recent years, the MOE has been planning to have another huge reform in the Singapore education system, in which the MOE wants to build a system that promotes creativity and critical thinking in the students [27]. Again, this approach is seen as necessary because of the growing concern among the MNCs that the current Singapore workforce lacks the creativity that the high-technology industries desire.

What did the government do to develop infrastructure and transportation?

By the time Singapore gained self-governance, its infrastructure was in a good position for the birth of industrialization in the island. From the British, Singapore had learnt a relatively efficient bureaucratic system of governance, and thus, was able to effectively maintain the physical infrastructure. Urban planning in Singapore itself has started early when Stamford Raffles began to settle in the island. From 1822, a town committee was formed to overlook matters in planning for land use. The island was separated into residential and business districts, which were then developed to form smaller new towns [11]. As one of the most important bases for the East India Company, the port of Singapore was very well supported with roads and other services. By 1956, the port of Singapore had six dry docks, and further developed from the 1960s onwards [5]. Meanwhile, airports in Singapore were continuously improved with the building of the Paya Lebar airport, which would then accommodate jet planes, instead of just propeller planes in the old Kallang airport, which was established in the 1930s [5].

However, Singapore's fast economic development in the 1960s brought serious problems to the transportation system in the country. With a strong governmental effort on industrialization and housing planning, transportation in the 1960s was not very much taken care of. The only existing transportation planning was in areas of road maintenance and enlargement.

From the 1960s onward, with Singapore's industrialization and population growing at very fast rates, the Singapore government realized that poor transportation planning of the physical transportation structures would slow down the economic development in the city. At that time, the most serious problems were those of the need for transportation infrastructure development and congestion management. It was in 1968 that the Singapore government established the Ministry of Communications to deal with the transportation issues.

The development team from the United Nations helped to propose the Transport Master Plan in the late 1960s, which then led to the implementation of the 1971 Concept Plan. With the 1971 concept plan, the main focus was to gradually expand the transportation infrastructure in the island up to the 1980s. The Singapore road system was expanded from only a total of 800 km of roads in the end of 1960s to more than 3000 km by 1990 [11]. Similarly, there were numerous efforts to develop a network of expressways, with the successful completion of almost 80% of the proposed expressways by the end of 1980.

The congestion problem was the other problem that was threatening Singapore's industrial expansion, and as a result the government authority implemented several measures including that of vehicle ownership laws, improvement of the public transport system and other more direct traffic congestion measures, such as the introduction of car pools, non-uniform working hours (to reduce congestion during peak hours) as well as the introduction of an area licensing scheme (under which no personal vehicles could enter the business district within the peak hours) [11]. In 1972, the government increased the import duty of personal vehicles to 45% of the vehicle's market value, from only 10% to 30% in the 1960s [11]. At the same time, the registration fee on vehicles was increased substantially from a flat rate of 25% in the early 70s to a range from 25%-50% in 1974, while the annual road tax was increased by about 40% in the same period [11].

To further discourage people from using personal vehicles, the government also improved the public transport system in Singapore. In the 1960s, there were a number of small private-owned bus service providers, which were often very inefficient. The government merged these companies to form the Singapore Bus Service (SBS) in 1973, with a huge public share in the company. The SBS played a huge role in providing more fleet service covering extensive housing as well as industrial regions, to complement the growth of industrialization in the island. To maintain an effective production and management, the government also introduced the Trans-Island Bus Service (TIBS) in 1982 to introduce competition to SBS. As a result, the number of fleet services in the Singapore bus system increased multi times from the period 1970-1980s [11]. In the late 1980s, Singapore established the Mass Rapid Transit System (MRT), which would provide greater links among the housing estates to the industrial towns. The coverage of the MRT has since grown from the 1980s up to now, with the introduction of a network of Light Rapid Transit (LRT), which provides routes to the newer housing estates and high-technology parks. The Land Transport Authority (LTA) was formed in 1995 to

oversee the management of the MRT and LRT, as well as the future concept plan for transportations in Singapore.

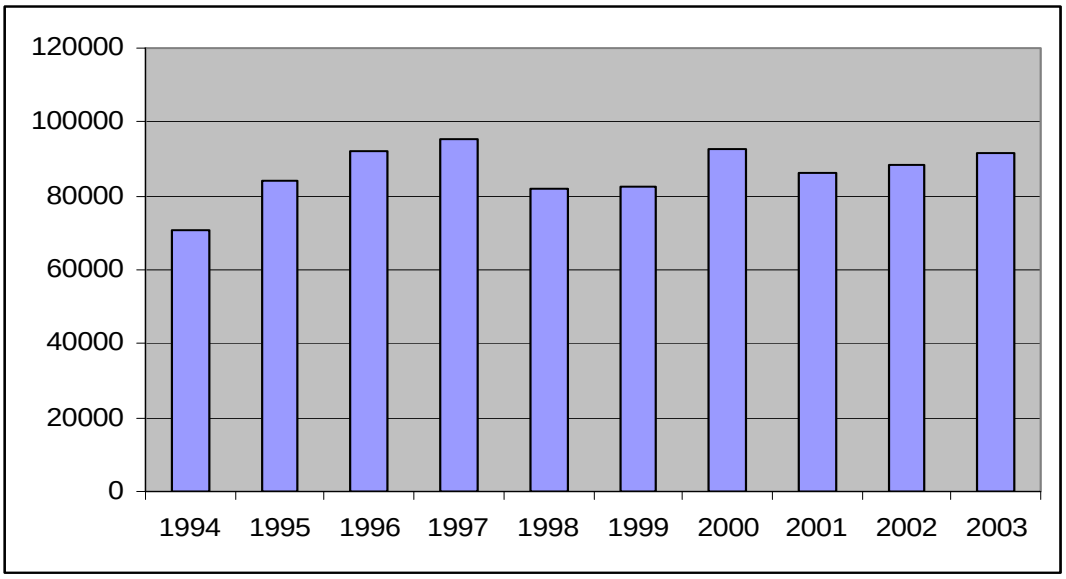
From the 1980s onward, Singapore saw a pressing need to attract more foreign investors by plunging into the information revolution [9]. From the 1980s, many efforts have been made to build up a good foundation for a knowledge-based economy or a system of infostructure, which was really a non-physical infrastructure [5]. Maintaining the existent physical infrastructure, the move towards establishing a knowledge-based economy was in the hope of adopting high-technology into the Singapore economy, just like how manufacturing technology was brought in by the MNCs in Singapore's early development. The keys in dealing with this challenge were to build a highly-trained workforce and to provide a good IT structure to transform Singapore into a high-tech financial hub in Asia [5].

4 The Current State of Singapore's Metropolitan Economy

4.1 How has the economy evolved over the recent years?

As has been previously mentioned, Singapore's Annual GDP growth has averaged about 8% from the 1960s up to now [31]. According to *Statistics Singapore* in 2003, Singapore's GDP is measured at US$ 91,341.4 million [18]. The Singapore economy has been growing rather slowly in the past few years, with negative growths observed in 1998 after the Asian economic crisis, and in 2001 when Singapore's economy experienced another recession. After 2001, annual GDP and GDP per capita have risen slightly. Graph 1 shows the changes in Singapore's GDP from 1994-2003.

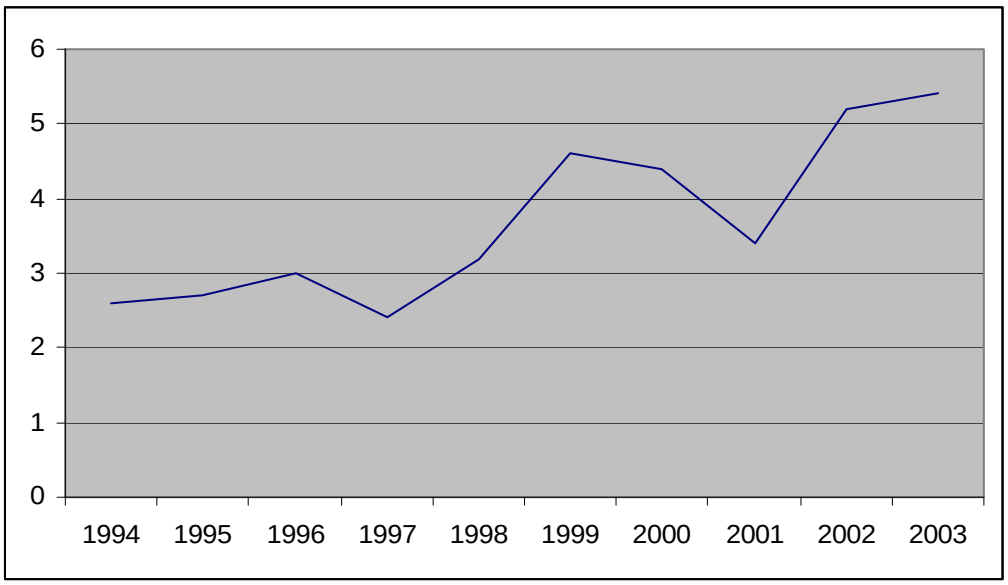
Graph 1: Annual GDP (US$ Million)



Source: Singapore Department of Statistics, Feb 2004
http://www.singstat.gov.sg/keystats/hist/gdp2.html (retrieved June 1, 2004)

The 2003 data puts Singapore's unemployment figure at 5.4%, slightly increased from 5.2% in 2002, which was the first time in the past 10 years that Singapore's unemployment rate has been more than 5% [19]. Most unemployment can be found in the manufacturing and construction sectors, which will be discussed at greater detail in their respective sections. The changes in the unemployment rate over the past ten years are shown by the graph below.

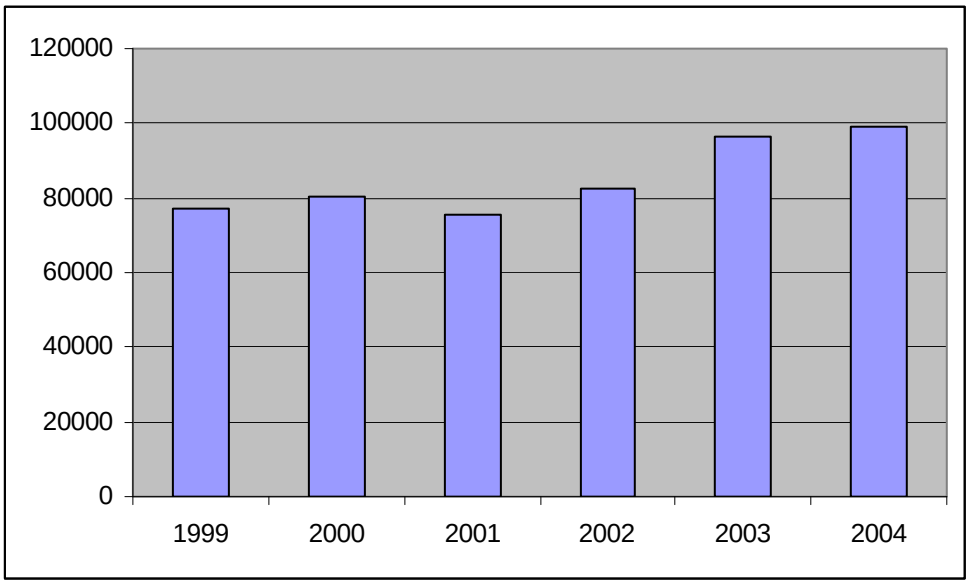
Graph 2: Annual Unemployment Rate (%)



Source: Singapore Department of Statistics (July 2003)
http://www.singstat.gov.sg/keystats/hist/unemployment.html (retrieved June 1, 2004)

Despite the bleak period that Singapore has been experiencing after the 1997 Asian crisis, the country is still the most important commercial center in South East Asia and to a certain extent in all of Asia. Singapore's foreign reserves are still relatively high compared to other Asian nations. In fact, except in 2001, Singapore's foreign reserves have increased rather significantly after the Asian crisis. The changes in Singapore's foreign reserves from 1999-2004 is shown in Graph 3.

Graph 3: Total Official Foreign Reserves (US$ Million)[1]

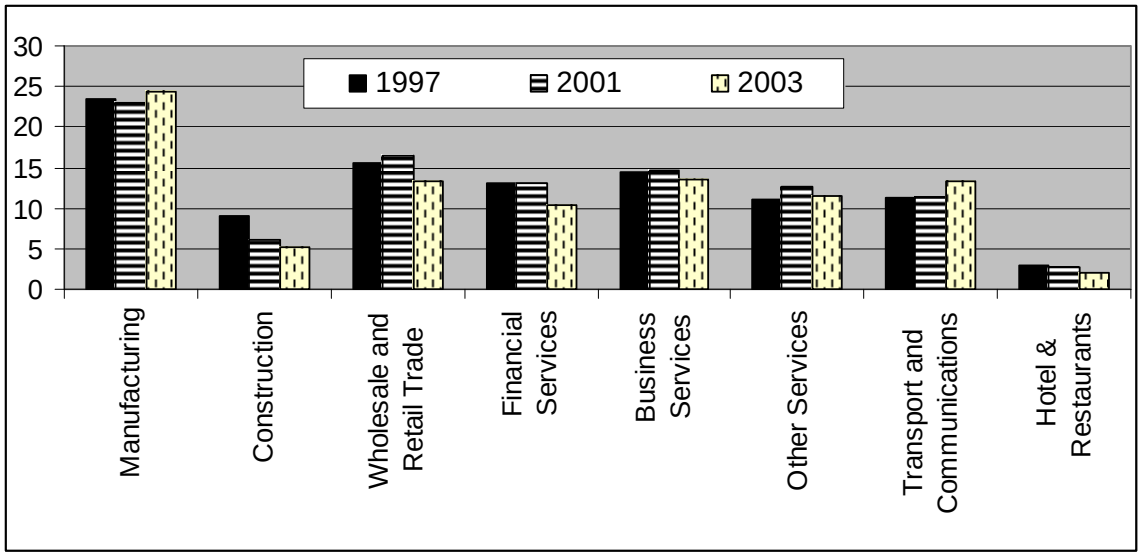


Source: Monetary Authority of Singapore (May 2004)
https://secure.mas.gov.sg/masmcm/bin/pt1Official_Foreign_Reserves.htm (retrieved June 1, 2004)

4.2 What are the key industry networks in Singapore?

The key industry networks in Singapore are the goods producing industries comprising of the manufacturing and construction industries and the service producing industries, which comprise of the commercial, transport and communications, as well as tourism services.

Graph 4: Proportion of GDP by Different Sectors[2]



Source: Singapore Department of Statistics
http://www.singstat.gov.sg/keystats/mqstats/ess/essa12.pdf (retrieved June 1, 2004)

[1] 2004 figure is based on data collected up to April 2004.
[2] Data for 1997 are retrieved from Guang Yang's report on Singapore.

Graph 4 shows the breakdown of Singapore GDP according to the main industry networks in 1997, 2001 and 2003. From 1997-2003, the composition of the total GDP by sectors has not experienced many changes. Over the period, the GDP of the goods producing industries make up about 1/3 of the economy, with the GDP from the manufacturing sector alone constituting about 1/4 of the whole economy [20]. The GDP of the service providing industries make up about 2/3 of the total GDP, with financial and business services alone making up about 20% [20].

4.2.1 Manufacturing

Although from 1980 onward Singapore has concentrated more into developing its service industry, Singapore's manufacturing industry is still very important to the economy. The industrial production index for the economy has increased slightly in 2003 by 3.1% [20] after having had a negative growth of 11.6% in 2001, due to the lower demand of Singapore's manufacturing products from the US, which Singapore's main importer [32]. In 2003, the manufacturing sector constitutes 24.3 % of the total GDP, a slight increase from about 23% in 1997 and 2001 [20].

The main sectors in the manufacturing industries include that of electronics, chemicals, engineering and biomedical engineering.

Electronics

Although there is a significant drop in the proportion of electronics' output to the total manufacturing output in the economy, the electronics industry is still the largest manufacturing sector in Singapore. In 2003, the electronics sector accounts for 40% of the total output of the manufacturing sector, down from 52% in 1999 [22]. The number of employed workers in the electronics industry was 85,581 in 2003, which was about 25% of total manufacturing industries. However, net investment commitments in electronics have increased from about S$ 3.2 billion in 1999 to about S$ 4.2 billion in 2003

Table 2: Key Indicators of the Electronics Industry[3]

Total Output	62,223.90
Employment	85,581
Value Added	11,575.50
Net Investment Commitment	4,224.10

Source: Economic Development Board as presented by Singapore Department of Statistics http://www.singstat.gov.sg/keystats/mqstats/ess/aesa93.pdf (retrieved June 1, 2004)

Major industrial activities in the electronics industry include that of semiconductors, computer peripherals, data storage, and consumer electronics as well as other electronics modules and components. The key challenge in the Electronics industry is mainly the slowdown in international demand for electronics components and the challenges posted by other emerging economies with cheaper employment cost.

[3] Figures in S$ Million.

Chemicals

Singapore's economy has seen the increased importance of its chemicals industry. In 2003, the Chemicals industry constitutes 26.2 % of total manufacturing output, slightly up from 25 % in 1999 [22]. The industry employs about 6.7 % of total manufacturing employment. Its net investment commitment in 2003 was S$ 1.57 billion, quite a significant drop from S$ 1.97 in 2001.

Table 3: Key Indicators of the Chemicals Industry[4]

Total Output	40,840.70
Employment	23,050
Value Added	5,208.50
Net Investment Commitment	1,571.40

Source: Economic Development Board as presented by Singapore Department of Statistics http://www.singstat.gov.sg/keystats/mqstats/ess/aesa93.pdf (retrieved June 1, 2004)

Major activities in this industry include petroleum, petrochemicals and other specialty chemicals. The aim of Singapore's chemicals industry is to make Singapore the regional hub for petroleum and to generate S$ 78 billion by 2010 [32].

Engineering

In 2003, the precision and transport engineering industries contributed 16.8 % of the total manufacturing output in Singapore [22]. Both industries constitute the largest employment in the manufacturing industries, with about 41 % of total manufacturing employment working in either the precision or transport engineering industries. The net investment commitment in 2003 was S$ 629.3 million, significantly down from about S$ 1.35 billion in 1999.

Table 4: Key Indicators of the Engineering Industry[5]

Total Output	26,444.70
Employment	140,880
Value Added	8,949.40
Net Investment Commitment	629.30

Source: Economic Development Board as presented by Singapore Department of Statistics http://www.singstat.gov.sg/keystats/mqstats/ess/aesa93.pdf (retrieved June 1, 2004)

Major activities include the manufacturing of machinery and systems, precision modules and components, and aerospace, land as well as marine transportation utilities.

Biomedical Manufacturing

Singapore aims to be the world class hub for biomedical manufacturing as well as life science research. In 2003, the biomedical manufacturing output constitutes about 7.7 % of total manufacturing output, with an employment of about 2.2 % of total manufacturing

[4] Figures in S$ Million.
[5] Figures in S$ Million.

employment. The average worker's value added was measured at more than S$ 900,000 indicating its highly skilled workers [22]. In 2003, net investment commitments in the biomedical industry was S$ 851.5 million, more than double the amount of S$ 333 million in 1999.

Table 5: Key Indicators of the Biomedical Manufacturing Industry[6]

Total Output	12,030.20
Employment	7,596
Value Added	6,922.20
Net Investment Commitment	851.50

Source: Economic Development Board as presented by Singapore Department of Statistics
http://www.singstat.gov.sg/keystats/mqstats/ess/aesa93.pdf (retrieved June 1, 2004)

4.2.2 Construction

Even though the construction industry plays a huge role in the development of Singapore, particularly in improving the physical infrastructure of the nation, there has been a major slowdown in Singapore's construction industry over the recent years. In 2003, the GDP from the construction sector constitutes only 5.3 % of the total GDP [20], significantly down from about 9 % in 1999. The construction sector employed 114,500 workers in 2003, also significantly down from more than 200,000 in 1999. Table 6 summarizes the amount of GDP from the construction sector as well as employment changes in the period from 1999 to 2003.

Table 6: GDP and Employment Changes in the Construction Sector (1999-2003)

Year	GDP (S$ Million)	Employment Changes
1999	11,125	-18,000
2000	9,966	1,100
2001	9,444	-20,500
2002	8,530	-34,300
2003	7,834	-17,500

Source: Singapore Department of Statistics
http://www.singstat.gov.sg/keystats/mqstats/ess/essa11.pdf (retrieved June 1, 2004)

Certainly over the next few years, the construction sector faces tough challenges. Some of the major challenges include that of low productivity of workers. In the period of 1995-99, labor productivity changes in this sector were at the range of -2.9% to -5.4%, while after 1999 [32], the sector has experienced all negative growth in labor productivity except in 2000, when it increased by a mere 0.5 %. The other main challenge is the over-dependence on foreign workers, which has caused slow progress in enriching of skills and also other social problems.

The government launched the Construction 21 project in late 1999 to address the increasing problems in the construction sector. Its aims are to increase workers productivity and professionalism to improve the construction industries [32].

[6] Figures in S$ Million.

4.2.3 Commercial Services

The main industries in the commercial services sector include that of wholesale and retail trade, financial services and business services.

Wholesale and Retail Trade

In 2003, the wholesale and retail trade contributed to about 13 % of the total GDP of Singapore, with an amount of more than S$ 21 billion [20]. Overall, the wholesale and retail trade employed close to 300,000 workers in 2003. From 1999 to 2003, labor productivity has experienced a significant positive growth (except in 2001) with growth in labor productivity being 7.3 % in 2003. The total retail index in 2003 had an 8 % growth compared to 2002. The domestic wholesale index in the first quarter of 2004 increased by more than 5 % and the foreign wholesale index increased by more than 15 % when compared to the same period in 2003.

Singapore has continued to alter its composition of non-oil exports into more skill intensive goods. The composition of exports has significantly changed over the years from its early low-skilled industries era to the current period of higher-skilled manufacturing. In the present time, Singapore's exports rely more on its exports of chemicals rather than manufacturing in the 1990s, or lower technology goods like food in the 1970s [32]. Table 7 shows the composition of exports in 2000 and 2003, as well as a recap of the composition of exports in 1976.

Table 7: Composition of Singapore Non-Oil Exports (%)

Exports	1976	2000	2003
Food	4	1.5	1.3
Chemicals	6	7.7	13.3
Manufactured Goods	13	4.2	4.2
Machinery and Equipments	54	74.7	68.9
Misc. Manufacturing	19	9	9.6
Others	4	3	2.9

Source: Singapore Department of Statistics and Guang Yang's Report on Singapore http://www.singstat.gov.sg/keystats/mqstats/ess/aesa64.pdf (retrieved June 1, 2004)

Financial Services

In 2003, the total output from the financial services was S$ 17.1 billion, which constituted about 10.5 % of the total GDP of the economy [20]. This was a slight decrease from its average 12 % share of GDP in 1990-2002. However, 2003 saw the labor productivity of the sector increasing by about 2.6 % after experiencing negative growth from 2000-2002. The financial sector employed about 105,000 employers in 2003.

The financial services sector comprises both local and foreign financial institutions. The main activities in this sector include that of trade financing, foreign exchange, derivatives products, asset management, securities trading, as well as mergers and acquisitions. The financial services have developed into a strategic hub in South East Asia.

Business Services

In 2003, the GDP from business services contributed to more than S$ 22 billion, which constituted about 13.5 % of Singapore total GDP [20]. Singapore's business services have improved rather significantly recently. The latest reports from the Singapore Department of Statistics show that in the first quarter of 2004, business receipts grew at 6.9 % over the same period in 2003, which is higher than the growths of 2.6 % in the fourth quarter of 2003 and 4.8% in the third quarter of 2004. Singapore has continued to solidify its prominent place as the business services hub of South East Asia.

The business services include that of legal, accounting, architectural & engineering activities, business management consultancy, business representative, advertising, labor recruitment, event management and building cleaning.

4.2.4 Transport and Communications

The transport and communications sector contributed S$ 21.8 billion in 2003, which constituted more than 13 % of the total GDP [20]. The transport and communications sector was the third largest sector in 2003. In total, the sector employed about 216,000 workers in 2003, up by about 18,000 from 1999.

Major activities in this sector include land transport and supporting activities, water transport and supporting activities, air transport and supporting activities, storage and warehousing, as well as other related activities such as passenger and cargo transportation utilities, telephone and postal services and internet provision [32]. Table 8 below shows the key changes in the transportation and communication activities from 2000-2003.

Table 8: Percentage Changes in Transport and Communications Activities (2000-2003)

Activities	2000	2001	2002	2003
Total Sea Cargo Handled	-0.1	-3.7	6.9	3.7
Total Container Throughput	7.2	-8.9	8.8	8.7
Sea Passenger Handled	11.1	1.9	-5.2	-3.5
Vessel Arrivals	3.8	5.5	1.2	1.5
Total Air Cargo Handled	11.9	-10.6	8.6	-1.5
Air Passenger Handled	10	-1.5	3.2	-15.4
Aircraft Landings	3.5	3	-2.1	-11
Postal Articles Handled	2.6	2.3	1.9	0.1
Total Number of Telephone Lines	4.6	0.7	-0.8	-1.9
Total Mobile Phone Subscribers	66	17.1	13.5	7.2
Total Internet Dial-up Subscribers	233	-1.2	4.3	-10.2

Source: Singapore Department of Statistics
http://www.singstat.gov.sg/keystats/mqstats/ess/essa121.pdf (retrieved June 1, 2004)

4.2.5 Tourism

The main activities in the tourism sector are hotels and restaurants services. In 2003, the tourism sector contributed to about 1.9 % of the total GDP, with estimated earnings of S$ 3.2 billion [20]. This was a significant decrease from about S$ 4.2 billion in 2001 [32]. In 2003, the number of total visitors has decreased by about 19 % from 2002 with significant decreases of visitors from all countries of origin. Hotel revenues also decreased in 2003 by 27 % while food& beverage revenues decreased by 13.7 % from 2002.

In line with the significant declines in the tourism sector over the recent years, the Singapore Tourism Board proposed the Tourism 21 Vision [29], which aims for Singapore to be the tourism capital of the East Asian region. The plan includes the recreating of Singapore as the destination for Business Tourism Center as well as the Tourism hub for South East Asia. Other plans include that of redesigning Singapore's main tourist destinations, such as the Sentosa Island.

4. 3 What are Singapore's current challenges and plans?

With the emergence of India and China as main economic players in the global economy, Singapore's strategy to maintain its economic competitiveness is to continue its transformation into a high-technology economy, and also to expand its external ties through the networks in the WTO and ASEAN as well as individually-designed bilateral arrangements. A recent report from EDB stated Singapore as the second most networks ready country in the world after the US, emphasizing the level of readiness of its economy into establishing itself to undergo the next revolution in technology.

Among the latest in Singapore initiatives is the formation of the One-North technological park for R&D and biomedical science, a vision of Singapore to lead the world in the future of biomedical scientific research in the 21st century [17]. The Singapore government is committed to spend billions of dollars in the next 15 to 20 years in order to expand the new technological complex. The One-North complex is meant to attract top scientists in the world, who will lead Singapore's technological transformation.

As it is a country that is highly dependent on international trade, with its trade over GDP ratio as the biggest in the world now, Singapore has to continue to seek good trade relationships with other countries in the world. Several bilateral economic agreements have been reached between Singapore and its partners. From 2000 onwards, the Singapore government has continued its negotiations into forming bilateral trade relationships, and in 2002, the Singapore government completed their first two agreements with New Zealand and Japan [28]. Then in January 2003, an agreement was also reached by the Singapore government with the European Free Trade Association (EFTA consists of Switzerland, Iceland, Norway and Liechtenstein). Singapore then established two further agreements with Australia in July 2003 and with the US in August 2003. These free trade agreements are very instrumental in Singapore's prospect of continuing its economic prosperity.

Singapore also faces other socio-economic challenges for its future growth. Apart from the pressing need to instill more creativity in the education system, Singapore's demographic changes present further challenges for the future economic growth. Singapore's population is now well above 4 million people, with close to 3.5 million citizens and permanent residents. The two main problems from Singapore's demography are its graying population and low fertility rate [23]. Life expectancy in the country has been rising and along with that, government expenditure of health services has increased tremendously for the past 10 years [23]. On the other hand, the fertility rate has been on the decline, causing concern about a rising dependency rate in the future. Table 9 shows a comparison of the key indicators for Singapore's demography in 1993, 1998 and 2003.

Table 9: A Comparison of Singapore Demography (1993, 1998, 2003)

Indicators	1993	1998	2003
Total Population (thousands)	3,315.40	3,922.00	4,185.20
Population Density(per square km)	5,169	6,052	6,004
Dependency Ratio	41.3	40.8	39.8
Life Expectancy at Birth	76.1	77.3	78.9
Total Fertility Rate	1.74	1.47	1.26
Government Expenditure on Health (per capita)	231	317	489

Source: Singapore Department of Statistics
http://www.singstat.gov.sg/keystats/annual/yos/yos111.pdf (retrieved on June 7, 2004),
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5 Conclusion

The wonders of the Singapore economic achievement since the 1960s have its roots in the hard work of the government and the people of Singapore. The government and the people of Singapore have realized that Singapore depends primarily on its human resources and secondarily on the resources of foreign investors. As such, both the government and the people have worked together throughout the years to ensure that Singapore's economy remains competitive. With relatively stable governments from 1960 onward, Singapore has been able to attract foreign investors, from which it gains the crucial financial capital for its economic progress.

Other developing countries can definitely learn from the experiences of Singapore, although there are certainly several underlying characteristics of a nation for it to succeed in implementing similar strategies as the Singapore economic strategies. Many skeptics have often cited that the small size of Singapore makes it easy for the government to implement state-planned economic strategies, something that is often tough to do in other bigger developing nations. And, as has been explained, the Singapore success story might well result from the good foundations of physical infrastructure that the British had built on the island.

Singapore has done well over the last forty years, turning its people into assets as the launching pad of its economic development. The next couple of years present Singapore

with a totally different set of new challenges, and yet, the Singapore government is still optimistic about the use of their human capital in their country as the strategy into the future.

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