
comercio internacional

The Singapore success story: public-private alliance for investment attraction, innovation and export development

Sree Kumar

Sharon Siddique



UNITED NATIONS

Division of International Trade and Integration



Santiago, March 2010



Secretaría General
Iberoamericana
Secretaria Geral
Ibero-Americana

This document has been prepared by Sree Kuman and Sharon Siddique, Consultants of the Division of International Trade and Integration, Economic Commission for Latin America and the Caribbean (ECLAC), within the activities of the study “Public-private alliances for innovation and export upgrading“, coordinated by Robert Devlin and Graciela Moguillansky with the financial support of SEGIB, through the project “Alianzas público-privadas para la Innovación y el Desarrollo Exportador: Casos Exitosos Extraregionales y la Experiencia Latinoamericana”. Some of their preliminary findings were formerly presented at ECLAC, in *Structural Change and Productivity Growth 20 Years later: Old Problems, New Opportunities*, (LC/G.2367 (SES.32/3)), Santiago de Chile, 2008, chapter. VI, pages. 231 to 299.

The views expressed in this document, which has been reproduced without formal editing, are those of the authors and do not necessarily reflect the views of the Organization.

United Nations Publications

ISSN printed version: 1727-9909

ISSN online version: 1728-5437

ISBN: 978-92-1-121715-5

LC/L.3150-P

Sales No.: E.09.II.G.123

Copyright © United Nations, March 2010. All rights reserved

Printed in United Nations

Applications for the right to reproduce this work are welcomed and should be sent to the Secretary of the Publications Board, United Nations Headquarters, New York, N.Y. 10017, U.S.A. Member States and their governmental institutions may reproduce this work without prior authorization, but are requested to mention the source and inform the United Nations of such reproduction.

Contents

Abstract	5
I. A brief review of Singapore's development	7
II. An outline of "first principles"	11
A. Setting clear objectives with achievable milestones	12
B. Empowering agencies and processes.....	12
C. Adherence to a consistent policy prescription	13
D. Delegating to trusted key individuals	13
E. Incorporating 'best practices' from elsewhere	14
F. Widening the spheres of influence	14
G. Pegging performance to milestones.....	15
III. The economic development board: investment and export promotion	17
IV. The National Research Foundation, A*Star, and the new world	23
V. Creating the Singapore "ethos"	29
Bibliography	33
Annexes	35
Annex 1: The institutions	37
Annex 2: The instruments of success.....	42
Annex 3: The new institutions	46
Annex 4: Insights into the bigger picture	51
Serie Comercio Internacional: Issues published	55

Tables

TABLE 1	SINGAPORE – GDP AND TRADE.....	8
TABLE 2	SINGAPORE’S FDI STOCK.....	19
TABLE 3	SINGAPORE’S TECHNOLOGY COMPLEXITY IN MANUFACTURED EXPORTS.....	24

Figures

FIGURE 1	FIT OF THE ‘FIRST PRINCIPLES’	16
FIGURE 2	THE EDB NETWORK	20
FIGURE 3	AGENCIES IN THE R&D LANDSCAPE	24
FIGURE 4	NRF ORGANIZATION STRUCTURE.....	25
FIGURE 5	THE NRF WORKING MODEL	26
FIGURE 6	CREATING THE SINGAPORE "ETHOS"	31

Abstract

Singapore has been touted as a success story in the development literature.¹ Various theories (Haggard and Kaufman, eds., 1992)² have been offered to explain how and why the city-state has succeeded, but none of them has received unanimous approval. There is no debate on the success itself, what is at issue is how that success came about and how it has been sustained. For many it is a combination of the right policies and timing; for some, exploitation of a strategic position in the region; and for even others, a one-party dominant political system that allows for consistency in decision-making. The truth probably lies at the intersection of all these various perspectives, for which there is no single unifying theory. And that is the irony and enigma of the Singapore story.

This report will look at one of the key elements of the Singapore experience: that of a public-business sector alliance and its wider impact on decision-making and policy implementation within the city-state. We begin with a quick review of Singapore's development over the last forty years and then look at some of the key "first principles" that animate this success. In particular, we focus on some of the major agencies responsible for charting Singapore's development trajectory and the role that the business sector has played, and continues to play, in the evolution of strategies for growth.

¹ World Bank, *The East Asian Miracle: Economic Growth and Public Policy*, 1993, Oxford University Press; World Bank, *World Development Report 1991: The Challenge of Development*, Oxford University Press.

² Haggard, Stephan and Robert Kaufman (editors), *The Politics of Economic Adjustment*, 1992, Princeton University Press, New Jersey; Haggard, Stephan, *Pathways from the Periphery*, 1990, Cornell University Press, Ithaca, New York; Meredith Wood-Cumings (editor), *The Developmental State*, 1999, Cornell University Press, Ithaca, New York; Birdsall, Nancy and Frederick Jaspersen (editors), *Pathways to Growth: Comparing East Asia and Latin America*, 1997, Inter-American Development Bank, Washington, DC.

I. A brief review of Singapore's development

Singapore started on an independent development trajectory when it was ejected from Malaysia in 1965, resulting from political differences between the two countries. The departure from Malaysia meant a need to seek alternative growth models that did not rely on a domestic market. This was made all the more urgent when, in 1967, the British Government announced its intention to withdraw its forces from the island by the end of March 1971. Although at that time Singapore was largely a commercial port city the British Forces provided significant employment, and services to the military contributed a sizeable share of the GDP.

In the late 1960s the need to create employment and sustain economic growth was a paramount requirement. A history of militant trade unionism in the 1950s had already alerted the government of the day to the need for a different approach to craft a sustainable growth strategy. While it is now taken for granted that the business sector plays an important role in policy inputs in Singapore, the roots of such an intimate role go back to this important historical period. A government which had to seek appropriate growth strategies turned to a tri-partite arrangement involving the trade unions (through the National Trade Union Congress - NTUC), the business community, and the public sector to craft an acceptable way forward. Co-option of the parties was seen as the pragmatic way of addressing the challenging problem facing the new city-state. Already two critical elements of the Singapore strategy had now been formulated at this stage – business sector involvement and the need for export-driven growth because of the lack of a domestic demand base. What was needed to weld these elements together was to foster foreign direct

investment into manufacturing and other industries to mop up labour and to create employment. The tri-partite arrangement allowed the public sector to view these requirements through the different lenses —business community’s requirements; labour’s need for a fair wage and conducive working conditions; and the ensuing need for public infrastructure.

The approach taken was instructive: the Economic Development Board (EDB) was strengthened with the aim of garnering foreign investments to develop a manufacturing base for exports. Taking a cue from business on their requirements, the government set about developing industrial infrastructure in the west of the island while the EDB began sourcing for investments in manufacturing. The initial investments were in labour-intensive manufacturing such as textiles and garments, leather ware, simple assembly-line products such as white goods and consumer electronics. The EDB became a central and integral part of the development process as it sharpened its focus on different sectors and firms. In the initial years there was a broad sector approach to seeking investments while in later years, when the initial successes had been assured, the EDB began to focus on specific companies with the reputation and technology that could support the industrialization thrust.

So, over time, there has been an evolution in the process of sector and firm selectivity and the participant list has widened to include more international business players. This approach, in a nutshell, has been the broad theme of Singapore’s investment-led and export-driven mantra. In the process, other agencies have evolved and taken on a life of their own. The Trade Development Board (TDB) grew out of a need to identify markets for Singapore’s products and to ensure that market access could be maintained. These activities have included collecting market intelligence, supporting local manufacturers through trade shows and overseas visits and, most importantly, designing and developing bilateral trade treaties. At the apex of this strategic thrust we see two agencies working in tandem – the EDB tasked with seeking inward investments for export production, and the TDB tasked with seeking and sustaining access to export markets for the products that are manufactured. There is thus a unity of purpose in the approach. The successes are easy to discern as shown in Table 1 below.

TABLE 1
SINGAPORE – GDP AND TRADE

(In millions of U.S. dollars)

Year	GDP	Domestic Exports	Re-exports	Imports
1965	970			
1970	1 896	577	975	2 458
1980	11 720	13 118	6 259	24 013
1990	34 600	34 202	18 602	60 959
2000	92 700	78 686	59 359	134 633
2005	116 800	92 151	115 186	189 745

Source: World Bank, WDR various years; UNCTAD; Department of Statistics, Singapore

What is apparent from Table 1 is the rapid growth in GDP and the level of trade openness³ which has increased from 2.1 in 1970 to 3.4 in 2005. Singapore’s industrialization and export growth has been largely founded on a willingness to be open to the international economy and imports have thus been an important component of the inputs for industrial processing and manufacturing. As an entreport, Singapore also has a high portion of re-exports (55 percent in 2005) in its trade structure.

The initial successes of agencies such as the EDB and the TDB set the seeds for an approach that has become the norm rather than the exception in the Singapore context. Over the years, other important

³ Ratio of total trade to GDP.

agencies have been created to sharpen the focus on specific areas. For example, the need for computerization of government ministries led to the setting up of the National Computer Board (NCB)⁴ and, subsequently, the need for a more technology-intensive services sector led to the emergence of the National Science and Technology Board (NSTB)⁵. But it is important to note that the manufacturing export model called for access to markets such as Europe and the US where non-tariff barriers in the form of technical specifications could often be invoked when products were deemed to be flooding the market. In order to ensure that these challenges could be met, and to step onto the ladder of producing manufactures of a world quality the Productivity and Standards Board (PSB) grew out of the Singapore Institute for Standards in Industrial Research (SISIR) and the National Productivity Board (NPB).⁶ The EDB, in the meantime, had become a significant element of the industrialization strategy and had created a separate body, the Jurong Town Corporation (JTC), which was initially tasked with turning the west of the island into an industrial estate before becoming a one-stop planner of industrial sites.

These agencies involved in export and industrial development were, and continue to be, answerable to the main ministry involved in policy guidance, the Ministry of Trade and Industry (MTI). In the overall scheme of economic development, the agencies have been directed by MTI but the policy-making capacity has been a joint one involving the agencies, MTI, the Ministry of Finance (MOF) and the Prime Minister's Office (PMO). This tight-knit and centralized approach to policy design, development and implementation has been possible in Singapore because they are constituted of, very often, the same people, i.e. the various implementation committees would, for example, comprise of the same people who have in one way or another have been part of another committee in which the policy design had been agreed. Thus, if there is a method in this approach then it must be the unity of purpose in the overall game plan.

While the growth of various agencies to facilitate or spearhead implementation of economic strategy has been at the cornerstone of Singapore's development process, the structure and governance of these agencies also bear some scrutiny. Their structural features bear the imprint of the early approach of a tripartite arrangement between government, business and labour to foster economic development. The EDB, for example, early into its formation had already tapped into international expertise to develop a coherent strategy for implementation of policies and projects supportive of foreign direct investment. Senior managers of multinational corporations were invited to sit on specific committees to add their views on how Singapore's industrial development ought to be crafted, while at a higher level the EDB created an international panel of advisers (IAP) to provide it with a feedback mechanism and intelligence gathering apparatus with which to fine-tune overall development policies. These members of the EDB IAP were drawn from multinational enterprises across the world, and were usually CEOs or others of a similar stature. What is also interesting to note is that these personalities came from industries in which Singapore had a focus, or intended to focus on, and also reflected the nationality of the countries with which Singapore was a major trading partner. This structure, needless to say, has been a boon because of the ambassadorial role that these personalities eventually played in supporting Singapore's approach to overcome restrictions on market access, and in acquiring new technology with which to upgrade manufacturing capability. Singapore learnt, very early on, that personalities matter and that some personalities were more important than others. With this in mind, the EDB and other agencies have, over the years, cultivated a broad spectrum of key individuals, many of whom are influential thought leaders in their own fields, to become part of Singapore's international profile through membership of the IAPs set up to serve various statutory boards.

The critical role of personalities and networks is a major piece of the jigsaw puzzle often ignored by economists and political scientists. In Singapore, the dominance of one-party rule and the continuity of such political power have meant that policy consistency is matched by personalities dedicated to fulfilling the overall strategic design. The EDB, for example, was in its time led by personalities hand-picked by the senior political leaders to set the tone and thrust of industrial strategy. Some of them came

⁴ NCB is now the Infocomm Development Authority (IDA).

⁵ NSTB was renamed A*STAR, or the Agency for Science, Technology & Research.. See Appendix 2 for further details.

⁶ In 1996, the Productivity and Standards Board (PSB) was formed through a merger between the National Productivity Board (NPB) and the Standards and Industrial Research (SISIR). In 2001 PSB was rebranded as SPRING Singapore – the Standards, Productivity and Innovation Board of Singapore. See Appendix 1 for further details.

from the business sector and in later years the EDB was led by career public servants who had risen through the ranks in key ministries, working with decision-makers within the political hierarchy. The level of loyalty towards the political system and the corresponding trust from the political hierarchy were important catalysts to creating the Singapore model. In the 1980s and 1990s, the chief executive of the EDB had powers akin to that of a cabinet minister simply because of the trust that the political system placed on his judgment, and in his extraordinary capability to engineer structural changes in the industrial landscape to fit with the changing global economic environment. Similarly other individuals can be found in other agencies and ministries, exercising a strong personality cult that is in consonance with the demands of the political system. Such an approach would smack of fiefdoms in a western-style, politically neutral, civil service but in Singapore this is seen otherwise because the public sector has been answerable to only one political party throughout the last forty years. More importantly there is common history between the public sector and the political hierarchy, especially in the last two decades when public servants have gone into political office. Indeed the political system today is made up less of politicians and more of technocrats. The Singapore model itself is evolving, and there is now a common heritage among the decision-making elements of the public sector and the political leadership. Many have gone to the same schools or universities, have similar military or other backgrounds, and have been through the same administrative system training programs. The challenge now is to ensure a diversity of views in policy-making and this is where the public-business sector alliance comes to the fore in the nature of the emerging Singapore governance model.

The next few sections of this report will look at in greater detail into some of the key agencies involved in the public-business sector alliance in Singapore. Some of these agencies have been set up recently to propel Singapore into new areas of economic importance, while others have a long pedigree. The structure, operations and policy-making processes of these agencies with their parent ministries will shed light on how Singapore works, and what the limitations are of such a system. But, first we start the next section with an outline of some of the *“first principles”* that can be extracted from the Singapore experience.

II. An outline of “first principles”

Singapore’s development success is being emulated by others albeit with limited success. Several island countries have tried to understand how a city-state with no natural endowments has created a vibrant economy. Yet others, more complex societies and economies, have tried to seek a coherent analysis of the Singapore model but have found limiting factors such as a unique political system or the “cult of political leadership” to be simply too tenuous for their own needs. Nevertheless, an understanding of the main processes of decision-making in the Singapore context can be illuminating.

Seven “first principles” can be enunciated from the Singapore experience. They are:

- A. Setting clear objectives with achievable milestones
- B. Empowering the agencies and processes
- C. Adherence to a consistent policy prescription
- D. Delegating to trusted key individuals
- E. Incorporating ‘best practices’ from elsewhere
- F. Widening the spheres of influence
- G. Pegging performance to milestones

These are broad principles and can be expanded into more detailed elements in the various decision-making processes affecting the various agencies. But before doing so, an expansion of these outline principles is called for.

A. Setting clear objectives and milestones

This principle seems simple and clear enough, yet the truth is that most organizations suffer from ambiguous objectives. In Singapore, all measures for economic development are set out with one specific goal – that of creating employment. There may be other objectives as well but the overriding effect has to be one of ensuring growth in employment. Within this substantive objective is an exposition of what can be achieved over a specified timeline. There is a distinct analytical evaluation of what is achievable within a given timeframe and these targets are defined and specified by the agencies through negotiations with their parent ministries. While the objectives are spelt out at the policy level after discussions by the agencies, key ministries, and the PMO, the translation of the policies into actionable targets is left to the agencies themselves. The Ministry of Finance (MOF) has an important role in these policy designs as it has to agree to, and devise ways of, raising the overall finance for specific programs. What is apparent in the Singapore model is that the policy design involves key elements of the agencies, the parent ministry, the MOF and the PMO. Once again, there is an element of some deference to the agencies depending on the leadership of the agency and their seniority within the administrative system. Personalities matter in this discourse and more so when some of the ministries, such as MTI, have a profound influence on economic structuring and job creation. The fact that there are common members in the various committees constituted for policy making and in subsequent implementation enables a unified and consistent view to prevail. This is one of the key strengths of the Singapore decision-making system.

B. Empowering agencies and processes

The use of the legislative architecture to give life to agencies and programs is another key element of the Singapore model. The EDB, for example, is a statutory board, as are most of the other agencies. This means that they are set up by an act of Parliament and are empowered to act on secondary legislation without further reference to the legislature. The nature of the statutory board and its powers are clearly defined in the enabling legislation, thereby allowing the staff of the agency to execute decisions without further reference to the parent ministry. The enabling legislation can be fairly wide, providing even for punitive actions when there has been a violation of the powers entrusted to the agency. For example, the Central Provident Fund (CPF) has enormous powers for collection of provident fund monies from employers and employees in the event of late payments or non-payments of monthly contributions. Similarly, Spring Singapore has powers to institute skills development programs and their funding albeit without any recourse to coercion of the small and medium enterprise sector. Statutory board status provides two main advantages and these are that (1) the staff of the agency are considered to be civil servants with comparable civil service emoluments and benefits, and (2) they can be operated on a commercial basis without having to adhere strictly to all the civil service operating requirements such as in hiring practices. These advantages provide the agencies with a high degree of flexibility in that senior civil servants from the administrative service can be seamlessly moved into and out of the statutory boards without a major dislocation of their compensation and benefits structure, and that they are free to source skills from the labour market without having to be screened by the Public Service Commission (PSC).

The second element of empowering the agencies lies in adequate funding. The act of Parliament specifying the creation and role of the statutory board also ensures sufficient budgetary support from the Ministry of Finance via the parent ministry. In more recent times, the creation of the National Research Foundation (NRF) has been accompanied by a clear funding amount set out in the enabling legislation. Increasingly, the parliamentary process is being used to also set out the finance being allocated to specific areas of strategic importance unlike in the past where they were tabled as part of the overall parent ministry's budget. Once again, personalities matter and in this case the fact that the NRF comes under the ambit of the PMO with the former Deputy Prime Minister as its head has given it a more visible role within the Singapore strategy architecture. A separate enabling legislation for financing the agency is a signal that the new framework for promoting the emerging science and technology sectors is a major shift in Singapore's growth trajectory. The old model of agencies seeking support through parent

ministries has a bureaucratic lag that has now been circumvented. Part of the reason is to remove the bottlenecks associated with the, standard prescription, due diligence approach taken by the Ministry of Finance in expenditure control. The new sectors in biomedical engineering, genetics and environmental technology do not have the luxury of waiting for funding along the annual budgeting cycle. They need to be funded readily across the board, depending on how the technology frontier is evolving.

C. Adherence to a consistent policy prescription

Singapore enjoys a particular luxury in policy-making that is less likely in many other countries. This is the continuous existence of a dominant single political party in government from the day it had to seek its own fate after being ejected from Malaysia. This continuity in governance and style of administration allows the design of policies for long-term objectives rather than for short-term expediency. The result is a policy environment that sees a strategic vision for the longer-term with periodic fine-tuning depending on the vagaries of the external economy. For example, the creation of an electronics manufacturing sector was part of the policy of developing a high-wage industrial sector and it was only revised and refocused when there was a global downturn in the electronics industry in the late 1980s. Similarly, since the early 1990s, Singapore has been on a pursuit to externalize its economy, modeled on the Netherlands, first by expanding its industrial hinterland to the neighbouring countries in the immediate region and, when that faltered, into the wider Asian landscape such as China and Vietnam. The policy was first crafted and announced in 1990 but it is still being pursued with a different set of target countries. Today the focus has widened to include India and the Middle East. For example, JTC, the infrastructure building arm set up by the EDB, now peddles its capabilities across the globe showcasing its prowess in developing and managing industrial parks. Such is the consistency and adherence to policies over the longer-term.

A political party that has been in power for so long and which has integrated the public sector decision-making capabilities to its own enables public servants to also act in unison with decisions made by the political hierarchy. Two main features stand out in this approach. The first is the consistency in policy prescription, which is central to the approach, and the second is that public servants have a commitment to adhering to the prescription. Major policy shifts are taken sparingly and then again only when crises have occurred. For example, major policy shifts relating to a high wage industrial sector were taken in the aftermath of the economic recession in the mid 1980s, and then following the Asian financial crisis in 1997. In both cases the policy shifts were decided through a process of discussions and hard thinking involving the public sector, business, labour unions, academics and think tanks, foreign experts and the political hierarchy. To Singapore's credit it has never shied away from seeking solutions from elsewhere whenever the need has arisen.

D. Delegating to trusted key individuals

In Singapore personalities matter and some matter more than others. Nowhere is this more apparent than in the main statutory boards entrusted with economic development, defence, and finance. The EDB and, to a lesser extent, the TDB (now IESingapore) have always been the province of selected individuals having the ear of the inner hierarchy within the political system. Although the leadership positions in these agencies have been filled by civil servants, a glance at their careers will show a close relationship with key cabinet members over the years in the various ministries. Many of these civil servants would have cut their teeth in policy making and administration in ministries that were headed by senior cabinet members and would have had an intimate working relationship with them. The trust that ensues from such a working environment then provides the glue with which critical agencies are managed from the centre. Singapore is unique in the sense that all major investment, finance, foreign relations and economic development issues are addressed and resolved through a centralized cabinet process. Entrusting the implementation of decided policies to trusted individuals within the agencies is then a forgone conclusion.

For example, when Singapore decided to forge a biomedical sciences sector, it set up A*Star, the former National Science and Technology Board (NSTB), funded it heavily and placed it under the guidance of the former head of the EDB who had been instrumental in restructuring the manufacturing sector. Likewise, the Defence Science and Technology Agency (DSTA) is led by key individuals who have had a long-standing association with the military, and who had been involved in some of the industries that the military had set up. Such an approach prevents maverick public servants from filling important positions which are of strategic importance. The notion of a politically neutral civil service is less of a concern. In the Singapore context, the longevity of a dominant political party has made it all the more difficult to disentangle national, public and party interests.

E. Incorporating ‘best practices’ from elsewhere

Over the last four decades Singapore has weathered several economic crises. In the early 1970s, the oil crisis led to a serious rethink of the growth strategy from one that was dependent on ship repair, ship building and low value added manufacturing to electronics and higher value added manufacturing. This was a gradual process whereby the government borrowed from the successes of Korea and Taiwan, creating large-scale conglomerates of its own except that these were government companies or GLCs (government linked companies). It is also in this process of incorporating “best practices” that there is a reliance on the business sector. The role of international advisers and businessmen on government committees is to provide inputs into how best Singapore can compete within the international community. By tapping into the knowledge and networks that these businessmen bring into the decision-making process, there has often been a tacit acceptance that there are lessons from elsewhere that can be adapted for Singapore. This has also been apparent in the two economic restructuring exercises that have been undertaken over the last two decades. The first followed the recession of the mid 1980s and the other, after the 1997 Asian financial crisis. In both cases, there was a major revamp in economic directions. In the early 1990s the need to diversify into the wider immediate region was coupled with a strategy of developing industrial and service clusters inspired by Michael Porter’s theories of the time.

Good examples of borrowing from elsewhere are readily apparent in the Port of Singapore Authority’s (PSA) approach to becoming a full scale logistics centre with a cluster of shipping related activities similar to that which is present in the greater Rotterdam and Antwerp area. The PSA has its own international panel consisting of ship owners, senior managers of shipping lines and academics. At the policy-making level, there are international advisers in the Maritime and Port Authority (MPA) providing policy relevant inputs into transforming Singapore into a major shipping and port city. Similar features of international advisers providing policy inputs exist in the EDB industrial clusters; in A*Star for the biomedical, environment and water technology, and genetic engineering clusters; and in IESingapore for export promotion. In developing the Science Park and the Biopolis (for the biomedical sector), for example, the different agencies have borrowed ideas and best practices from the North Carolina Research Triangle, the Boston science belt and Silicon Valley.

F. Widening the spheres of influence

The international advisers who provide important feedback and inputs for policy making and implementation also act as influence disseminators of Singapore’s ambitions for its economy and development prospects. Many of these international advisers are influential thought leaders or corporate chiefs who sit on the boards of various multinational corporations. They bring with them the key thinking in corporate circles and in their chosen technologies. They take with them an understanding of how Singapore works and what it offers the investor. The flow of information is two-way and makes for an interesting confluence of theoretical thinking, pragmatism and public policy design. The same is also true of the various business chiefs who are resident in Singapore and who sit on various government-mandated committees. They provide the now and here of the challenges facing the business community

such as issues related to the cost structure, international taxation, trade access and the like. Thus, between the international advisory panels and the business community in Singapore, policy makers get a fairly comprehensive view of the challenges of making Singapore competitive and in the ways in which these challenges can be overcome.

At another level, Singapore has also embarked on internationalizing its economy by investing abroad. The international advisory panels provide a conduit for developing relationships with key players abroad as well as providing a platform for championing the Singapore cause. In this sense, the international relations reach of Singapore is being multiplied beyond the limited geography of its foreign relations and economic offices abroad. It is important to note that Singapore's diplomats abroad play an important economic role in fostering foreign investment, ensuring market access and in keeping the political relationships strong. A similar role is played by the EDB which has several offices abroad in the major cities of the world such as London, New York, Chicago, San Francisco, Frankfurt, Tokyo and Hong Kong. Thus the network of relationships extends beyond the immediate group of Singapore public servants and includes the international advisers, multinational corporations and financial institutions.

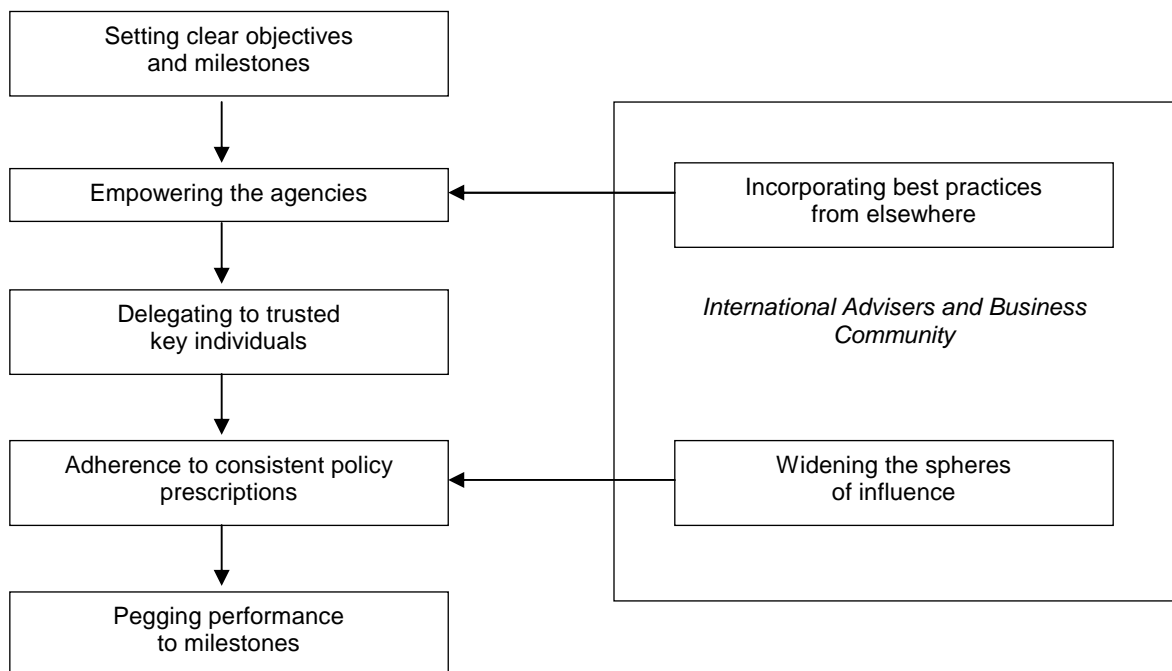
G. Pegging performance to milestones

Much has been written about pegging remuneration to performance in the business world. The unique feature of the Singapore system is that public service remuneration is pegged to performance which is benchmarked against the milestones that have been agreed by the agencies and the parent ministries. At the highest levels, political office holders and senior public servants have their salaries pegged to economic performance and the salaries of the top echelons of a group of key professional classes. At the lower levels, compensation is pegged against performance against milestones. There is a higher element of variable bonuses in this system compared to the standard public service remuneration schemes of other countries. Such a system is unique in that public service salaries are some of the highest in the world. Moreover, because of the in-built performance element, it is a greater reflection of how Singapore achieves its strategic objectives and goals.

As the development of the city-state proceeded apace there was consensus that adequate public service compensation would be a *sine qua non* for a clean and effective government. This resulted in a significant salary revision in the public sector which was subsequently pegged to the performance of the economy. The government then set in place performance based pay for all civil servants and allowed the statutory boards to design their own compensation schemes for staff. Thus, a flexible and somewhat market responsive compensation structure has now come to dominate the culture of the civil service and the attendant agencies. Accountability and responsibility for execution of plans and programs has now become the province of lower level civil servants as well. It is the creation of a new corporate culture through this approach that differentiates the Singapore model from most others. It is also an important reason as to why it works efficiently.

This section has expanded on an outline of the “*first principles*” of the Singapore model. A schematic of the different pieces shows the role of the business sector and how the alliance fits together as shown below:

FIGURE 1
FIT OF THE “FIRST PRINCIPLES”



Source: Author

Thus far, this section has outlined seven “*first principles*” that can be extracted from the Singapore experience of effective governance to support investment facilitation and export promotion. Many of these principles are at the root of the overall philosophy of governance that the city-state has chosen for itself. The key unique feature is that of a public-private sector alliance being used in an effective manner to widen the reach of the Singapore strategy of economic development. What is also clear in this approach is a disdain for ideology and dogma, and a preference for pragmatic realism. Indeed pragmatism has been at the core of Singapore’s survival instincts in a region that has been plagued by crises, war and political upheavals. The next two sections will expand on these principles in the context of two major strategic thrusts in the evolution of Singapore’s global position. The first is the overall strategic direction and operational design of agencies and processes for export promotion via investment facilitation involving the EDB, IESingapore (the former TDB), MTI and the PMO. The second is the more recent attempt at creating an architecture to support innovation and research in the sciences and new technology via the formation of the National Research Foundation (NRF) and its attendant agencies. Both approaches continue in tandem for different reasons and the structure of the two processes highlights the challenges that have arisen and the solutions that are being sought.

III. The economic development board: investment and export promotion

Singapore's success in export promotion can be traced to the creation of the Economic Development Board in 1961 when the statutory board was set up, bringing together the former Industrial Promotion Board (IPB) and the economic development division of the Ministry of Finance. Since then the EDB has been at the forefront of Singapore's industrialization drive and the subsequent expansion of the economy through diversification into services. The EDB is an agency that comes under the Ministry of Trade and Industry (MTI) and has just over 530 staff members with an annual budget of around US\$ 223 million in 2007. It has 19 international offices located in North America, Europe and the Asia Pacific.

The main functions of the EDB are spelt out in Parliament during the budget debates. Today, these functions are clearly defined as:

- a) to formulate and implement economic and industrial development strategies for Singapore; and
- b) to develop Singapore into a global city with total business capabilities by attracting foreign investments, developing local enterprises as well as implementing strategic overseas projects with significant linkages to Singapore.

Within these functions, the EDB has four major development programs which together have a budget of around US\$ 144 million. These four programs consist of three development assistance schemes and a science and technology plan for the country. There are ten line divisions aligned along the clusters which Singapore has designated for its growth strategy. These divisions and their operating units are listed below:

1. Biomedical Sciences (Pharmaceuticals, Healthcare Services, Biotechnology, Medical Technology)
2. Chemicals (Oil and Gas, Petrochemicals, Specialities)
3. Electronics (Semiconductor, Electronic Modules and Components, EMS, Storage and Peripherals)
4. Precision Engineering & Light Industries (Precision Modules & Components, Printing & Packaging, Machinery & Systems. Food, Textiles/Apparel/Fashion)
5. Infocomms and Media (Media and Digital Entertainment, Information Technology/ Computing & E-Business, Communications)
6. Logistics & Transport (Transport including Aviation, Maritime/Land Transport. and Oil & Gas/Alternative Energy, Logistics/Supply Chain Management)
7. HQ, Education, Environmental and Professional Services (Education Services. Headquarters & Professional Services. Engineering & Environmental Services)
8. Enterprise Ecosystem & Planning (Planning including Strategic Planning and Corporate Planning, Research & Statistics Unit, Policy, The Knowledge Centre)
9. Enterprise Ecosystem Development (Technopreneurship/Venture Capital, Enterprise Development, R&D/Innovation, Incubation Unit, Intellectual Property – SBU, International Policies, International Agreements)
10. Resource Development Division (Physical Infrastructure, Human Capital, Business Infrastructure)

The EDB has a board consisting of twelve members. The Chairman is a retired senior civil servant. Members include a mix of public and private sector leaders, as well as a mix of Singaporeans and foreign CEOs resident in Singapore. Board members drawn from the public sector include the MD of EDB, and representatives of MTI and NTUC. This structure shows a bias towards a larger private sector component (8 members, 7 foreigners and 1 Singaporean) within the board structure. This is, no doubt, to ensure that private sector views are clearly heard within the corridors of power. What is more telling is the presence of a senior NTUC official at the board level which allows for the views of labour to be voiced at the highest levels of the agency besides also taking on board views of business for the union. The structure of the board is in many respects true to the founding principles of a tripartite approach to development planning in Singapore. Board members are usually appointed for three years. There is no remuneration for being members of the Board but they may receive a token annual honorarium and reimbursement of expenses related to attending board meetings. The role of the board is not to make decisions relating to the activities of the EDB. It meets every month to review, comment on and provide clear inputs and feedback into EDB's strategies and their overall impact on different sectors.

As a statutory board, the EDB is answerable to Parliament through its parent ministry (MTI). Nevertheless, EDB and most of these other statutory boards are not exposed to the full scrutiny of Parliament because their parent ministries are expected to exercise oversight. In the 46 years of the EDB's existence, only now has the Auditor General reviewed the EDB's operations and efficiency with a number of suggestions for improving program disbursements and administration (Straits Time, 2007).

Besides a board which has a sizeable private sector presence, the EDB also has an International Advisory Council (IAC) consisting of a Cabinet Minister and seventeen CEOs of global corporations. The IAC meets annually and they provide inputs into Singapore's growth strategy. For example, the recent IAC meeting focused on Singapore's new thrust to become a global city focusing on knowledge and lifestyle by providing clear recommendations on (a) building a strong talent base, (b) building connectedness to economic growth engines and R&D networks, and (c) building innovative capabilities and a climate for entrepreneurship. The role of the IAC is to act as a sounding board for Singapore's strategies and to provide specific views on how some of these strategies can be achieved expeditiously.

The EDB has an annual corporate planning conference and in the early 1990s, there was a focus to stimulate local industry. Several programs, some of which had been in existence for a much longer time, were given added impetus. These included:- the local enterprise computerization scheme, finance scheme, technical assistance scheme, industry upgrading program, skills development fund, venture capital, product development assistance scheme, market and investment development assistance scheme

and the overseas enterprise investment incentive. More recently the focus has shifted to the new clusters enumerated earlier, while Spring Singapore (the former Productivity and Standards Board) has been tasked with developing a strong domestic small and medium enterprise (SME) sector.

The EDB, in line with the civil service, has its own recruitment and talent spotting structure. It selects potential candidates from their school leaving year and funds them through university and then bonds them to serve the EDB for a period of five years. The EDB scholarships are funded largely by multinationals which have benefited from investing in Singapore. Most are sent to engineering or business schools abroad or at the local universities. They form a critical core of the organization's talent pool. The EDB also hires specialized skills from the labour market. The compensation structure in the EDB, while broadly following civil service guidelines, deviates in many ways so that it has its own salary structure which is often higher than that offered by the civil service. In the recent past this gap has become less pronounced as the civil service itself has had a significant rise in remuneration levels.

It would be too simplistic to argue that a system full of programs and strategies would succeed by the mere fact that the system has them. In Singapore, there is a creed of elitism and a culture of "getting things done" that have come to dominate the various agencies. The pegging of compensation to specific program outcomes and to overall organization performance has much to do with this culture. In the EDB this culture has evolved over its almost five decade existence. This strong culture is ingrained in the EDB's officers from the time they join the organization. Most EDB officers start at industry level, learning all about a particular sector. They meet with the investors, study their industry sector, write papers on issues and keep up with industry journals. As they move up the ladder they increase the number of sectors they work in and widen their knowledge of the different sectors and firms. Almost all EDB officers spend a stint in the overseas offices where they learn to market Singapore and begin to understand the intricacies of the international business community. In identifying multinational companies as potential investors in Singapore, they cultivate CEOs, and know enough about the multinational's strategies and Singapore's investment challenges to craft a cogent business proposition for the multinational.

These task oriented challenges have now become a routine exercise for all EDB officers, and there is a simple and clear format for reporting to the head office on client visits, suggestions and outcomes. Furthermore, the creation of teams from within the organization to address the needs of various investors or sectors creates a matrix of skills and interpersonal relationships that provides for a strong knitting among the staff. It is this approach of going through the same process of personal and career development that accounts for much of the EDB "culture". The real difference between the EDB and other civil service organizations elsewhere is the almost brahminical approach to creating a strong ethos of belonging to a performance oriented culture similar to that seen in the world's leading consulting companies. In short, the EDB has an operating style closer to that of a global consulting or investment bank rather than a civil service organization. The success of such a culture can be seen in Table 2, which shows the FDI stock in Singapore over the last several years.

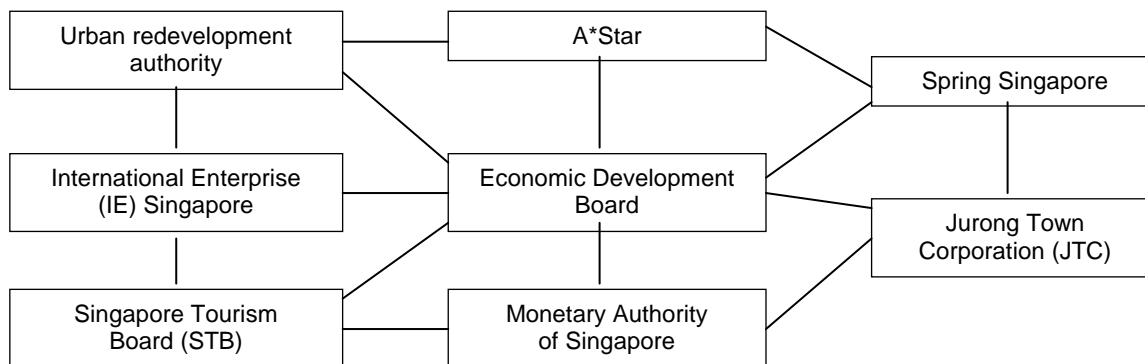
TABLE 2
SINGAPORE'S FDI STOCK
(In millions of U.S. dollars)

Year	Amount
1980	5 351
1985	10 620
1990	30 468
1995	65 644
2000	112 633
2005	186 926

Source: UNCTAD, 2007

In the Singapore development context, the EDB is often touted as the lead agency, coordinator and facilitator across the various other government agencies. In investment facilitation with an eye towards export promotion, there is a wider network of relationships that is at play with the EDB acting as the coordinator.

**FIGURE 2
THE EDB NETWORK**



Source: Author

In investment promotion, the EDB structure is an important feature of the Singapore model. It has spawned other agencies with a similar ethos and structure. Trade development was modelled after the EDB with the setting up of the Trade Development Board (TDB) which is now known as International Enterprise (IE) Singapore. IESingapore is tasked with identifying key markets and providing information to local manufacturers on access to export markets. It is also involved in crafting and negotiating bilateral trade treaties with important partner countries. There is a clear delineation between the work of the EDB and that of IESingapore. While the EDB focuses on inward flows of investments, the IESingapore focuses on export promotion. Once again the separation of their work is highly transparent.

The EDB has a mandate to seek world class manufacturing and service companies to invest in Singapore. These multinationals do not require the support of the Singapore Government for their exports. They choose to invest in Singapore on the basis of a package of incentives provided by the Government through the EDB. Their markets are assured and their global production networks have a fit with their individual corporate strategies.

With the establishment of EDB Investments in 1991, EDB has also become a risk taker. It was set up to provide equity in projects that expand Singapore's cluster of key industries in partnership with local companies and/or multinational enterprises. This funding known as the Strategic Direct Investments (SDI) is meant to spur new projects and the EDB exits the project once it has achieved its operating aims. There are also other funds such as the Startup Enterprise Development Scheme (SEEDS) set up to foster entrepreneurship and innovation in industries in Singapore. The scheme provides matching funds to stimulate entrepreneurship. Meanwhile EDBV Management (EDBVM) manages over US\$ 450 million and around 100 projects in its portfolio. It is wholly owned by EDB Investments and works closely with domestic and international co-investors, businesses and entrepreneurs in sectors which are within the EDB's overall cluster development strategy. A recent fund is Bio*One Capital which aims to enhance the level of the biomedical industrial activities in Singapore. It has over US\$ 650 million in investable funds with strategic investments in over 80 companies around the world. There is also TIF Venture which is a fund of funds management company set up to draw more venture capital

activities to Singapore and develop a thriving venture financing industry. TIF Ventures has a pool of over US\$ 1.3 billion in its portfolio and has invested in more than 50 partnerships worldwide.

IESingapore, on the other hand, is tasked with creating and ensuring market access for Singapore companies which do not always have the international connections that the multinationals have. These companies are a mix of large government linked corporations (GLCs), medium-sized manufacturers and small enterprises. These entities are often new to the international marketplace, are unfamiliar with Singapore's preferential access to markets, or are ill-equipped to seek export markets. IE Singapore fills the gap to ensure that exports from Singapore can be channeled to these markets without restrictions. It has a large database on trade, tariffs, product standards and requirements for the use of domestic and international manufacturers.

The Jurong Town Corporation (JTC) was created to develop the first industrial estate in the west of the island. Since then it has become one of the largest developers of industrial infrastructure on the island, and is a partner in the EDB's quest to seek investments. They build flatted factories, custom-built factories, industrial estates and also manage these facilities. Today, with the new approach of selling Singapore's capabilities abroad it has become an international industrial estate developer and manager. It has, over the years, become less relevant in the Singapore domestic environment as investors today set up their own infrastructure since the strategy now is to focus on world class companies and offer them an overall package of incentives to suit their own needs. There has been a move away from a standardized incentive program or standardized infrastructure.

The link with the Singapore Tourism Board (STB) is a more recent phenomenon, set up to develop Singapore as a centre for Meetings, International Conventions and Exhibitions (MICE), in addition to seeking investments in the services sector. The EDB's role is, as in the past, to identify top players in these various fields and to entice them to Singapore. The STB, in turn, provides the overall fit with the tourism industry and the different facilities that are part of the MICE cluster.

For most of the 1990s the EDB was also tasked with creating an enabling environment for local entrepreneurship. More recently these tasks have been taken over by Spring Singapore (the former Productivity and Standards Board). The real impact of the EDB in this sector is to ensure that spillovers from multinationals flow through to local enterprises. With this in mind, the EDB has been scouting for companies with the knowledge and technologies that can be transferred to SMEs in Singapore through innovation or direct tie-ups. Nonetheless, Spring Singapore has now been tasked with creating a more formal SME sector through training, skills improvement and adaptation of technology.

Perhaps the area in which there is the greatest overlap between what the EDB does and the new approach to developing a core competence in biomedical sciences, environmental technology and the digital media is in the relationship with A*Star. The relationship has become less structured in recent months as A*Star has itself acquired a new focus and strength from its association with the National Research Foundation (NRF). In the past A*Star worked in tandem with the EDB and, in some cases, took the lead in some of the sector development. This symbiotic relationship has now become diffuse as A*Star has had to weather changes in personalities and reporting structure. (This is discussed in the next section).

The link with the Urban Redevelopment Authority (URA) is unusual since the URA reports to the Ministry of National Development (MND). The real relationship revolves around the need to have office infrastructure and appropriate housing for high value-added skills that accompany multinational investments. The URA is responsible for much of the development of city infrastructure and urban master planning. By involving the URA in investment promotion activities it is sensitized to the needs of investors and of the challenges of facilitating high value-added investments. Of particular relevance is the creation of service sector infrastructure in and around the immediate vicinity of the city centre.

Although the EDB has a strong mandate for investment attraction, in the services sector relating to the financial industry it defers to the Monetary Authority of Singapore (MAS). The MAS, which acts as the Central Bank, has a fiduciary duty to ensure that financial institutions have the appropriate

credibility and financial structure for both domestic and offshore financial operations. For this reason, it takes a lead role. Nevertheless, in FDI, multinational enterprises often require an assurance of monetary stability and various sectors have varying requirements for the overall costs of production depending on the volatility of exchange rates. The MAS has to be aware of these different pressure points affecting these industries and their impact on the long-term viability of these investments. For example, the oil refining and petrochemical industry is highly dependent on short-term volatility in exchange rates and price movements in the international market place. The EDB has been promoting Singapore as an oil trading hub and the MAS has to be cognizant of the risks that these firms face in the short-term fluctuations that occur in the money markets.

What this network of relationships shows is that the Singapore model of investment facilitation and export promotion is a strong and integrated approach. Although the EDB has the catalytic role, it alone cannot ensure a complete set of offerings for investors. A host of other agencies operate in tandem with the EDB and set in place the necessary soft and hard infrastructure for investors and exporters. What is also interesting is that the culture of these other agencies is similar to, if not copied from, that of the EDB through emulation, staff movements or even organization design. This cultural and organizational context is discussed next.

Personalities matter and some matter more than others. From the mid-1980s to the end of the millennium, the EDB was led by a dynamic chairman who set the tone for a highly energized organization. He expanded the international offices, removed the hierarchy within the organization and made it a flat structure. He put in place a reward structure for performance and inculcated a new culture of responsibility and accountability. He brought in trusted staff from his previous organization, the National Computer Board (NCB), where he was the chairman. His immediate senior staff in the EDB then went on to create a similar culture in the Singapore Tourism Board (STB), in Spring Singapore and in the Jurong Town Corporation (JTC), while he himself took over the running of A*Star. Not only was this a process of entrusting key people with delegated tasks, they already sat on the boards of these other agencies while they were at the EDB thereby ensuring that they all sang from the same song sheet. There has now been a change in leadership in several of these agencies but what is a common theme is that the new leaders are all those who came with the EDB chairman from his previous job at the National Computer Board. It is this network of relationships with a common bond that is at the core of the Singapore success story for it is also replicated within the higher echelons of the civil service as well as in the defence forces. What is also an important point to note is that the political leadership is also drawn from this group of agency leaders and civil servants. The knitting between the political leadership, the civil service and the agencies is fairly tight and robust.

In summary, EDB's success can be attributed to several key factors. These include a legislative empowerment of the agency, sufficient funding, flexibility in hiring and retaining skilled staff, strong political commitment, a flat organization structure, a strong network with other agencies and, most importantly, the quality of leadership through selection of trusted individuals for key positions. But change is afoot. A new architecture for the emergence and development of a research-based and innovation driven group of industries in bio-medical sciences, digital media and water and environment technology is now underway. The origins of this strategy go back some ten years but it is only now being given a clear structure and impetus to ensure that funding is channeled to the most appropriate sectors. There is now greater recognition of the need for selective support for these, high risk, high cost sectors with a sense of greater public accountability. The lessons of the EDB and its associated network of other agencies are being adapted and fine-tuned for a different environment in which commercial technology and research, not always compatible, have to be managed and promoted.

IV. The National Research Foundation, A*Star, and the new world

There is a new world that is being explored in Singapore. After some forty years of focusing on investments geared towards export promotion, there is now a tacit acceptance that the growth model of old is no more a panacea for the future. This new world is that of science and technology, and a focus on sectors in which Singapore can make a breakthrough. Three main areas of focus have been identified: (a) Biomedical Sciences (BMS), (b) Interactive and Digital Media (IDM), and (c) Environmental and Water Technologies (EWT).

In the 1990s Singapore decided on a strategy of widening its industrial and service sectors. Manufacturing had started to decline as a proportion of GDP and was being rapidly displaced by services. Financial and business services took off rapidly as Singapore became a regional financial centre in competition with Hong Kong. There came a recognition that high value added services could only be sustained if there was a push for a research based cluster of activities. This led to the setting up of several science institutes such as the Institute of Molecular and Cell Biology, Singapore Institute for Clinical Sciences and the Institute of Medical Biology. These institutes are staffed by a mix of foreign scientists and locals. However as Singapore has had a shortage of trained scientists the government, under A*Star, has started a large funding scheme to train Singapore students up to PhD level in the sciences. Today there are some 650 graduate students doing their PhD in universities abroad. This number is expected to rise to around 1000 by the end of the decade. Returning graduate students will eventually be placed in these institutes to work alongside established scientists in the various research fields. As the number of these institutes have proliferated, A*Star (Agency for Science, Technology and Research) has become the parent agency overseeing them. It manages the overall development budget (US\$ 562 million in 2007) for research and administration and monitors the programs being

pursued by the institutes. Total development expenditure on research activities and infrastructure over the last several years has already reached around US \$ 3.7 billion and the total program budget will run to around US \$ 10 billion by the end of the decade.

TABLE 3
SINGAPORE’S TECHNOLOGY COMPLEXITY IN MANUFACTURED EXPORTS
(Selected years)

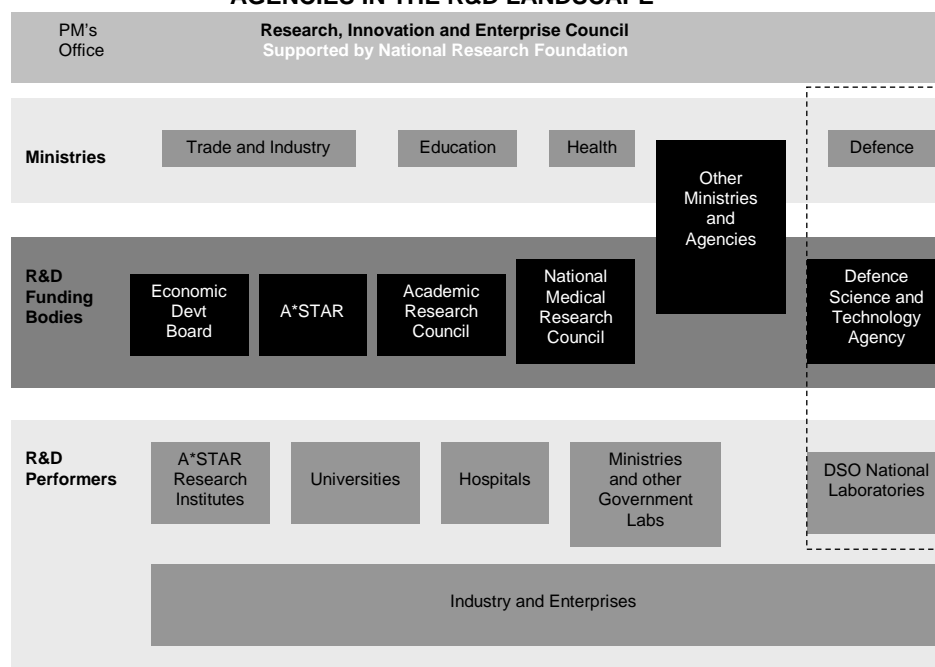
Years	Primary Products	Natural Resources	Low Tech	Medium Tech	High Tech	Other
1984-1985	2 253	8 501	1 686	4 646	4 600	1 791
1994-1995	2 828	16 784	7 401	22 304	55 533	2 695
2004-2006	2 311	42 000	12 179	39 562	108 949	9 142

Source: Author, based on ECLAC official numbers.

Table 3 above shows how Singapore has moved from low technology, primary products and natural resource-based manufacturing to high technology manufacturing. In high technology manufacturing there is a greater dependence on basic science and technology, and this move has been part of a designed strategy of creating a knowledge and science based economy. High technology manufacturing encompasses customized wafer fabrication, pharmaceuticals, water and environment technology products, biomedical products and the like.

As was intimated in the earlier section, the previous chairman of A*Star came from the EDB and brought with him a culture that he had created there. More recently there has been a steady restructuring of the overall R&D architecture with the Prime Minister’s Office (PMO) taking on a more important role in steering the R&D sector through the National Research Foundation (NRF).

FIGURE 3
AGENCIES IN THE R&D LANDSCAPE



Source: Extract of the National Research Foundation (NRF) presentation, 2006.

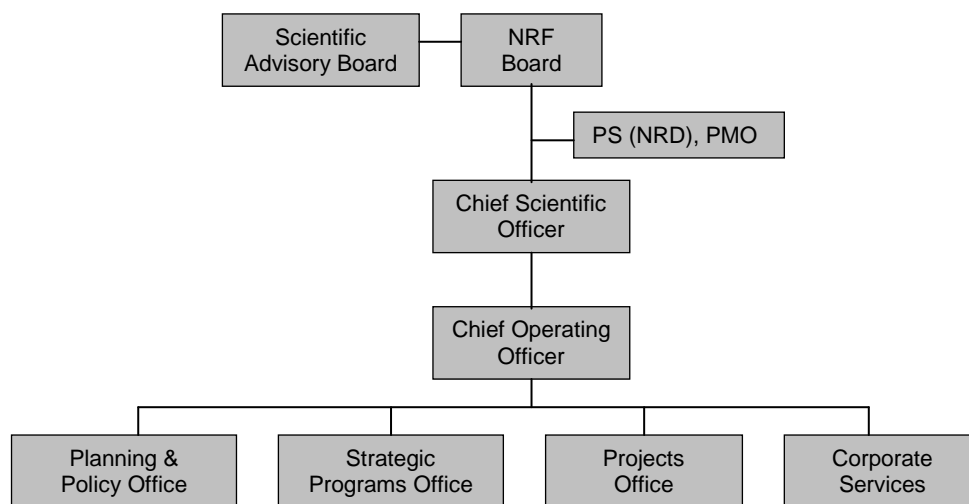
As shown in Figure 3 above, there are several agencies, ministries and institutions involved in the overall R&D architecture in Singapore. What is important to note is that the NRF has administrative oversight over all the research activities that are being pursued.

Once the RIEC (Research, Innovation and Enterprise Council) sets the specific agenda and sector for promotion, the relevant ministries are called upon to set in place appropriate actions to effect the policy direction. The various agencies under the ministries then create action plans that support these directions from the ministries. The research institutes and laboratories then become recipients of funds for their selected programs. There is a consistent application of policy prescriptions across the ministries and vertically through to the different research agencies, thereby providing a glue for pursuing different research programs.

The NRF was formed in 2006 with a view to (a) coordinate research being done by the different agencies in order to provide a coherent strategic perspective; (b) develop policies and plans for the national R&D agenda; (c) implement national research, innovation and enterprise strategies approved by the Research, Innovation and Enterprise Council (RIEC); (d) allocate funding to programs that meet the NRF's strategic objectives and; (e) provide secretarial support to the RIEC.

The NRF's agenda is set by the RIEC which is chaired by the Prime Minister while the NRF itself is chaired by the former Deputy Prime Minister. The RIEC is composed of cabinet ministers (7) and chief executive officers (10) of global corporations. The RIEC sets the guidelines and overall policy directions for research. But much of the policy prescriptions would have already been developed and proposed by the NRF prior to the review by the RIEC. The RIEC, effectively, sanctions the priorities and provides the political impetus for the different activities to be initiated and sustained. There is thus a concrete and substantive political commitment from the highest levels of government for the R&D agenda in the country. The NRF, meanwhile, has a lean structure and operates from within the PMO.

FIGURE 4
NRF ORGANIZATION STRUCTURE

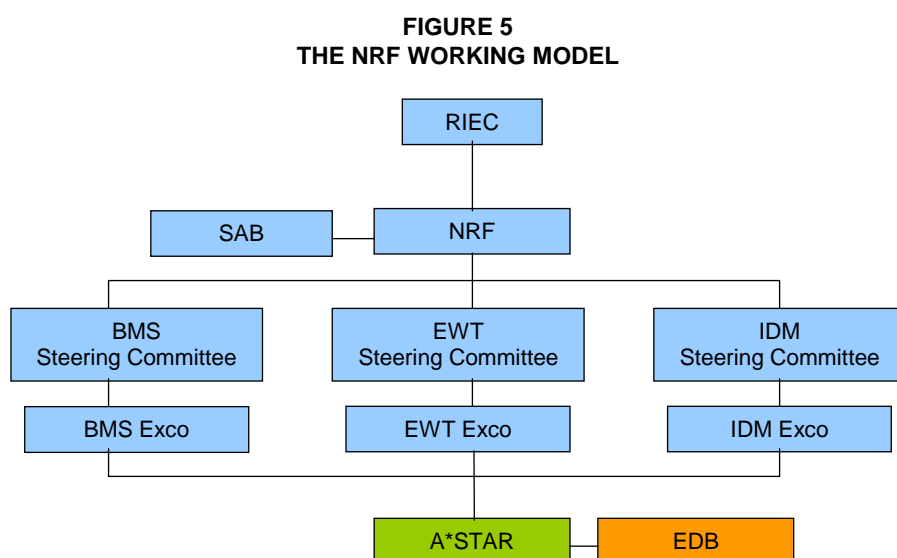


Source: Author, based on information published on the NRF website, 2008.

The NRF Board consists largely of cabinet ministers (3), junior ministers (2), senior civil servants (6), academics (5) and the private sector (3). This structure, in sum, attempts to have a strong “Singapore” element within the decision-making hierarchy compared to that which was seen previously in the EDB. But the real international input into the research agenda and overall operational strategies emanates from the Scientific Advisory Board (SAB) which consists exclusively of scientists from abroad. Some of these advisers are Nobel Prize winners and the Board is multidisciplinary in its

composition. In essence, the SAB tracks global trends in research; identifies areas in which Singapore could benefit from such research; reviews and advises on proposals and plans prepared by the NRF and; assists and advises on funding targets. But it is interesting to note that the NRF has been set up through a legislative bill with a statutory funding of US\$ 3.3 billion. This creation takes the NRF out of the Ministry of Finance's overall budget cycle since, it is probably recognized that, science research cannot have immediate results and civil service-type benchmarks do not apply to such activities.

As shown in Figure 5, the NRF currently focuses on three sectors: (a) Biomedical Sciences (BMS), (b) Environmental and Water Technologies and Clean Energy (EWT), and (c) Interactive and Digital Media (IDM). Each of these areas has a steering committee led by the former Deputy Prime Minister, and three or four serving ministers. Beneath this steering committee there is an Executive Committee (Exco) consisting of civil servants from relevant ministries and heads of research or tertiary educational institutions. These executive committees are largely filled by local individuals rather than foreigners.



Source: National Research Foundation website, 2008.

The trickle down of decision-making in research culminates in the various institutes that come under the umbrella of A*Star. It is also at this stage that the EDB has direct intervention with A*Star and the NRF in jointly funding specific programs that have a strategic purpose that meets the objectives of all three agencies. But this also obscures the fact that the senior decision-makers in the EDB and A*Star are also involved in several of the executive committees of the three areas in which the NRF has a focus, i.e. BMS, IWT and IDM. Some of the EDB's funding ventures, such as Bio*One Capital, are actively involved in supporting the NRF jointly with private sector participants.

Thus far, the structure and methods of an integrated research oriented development strategy have been outlined. But more significant is the reason for this strategy. Singapore now has a high wage structure and a dominant service sector consisting of financial and business services. Manufacturing and low value added activities are less effective for economic wellbeing. There is thus a concerted effort to create a sustainable basic research capability which can have spinoffs for other industries and sectors. But the handicap is that for most of the forty years of a foreign multinational-led and investment-driven growth strategy the main focus was on job creation rather than on basic research. Thus, skills were created to support multinational activities which were oriented towards manufacturing and production. The onset of a high wage economy, and competition from lower wage economies such as China, Vietnam and India have both dealt a blow to the old export-led growth model. Restructuring the

economy called for the creation of domestic entrepreneurship, externalizing the economy and identifying new areas of sustainable skills formation. It is in creating sustainable and flexible skills with a potential for spillovers into local production that there has been a focus on basic research. Perhaps it is also important to note that basic research in the sciences allows Singapore to leap frog into the constellation of the developed economies where such research forms the core of subsequently commercialized activities. Nonetheless, the need has been to focus the research into areas where Singapore can create a sustainable advantage and hence the selection of the three sectors – BMS, EWT and IDM. These are all areas in which Singapore has already started to create some core capabilities although they are still far from being commercially viable. The challenge today is to create major breakthroughs in research and to commercialize them as quickly as possible. It is this concentration of effort that is at the centre of much of the political support that has been forthcoming.

With these thoughts in mind, the national R&D agenda has five strategic thrusts:

1. To intensify national R&D spending to achieve an expenditure of 3 percent of GDP by 2010
2. To identify and invest in strategic areas of R&D
3. To fund a balance of basic and applied research within the strategic areas Biomedical Sciences (Pharmaceuticals, Healthcare Services, Biotechnology, Medical Technology)
4. To provide resources and support to encourage private sector R&D
5. To strengthen linkages between public and private sector R&D

Of these strategic thrusts, two are clearly focused on obtaining private sector cooperation. It is in the area of private sector involvement that the EDB comes into its own with its international coverage and networks. Thus, the role of the EDB within this architecture is significant, geared towards identifying and providing incentives to appropriate partner companies.

While the EDB acts as a magnet to attract foreign investors into the specific clusters which are affiliated to the overall R&D architecture, this does not preclude the others such as A*Star or the academic institutions from seeking their own private sector or other partners. For example, the NRF via A*Star and the local universities has also set up research institutes in partnership with US universities such as MIT. The overall goal is to ensure that Singapore is plugged into the global research network and particularly with institutes of excellence. The overarching theme in the R&D agenda is to nurture a core of research skills in Singapore, which, on its own, may not have exportable tangibles but provides spillovers into commercial production which may have export potential. It is the creation of a backward linkage that is the essence of the current strategy. The role of the private sector is to identify and capitalize on these commercial opportunities. This can happen through venture capitalists identifying potential commercial research areas or through the private sector participating in the research agenda, setting up laboratories and bringing the appropriate skills to undertake the research. The role of government and the NRF is to ensure that these skills and investments are facilitated and promoted without restraint. For this operational strategy to work effectively there must also be extensive coordination among the different agencies and ministries. For example, the Ministry of Manpower has to expedite the processing of employment passes for skilled scientists as does the URA in ensuring that these scientists also obtain affordable housing while the Ministry of Education has to cater to the requirements for the children of these families. Thus, the network of policy implementing agencies is well drawn and requires a high sense of oneness to ensure that the overall game plan is met. And this requirement is achieved in the unique “Singapore way” – having the same group of political leaders, senior civil servants and key agency individuals all actively involved in every aspect of the policy design and implementation.

As in the other agencies, the success of the NRF’s strategies is predicated on getting the right, trusted, individuals to lead the different programs and executive committees. Once again, the secret to the Singapore model is the choice of key individuals. Many of these are senior civil servants with a common background in the administrative service and a history of having worked together in other agencies. The NRF architecture is much wider than that seen in the EDB approach of the last section. It has a much bigger group of individuals drawn from the various ministries and agencies, and a larger role for the political leadership. Such a framework allows for greater oversight of the cluster and its various

elements. It is also a measure of the times that a statutory fund, i.e. National Research Fund, has been tabled and passed in parliament to ensure greater transparency in how the funds are being spent.

Two observations are appropriate at this stage. The first is that over the last decade there has been a move from a single “all powerful” organization such as the EDB to a more network oriented approach as seen in the NRF. Part of the reason is to reduce the creation of the “culture of the individual” to that of the “culture of an institution”. The second is the greater transparency that is being brought to bear on large scale spending by taking the route of a statutory fund. However, it can also be argued that this approach removes the usual oversight exercised by the Ministry of Finance to allow for a more expeditious allocation of funds when the technology frontier shifts rapidly.

Thus far, the changing nature of decision-making networks in Singapore has been outlined. Nevertheless, there is one constant in the overall scheme of policy planning and implementation in Singapore. This is the creation of a Singapore “ethos” within the administrative system and which is largely responsible for much of the success of the Singapore model. We turn to this next.

V. Creating the Singapore “ethos”

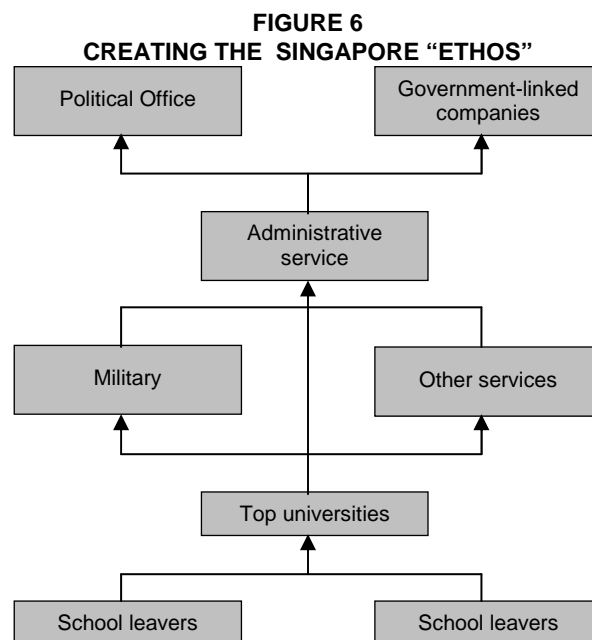
Singapore has had a unique administrative culture from the time it had to fend for itself when expelled from Malaysia in 1965. There was, and continues to be, a sense that it has to seek its own solutions to issues of national interest. There never was a fear of having to borrow ideas or of refusing any particular ideology. Unlike many other developing countries, which had an ideological bent set forth by the political leadership, Singapore opted for a sense of pragmatism sharpened by the need for any option to work effectively. This philosophy of getting things to work meant that the administrative system had to be crafted to become an efficient implementer of policies. But it also required a system that could react to the needs of the different stakeholders – the political leadership, the public and the business world. A tripartite culture was seen to be the best way forth. Thus, Singapore’s early industrialization drive set the format for the future when the political leadership, labour unions, and business created the crucible within which policy design began to take shape. This is a lesson that has not been lost over the last several decades. The public sector, as one of the participants in this process, has become comfortable in dealing with business and labour without rancour.

The creation of an efficient administrative system in the early years followed the examples of India and the United Kingdom. The top university graduates were selected into the civil service and formed the core of the first administrative system. Subsequently, the net was widened as the best school leavers were selected to pursue university education in the top universities in the UK, returning to be bonded to the civil service. The culture of getting the best into the civil service continues, with some adaptation. The setting up of a strong military expanded this network as some of the best and brightest were

selected on military scholarships and sent to the best universities abroad. They return to serve a period of military service before being retired, at a fairly young age, to be sent into the administrative service and the different agencies. There are different types of scholarships including those for local and overseas universities, and for the various parts of the public sector. The EDB, for example, has its own scholarship scheme, as does A*Star for its future scientists. But within the public sector the military and the Police Force have their own scholarship schemes, as does the Administrative Service. The core of returned scholars form a pool from which they are sent to various ministries and agencies. They have a six-month stint of working together when they first join the service. This creates a culture of bonding amongst the young civil servants and cements the creation of a network, which then ascends the decision-making hierarchy as they get promoted through the system over the years. Many will also be given a sabbatical in mid-career to pursue higher qualifications in public administration or management. A particular favourite is to do the MPA at the Kennedy School in Harvard University. Over the years, undergraduate scholarships have been awarded to students to study in the UK, US, France, Germany and Japan. There was an effort to inculcate the French administrative model and some elements of the French system have now been adapted to the Singapore administrative culture. Just as the best of the French “enarques” end up running many of the French corporations so do many of Singapore’s top administrators end up running government-linked companies (GLC).

What has to also be noted in the Singapore model is the common culture that pervades both the civil service and the political system. Many, if not most, of the recent ministers in the political hierarchy have been drawn from the administrative service, having being scholars previously. Interestingly, the administrative system has become the feeding ground for future political office. In a sense this is similar to the French model where France’s best and brightest rise up the administrative system and eventually take up political office. The difference in Singapore is that the British parliamentary system that prevails requires civil servants to resign from the service and to be elected into parliament. A dominant “one party” system, with group representation constituencies (GRC), allows for such a structure to become effective in Singapore. The essence of this structure is to allow the administrative culture to become a part of the political culture and vice versa. The seamless integration of political needs, public policy design, and implementation come together in Singapore in this fashion.

Keeping an honest and clean administrative and political culture has also meant adequate compensation for civil servants and political office holders. Singapore has one of the highest remuneration schemes in the world for political leaders and civil servants. The reward structure, as alluded to earlier, is linked to national economic performance and milestones, and the mechanics of the structure, however, is more formulaic. There is also a strong anti-corruption agency with wide powers of investigation. But more interestingly, it is the fact that a highly rewarded public sector sees itself as equals to the private sector and is therefore comfortable working within a public-private alliance. In the Singapore context the definition of the private sector goes beyond local companies and multinationals. Many of the largest companies in Singapore are government-linked (GLC) and led by former civil servants. Thus the culture of the civil service lives on even in the wider private sector. More interestingly, the international private sector finds dealing with the Singapore administration to be similar to that which they are accustomed to in their own organizations. Many Singapore civil servants have the same backgrounds as the senior decision-makers in these companies. Thus the bonds are social as well as formal within the public-private sector alliance.



Source: Author.

The Singapore model works because it is small, and draws on a limited population base of just over 4 million people. There are also several limitations of the model. Of primary concern, even to the older political leadership, is that of a limit to diverse views within close-knit group of like-minded individuals. The second relates to the challenge of renewing the administrative and political cadre. The third is to ensure that the best and brightest continue to be attracted to the higher echelons of public service.

It is in the first of these concerns that the private-public sector alliance comes into its own. The private sector brings to bear a different set of concerns and solutions which the public sector has to address or use to enrich its thinking process. It is for this reason, among others, that the public service has been welcoming of selective private sector support in its endeavours. In some cases, such as in the NRF, the public sector does not have the skills base in science and technology which the private sector has, and is therefore forced to adapt the solutions provided by the private sector. The Singapore public sector has become adept at obtaining private sector knowledge and fine-tuning it to its own requirements.

Political and public sector renewal is a more daunting task and the recent approach has been to attract private sector talent into both areas. The public sector has allowed for lateral entry into key senior positions by private sector individuals and has also structured jobs for short-term, three-year, tenures. The equalization, or indeed rapid increase, in the levels of remuneration in the public sector to that of the private sector has also made it more attractive to the private sector individuals. But the experience of recent years shows less of a willingness by the private sector individuals to go into public service.

The third concern of attracting the best and brightest has now become a critical issue. A country with a limited population base, and an even smaller cohort of highly educated individuals, can ill afford to dilute the overall business environment by reducing the pool that the business sector depends on. Much of these limits are being addressed by reducing the scholarships offered to school leavers and by allowing an infusion of foreign talent into the business community. It has also become apparent that highly skilled individuals are internationally mobile, and keeping them in Singapore requires several policy imperatives to sustain a high quality of life. These challenges have not been overcome but the problems are being faced squarely by a system that has been addressing other issues for a longer time.

In summary, Singapore's successful application of a public-private sector alliance to its development needs is not just one of programs, policies and funding. All these are important and Singapore has had its full share of all, but the more important drivers have been political will and the creation of a culture of "getting things done". Much of that culture has been developed, sustained and championed by the political system by as much as the administrative system. An understanding of the political and administrative system in Singapore lends better clues to what can work than an overt attempt to analyze only the policies, instruments and other mechanisms of governance.

Bibliography

- A*STAR (Agency for Science, Technology and Research) (2007), “About A*Star” [online], Singapore, [date of reference: October 2007] http://www.a-star.gov.sg/a_star/2-About-A-STAR.
- Birdsall, Nancy and Frederick Jaspersen (eds.) (1997) “Pathways to Growth :Comparing East Asia and Latin America”, Inter-American Development Bank, Washington, D.C.
- Chin Bock, Chan (2002) “Heart Work”, Economic Development Board, Singapore.
- CPF (Central Provident Fun Board) (2007) CPF Board, Saving for Retirement Homepage [online], Singapore [date of reference: October 2007] <http://mycpf.cpf.gov.sg>.
- ECLAC (Economic Commission for Latin America and the Caribbean), from World Bank data.
- EDB (Economic Development Board) (2007) Homepage [online], Singapore, [date of reference: October 2007] <<http://www.sedb.gov.sg>>.
- Ghesouiere, Henri (2007) “Singapore’s Success: Engineering Economic Growth”, Singapore: Thompson Asia.
- Haggard, Stephan (1990) *Pathways from the Periphery*, Cornell University Press, Ithaca, New York.
- Haggard, Stephan and Robert Kaufman (eds.) (1992) “The Politics of Economic Adjustment”, Princeton University Press, New Jersey.
- IDA (Infocomm Development Authority of Singapore) (2007), “About Us” [online], Singapore [date of reference: October 2007] <<http://www.ida.gov.sg/About%20us/20060406102431.aspx>>.
- IES (International Enterprise Singapore) (2007) Homepage [online], Singapore, [date of reference: October 2007] <http://www.iesingapore.gov.sg>.
- MOF (Ministry of Finance) (2007) “About Ministry of Finance” [online], Singapore [date of reference: October 2007] http://www.mof.gov.sg/aboutus_mission/index.html.

- NRF (National Research Foundation) (2008) [online], Singapore [date of reference: October 2007] website <<http://www.nrf.gov.sg/nrf/aboutus.aspx?id=112>>, 5 may 2008.
- PMO (Prime Minister's Office) (2007) "About PMO Office" [online], Singapore [date of reference: October 2007] <http://www.pmo.gov.sg/AboutPMOffice/>.
- SPRING Singapore (2007) "About SPRING Singapore" [online], Singapore [date of reference: October 2007] < <http://www.spring.gov.sg/Content/WebPage.aspx?id=0a84ffd1-6ceb-4cf0-b9e4-b97ccc45b762>>.
- The Straits Times Singapore Press Holdings Limited (2007), article on EDB Auditing Process, 26 May.
- _____(2007), article on the Singapore civil salary revisions in 2007, 10 April.
- UNCTAD (United Nations Conference on Trade and Development) (2007), *World Investment Report 2007 Transnationals Corporations, Extractive Industries and Development*. Country fact sheet: Singapore [online], http://www.unctad.org/sections/dite_dir/docs/wir07_fs_sg_en.pdf.
- Woo-Cumings, Meredith (ed.) (1999) "The Developmental State", Cornell University Press, Ithaca, New York.
- World Bank, (1993) *The East Asian Miracle: Economic Growth and Public Policy*, Oxford University Press.
- ____ (1991) *World Development Report 1991: The Challenge of Development*, Oxford University Press.
- Yeoh, Francis (2006) "National Research Foundation of Singapore", document presented at the ICAAS – UIAAS Innovation symposium, Singapore, 26 of August [online] <https://www.iscs.nus.edu.sg/~wongls/icaas-web/links/NLB/innovsymp06/francis-nrf-talk.pdf>.

Annexes

Annex 1

A. The institutions

1. The Economic Development Board (EDB)⁷

The Economic Development Board (EDB) is the prototype Singapore government agency, and highlights three important issues. First, the re-branding and refocusing of agencies, where agencies are renamed, rejuvenated, and merged in order to be more effective in delivering the stated government policy goals; second, the clarity of focus which each agency builds into its mission statement from Day One; and third, the manner in which various agencies mesh to enhance each other in the achievement of a well-articulated policy, programme, or other agendas.

The EDB is also the prototype for the integration of public/private spheres in furthering national development. As a statutory board, however, the EDB Board of Directors is responsible for the planning and execution of EDB policies. The pattern is thus to have a board, which supervises and facilitates the implementation of EDB's strategic plans. Board members are drawn mainly from government agencies, ministries, and private sector parties that have a particular role to play, or expertise to lend, to the success of EDB's mission to draw foreign sector private investments to Singapore. EDB, like several other strategic development agencies, is a statutory board under the Ministry of Trade and Industry (MTI), and therefore there is an MTI presence on the EDB Board.

The current 12-member EDB Board (2007) is chaired by the Chairman of EDB. Members include the MD of EDB, a representative of MTI, the Assistant Secretary General of the NTUC (National Trade Union Congress), and 8 private sector representatives, including the CEO of Schott Asia, the Regional Director of Rolls-Royce Singapore, the VP of Schering-Plough Ltd, the Asia Pacific MD of ExxonMobil, the EDO for Asia of Hitachi Ltd, the VP of Federal Express, the EC of UniSteel Technology, and the President of the UNSW.

In addition to the EDB Board members, all of whom are Singapore-based, there is also an EDB IAC (International Advisory Council), members of which are internationally prominent industry leaders. The current Council is chaired by the Minister of Defence, and co-chaired by the chairman of the DBS (Banking) Group. The 18-member council reads like a who's who of strategic industrial clusters of relevance to Singapore's current development aspirations. For example, they include senior executives of such companies as DHL Logistics, Agilent Technologies, GE International, 3M, Draper Fisher, Royal Philips Electronics, TCL Corp, Proctor and Gamble, Waverly Associates, the Institute for Global Futures, Toshiba, Royal Dutch Shell, Tata Group, Sumitomo Chemicals, and Infineon Technologies. The EDB IAC meets annually, and the inputs into EDB policy directions and formulations are substantive.

When the EDB was formed in 1961 with a budget of \$ 200 million, Singapore was a third world country with a GNP per capita of less than US\$320. Infrastructure was poor, there was little capital, and the handful of industries produced only for domestic consumption. Low-end commerce was the mainstay of the economy, and there was little or no direct foreign investment. There was massive unemployment and labour unrest following the withdrawal of the British troops. Creating jobs was the priority, and this meant attracting labour-intensive industries.

But Singapore lacked an environment conducive to industrial development. Thus, the EDB first contribution was to build the Jurong Industrial Estate (JIE), located along the west coast of the island. JIE eventually grew into JTC (Jurong Town Corporation), which has worked with EDB to build and operate industrial estates in Singapore, and overseas. The EDB first task in the transformation of the Singapore economy was to set about the challenge of convincing foreign investors that Singapore was a good place to do business.

⁷ Material for this section on EDB is taken largely from the Economic Development Board (EDB) website [online] <<http://www.sedb.gov.sg>>. See also Henri Ghesouiere, 2007, and Chin Bock, 2002.

Singapore's industrialisation programme began with factories producing garments, textiles, toys, wood products and hair wigs. But along with these labour-intensive industries, there were also some capital and technology-intensive projects such as Shell Eastern Petroleum and the National Iron and Steel Mills. After Singapore's expulsion from Malaysia in 1965, the EDB faced the new challenge of developing export-oriented industries, and EDB opened its first overseas centres, in Hong Kong and New York.

By the 1970s, unemployment was no longer a problem for Singapore. Industrial development was surging ahead and EDB marketed Singapore as a quick operations startup location where factories were built in advance of demand, and a highly skilled workforce was readily available. More EDB offices were set up in Europe, USA and Asia. Between 1971 and 1976, new EDB overseas centres were opened in Zurich, Paris, Osaka and Houston.

Singapore's industrial base widened. The products manufactured became more sophisticated and included computer parts, computer peripherals, software packages and silicon wafers. This led to new investments, particularly in electronics, and product diversification which greatly enhanced export performance in spite of a global recession. Multinational companies (MNC) began to undertake R&D activities in Singapore as an extension of their successful manufacturing operations here. This demonstrated their long-term confidence and the strengthening of their industrial bases in Singapore.

As industrialization proceeded apace, skills development became an absolute priority. The Overseas Training Programme, which placed young Singaporean workers in apprenticeship programmes in Germany, was drawn up in 1971. Discussions began for Joint Government Training Centres with Tata of India, Philips of Holland, and Rollei of Germany. This unique partnership approach to workforce training was the first of its kind and was a significant step forward in Singapore's investment promotion programme.

The 80s saw Singapore embark on what the government called the "Second Industrial Revolution", a move into knowledge-intensive activities such as R&D, engineering design, and computer software services. EDB was the lead organization in this effort. In his 1981 Budget speech, the then Minister of Trade and Industry, Mr Goh Chok Tong, said, "The prime objective of the plan is to develop Singapore into a modern industrial economy based on science, technology, skills and knowledge".

To meet the specialised manpower needs of high-technology industries, EDB established institutions of technology jointly with the governments of Japan, Germany and France. These trained Singaporeans for specialised jobs in electronics and engineering. EDB also took on the task of administering the Skills Development Fund (SDF) to encourage the right kind of manpower training. EDB also spearheaded the setting up of the Science Park next to the National University of Singapore to stimulate R&D activities by the private sector. Low-cost financing and technical consultancy under the government's Robot Leasing Scheme (RLS) helped manufacturers automate their operations.

The government adopted a high wage policy to accelerate the move away from labour-intensive industries and the attraction to high-technology industries. In the mid-1980s, the world slipped into an economic slowdown, and Singapore slid into a recession. An Economic Committee led by the then Minister for Trade and Industry, Mr Lee Hsien Loong, took a long hard look at what was needed to restore Singapore's competitiveness. The Committee's most far-reaching recommendation was the introduction of a flexi-wage system where pay hikes would be relative to a company's profitability⁸.

Another call the Committee made was for EDB to promote all aspects of economic activity. With the new goal of selling Singapore as a Total Business Centre, EDB set out to attract international service corporations in the financial, educational, lifestyle, medical, IT and software sectors. The economy was to be supported by twin engines of growth: manufacturing and services. The promotion of local enterprises also became increasingly important. EDB set up the Small Enterprise Bureau (SEB) in 1986 and shaped a range of assistance schemes to help small local enterprises grow.

By 1990, EDB had 16 investment promotion centres worldwide. Its role had broadened into that of a business architect helping companies configure and design activities through strategic planning

⁸ See also Appendix 3.

partnerships. Globalisation became the new target. Under the Singapore Unlimited initiative, EDB looked to the world for resources in finance, technology, manpower and information. Singapore still sought to attract foreign investments, especially in high value-added industries, but the development of an external economy linked to the domestic economy was crucial to Singapore's economic competitiveness.

The concept of creating economic space beyond Singapore was shaped. The idea was to get local companies and Singapore-based multinationals to participate in the region's growth by distributing resource-dependent operations to resource-rich countries. Meanwhile, operations in Singapore were upgraded to higher-end activities that required Singapore's unique set of competencies.

New economic space was created when Singapore tapped the land and manpower resources of other countries in the region to establish industrial parks. Companies which invested in these parks benefited from their proximity to Singapore, from where they still controlled their operations, as well as by operating in an environment with similar standards to Singapore. These industrial parks were established in China, India, Vietnam and Indonesia. Most importantly, the Singapore government promotes a pro-business environment that continues to encourage MNCs and local companies to invest and expand in, and with, Singapore.

2. International Enterprise Singapore (IE Singapore)⁹, the former Trade and Development Board (TDB)

The Singapore Trade Development Board (TDB) was formed in 1983 to develop Singapore as an international trading hub, and promote the nation's goods and services. From basic trade facilitation, TDB's focus expanded to review existing marketing policies, strategies, and techniques. TDB also explored new opportunities in both traditional and non-traditional markets, and exported business systems and developed international offshore trading.

To promote Singapore's goods and services to overseas markets, TDB pushed ahead with promotion and began to develop a comprehensive network of overseas centres. In 1984 TDB established its first overseas centre in Frankfurt, Germany. This was followed in 1985 by offices in Bombay, Shanghai, Geneva and Washington.

When Singapore joined the General Agreement of Tariff and Trade (GATT) in 1985, TDB was tasked with actively securing market access and championing free trade. Along with this, trade facilitation graduated from a documentation department to handling trade processes and ensuring that Singapore's traders complied with international trading rules and procedures. These developments later led to the implementation of TradeNet in 1989, the world's first electronic, nationwide, paperless trade facilitation and documentation system. In 1986 TDB pushed pioneer status for countertrading activities to attract international counter-trade companies to Singapore.

The role of promoting a more liberal trade environment became more significant in the 1990s as world trade grew. Apart from GATT, TDB represented Singapore in negotiations within such organisations as the World Trade Organisation (WTO), Association of Southeast Asian Nations (ASEAN), Asia Pacific Economic Co-operation (APEC), and Asia-Europe Meeting (ASEM). In 1994, Singapore endorsed the WTO Agreement, along with 81 countries. In 1996, Singapore hosted the first World Trade Organisation (WTO) Ministerial Conference.

TDB facilitated companies' efforts to seize trade opportunities by providing timely information, enhancing efficiency in trade operations and procedures, and using incentive schemes to attract investments. By the late 1990s, services exports had moved towards the higher-value end of the trade spectrum. Together with EDB, TDB was tasked to help boost Singapore's competitiveness by developing the nation into Asia's premier services hub. TDB stepped up activities to attract even more investments in international trading, shipping and logistics, international exhibition management, infrastructural services, and new sectors such as electronic commerce.

⁹ For further information, visit International Enterprise Singapore [online] <[http:// www.iesingapore.gov.sg](http://www.iesingapore.gov.sg)>.

To more effectively compete, Singapore has had to move beyond its investment-driven and electronics-dominated export base to develop new bases of growth. This has led to a key thrust identified under Singapore's new economic strategy, namely to help Singapore-based companies internationalise and grow in the global market.

In 2002, TDB was restructured, and officially renamed International Enterprise Singapore, or IE Singapore, to move beyond trade to focus on internationalising Singapore-based enterprises. IE Singapore's main focus is on providing heightened support to help Singapore-based companies start and develop their business overseas. This includes a wide range of services, both locally and overseas, to help companies shorten their learning curve and make the right connections, for example, providing valuable market information, doing feasibility studies, and finding overseas partners.

In 2007, IE Singapore has a global network of over 36 overseas centres in Asia, Europe, Middle East and the Americas. After its own rebranding exercise, IE Singapore established the Capability Development Group to help companies develop core capabilities in branding, design, manpower, capital enablement, networks and alliances. It also set up Business Support Offices (BSO) alongside its Overseas Centres to provide temporary office space and consultancy services to Singapore-based companies setting up in China, New York and Mexico City. Plans are in the pipeline to set up more of such offices in Europe and India. To help Singapore-based companies share knowledge and facilitate networking at various levels, IE Singapore has also spearheaded the formation of networking platforms like Network China, Network India and Network Indonesia.

Spring Singapore¹⁰, the former Productivity and Standards Board (PSB)

In 1996, the Singapore Productivity and Standards Board (PSB) was formed as a result of the merger between two statutory boards – the National Productivity Board (NPB) and the Singapore Institute of Standards and Industrial Research (SISIR). The strategic integration brought together the 'soft' aspects of productivity handled by NPB and the 'hard' aspects handled by SISIR for the purpose of managing Total Factor Productivity (TFP) in Singapore.

In 2001, PSB was repositioned as the Standards, Productivity and Innovation Board of Singapore (SPRING Singapore), tasked to enable enterprise development. Since then, SPRING has played an important role in productivity promotion, manpower development, technology application, industry development and standards and quality development. To accomplish this, it works closely with both EDB and IE Singapore. The government is committed to groom and grow Singapore's SMEs. Through SPRING, some \$3.9 billion will be pumped in from 2006 to 2010 to help SMEs grow their businesses.

From 1996, the newly established PSB actively promoted a series of projects and programmes to increase the quality of Singapore's labour force. For example, PSB launched a "Back toWork" Programme, a tripartite initiative to meet Singapore's manpower needs through better utilisation of manpower resources. Other initiatives were the lunch of PSB's series of alliances with trade and industry associations to raise the productivity and competitiveness of industry, and *repositioning* and renaming of "Quality Control Circles" as "Quality Circles"

PSB also actively promoted all manner of quality control certification schemes, such as PSB's ISO 9000 certification schemes, 9000 quality management certification schemes. PSB's efforts were geared to assisting the SME sector. In 2000 PSB launched a \$20 million Industry Productivity Fund (IPF) to enable companies from all industries to seek financial assistance to achieve significant gains in productivity.

When PSB was rebranded as Spring Singapore in 2001, the goal of constantly improving TFP remained. This was set out in the Standardisation Strategy 21, which set the long-term direction for standardisation to improve productivity and facilitate trade access to international markets. SMEs continued to receive the bulk of the attention, with such programmes as the Micro Loan Programme to help very small companies; the Corporate Advisor Programme to help fast-growing SMEs strengthen their business capabilities; and the SPRING Startup Enterprise Development Scheme (SEEDS).

¹⁰ For additional information, visit [online] <http://www.spring.gov.sg>.

Much attention has also been placed on capitalizing on the new opportunities afforded by the worldwide web. For example, EnterpriseOne which is a web portal to provide a comprehensive gateway for companies to access government information and advisory services, and the GeBIZ Mall to help SMEs market their goods and services directly to government agencies on the Government Electronic Business portal (GeBIZ)

Spring Singapore is also relentless in searching out “weak spots” in its mandate, and recently attention has focused on the retail sector, which is considered critical as Singapore swings into gearing up its tourism campaign (spearheaded by the Singapore Tourism Board - STB), and providing quality staff for the new jobs expected to be generated by the opening of the Integrated Resorts (IR). The National Retail Scholarships Programme is a joint-initiative by the Singapore Retailers Association (SRA), Singapore Workforce Development Agency (WDA) and SPRING Singapore to professionalise the retail industry. The annual scholarships aim to attract and groom retail leaders who will take the industry to greater heights. It is one of the first steps taken to catalyse the acceptance of the mindset that professional training is crucial to developing good retail managers. The scholarships programme addresses the talent crunch in the retail sector. Statistics show that close to two-thirds of the retail managers have no professional qualifications, and furthermore one in five will retire in the next five to ten years.

Annex 2

A. The instruments of success

The Singapore Government has been at the forefront of using attractive tax concessions and incentives for foreign investment from the early days of its industrialization and export drive. More recently these have become more sophisticated, wider in scope, and cater to a variety of businesses which include industries and services. In a designed approach to become a major financial and services centre in Asia, the government has crafted several new incentives for financial institutions, logistics companies and fund managers. It is also important to note that Singapore is a low tax jurisdiction with an extensive network of tax treaties and therefore enjoys a far greater level of foreign interest for tax planning and tax location purposes.

The variety of assistance and tax incentive schemes is vast and is now available to both foreign investors as well as local companies. The trend is foster a higher degree of local entrepreneurship where possible without discouraging foreign investment. This appendix can only highlight the main instruments that have been used and that are publicly announced. The more recent approach in fostering investment has been to craft a basket of incentives for a particular firm in a selected industry and to tailor the incentives to that particular client. So from industry selectivity it is now firm selectivity in targeted strategic industries or sectors.

The provision of an incentive depends largely on the amount of investment, the technical output, export potential, employment creation and overall support of the Singapore economy.

Some of the main instruments applied in Singapore:

Pioneer Status

This was used aggressively in the early days of the industrialization drive. Today it is given to companies that introduce high technology skills to the country. Examples of such companies include IT, engineering and technical services such as naval architecture and design, industrial designs, and the like. Pioneer status provides the following benefits:

1. Profits are exempted from corporate tax (currently at 20 percent) for a period of 10 to 15 years.
2. Dividends are taxed at 20 percent with a tax credit for any corporate tax levied on profits out of which dividends are paid. If there is a shortfall between the tax credit and charge on dividends, such shortfall is exempt from further taxation.

Development and Expansion Scheme

This scheme is for companies whose pioneer status has expired and which are engaged in upgrading or modernizing production capacity. If such investment has significant economic benefits to the rest of the economy, then the development and expansion scheme provides the following benefits:

1. Income from qualifying activities is taxed at not less than 10 percent (usually 13 percent) for a period of 10 years, which can be extended for a further period of 10 years.
2. Dividends are taxed at 20 percent with a tax credit being given for any corporate tax paid on the profits out of which dividends are paid. There is an exemption of tax on the shortfall between the tax credit and the tax on dividends if the shortfall is caused by tax free income from activities related to the development and expansion scheme.

Expansion Incentive

The expansion incentive is meant for companies to improve productivity by mechanization and automation. The scheme consists of tax exemption on all income which exceeds the level of income

earned prior to the expansion plan being implemented. Expansion incentive certificates are given to such companies including those that have pioneer status.

The benefits of the scheme are:

1. Exemption from tax of all income which exceeds the level of income earned prior to the expansion plan being implemented. This concession is available for 10 years, extendable for a further 10 for service companies. The relief is usually granted to companies incurring an expenditure of at least US \$ 5.7 million for the purchase of equipment used for the manufacture of ‘approved products’.
2. Dividends are taxed at 20 percent with a tax credit for any corporate tax levied on the profits out of which the dividends are paid. Companies having ‘expansion incentive certificates’ are exempt from taxation of the shortfall between the tax credit and the dividend tax.

Export Incentives

The export incentive scheme aims at improving export growth by providing the following benefits:

1. 90 percent of the “qualifying” export income is exempt from corporate tax, for a period of 5 to 10 years (which can be extended) for service companies and 3 to 15 years for manufacturing companies. “Qualifying” export income refers to any annual increase in export income.
2. Dividend benefits are similar to those given to companies in the expansion incentive scheme so long as they hold “export incentive certificates”.

Investment Allowance Incentive

This scheme provides companies with the benefit of being able to set off up to 50 percent of the cost of “qualifying capital expenditure” against profits. The capital expenditure can be on the purchase of plant, machinery and factory buildings (excluding land) for an “approved project” which involves research & development, specialized engineering or technical services, promotion of tourism (except hotels) or the manufacture of any product. This allowance is in addition to the annual depreciation of fixed assets set off against taxable profits. The scheme is, in effect, a form of double deduction against tax, and is granted as an alternative to pioneer status and export incentives.

Overseas Enterprise Incentives

This scheme benefits companies providing designated services to “approved” overseas projects and consists of:

1. Tax of a concessionary rate of 10 percent on “qualifying export services income” for an initial period of 10 years. The services must be rendered to non-Singapore residents or to companies which have no permanent establishment in Singapore. The company providing the service must be at least 50 percent owned by Singapore citizens or permanent residents and must be incorporated and resident in Singapore for tax purposes.
2. Dividend benefits are as before, with total exemption for any shortfall between the tax credit for corporate tax and the 20 percent tax on dividends for companies which have been granted “overseas enterprise incentives”.

Double Deduction for R&D Expenses

Some “qualifying” R&D expenses can be deducted twice from profits for corporate income tax purposes. This usually applies to computer software, agro-technology, IT industry, and medical research and laboratory testing. This benefit is geared towards supporting the activities being promoted by the National Research Foundation (NRF).

Regional/International Headquarters Award¹¹

This scheme is geared towards multinational corporations to encourage them to use Singapore as the base to conduct HQ management activities. It consists of a customized package of tax incentives or grants under the Regional Headquarters (RHQ) award or International Headquarters (IHQ) award to meet the needs of investors. The award offers a concessionary tax rate of 15 percent for 3 (+2) years on

¹¹ More details in Singapore Economic Development Board (EDB) [online] <http://www.sedb.gov.sg>.

the incremental qualifying income from abroad. The scheme is applicable to entities incorporated or registered in Singapore and which provide corporate support and headquarters-related services and business expertise on a regional or global basis. The entity should belong to a group that is well established in its respective business sector or industry and has a critical size in terms of equity, assets, employees and business share. It should also be the nerve centre in terms of organization reporting structure at senior management levels for its principal activities. The substantial headquarters activities in Singapore may include:

- Strategic business planning and development
- General management and administration
- Marketing control, planning and brand management
- Intellectual property management
- Corporate training and personnel management
- Research, development and test bedding of new concepts
- Shared services
- Economic or investment research and analysis
- Technical support services
- Sourcing, procurement and distribution
- Corporate finance advisory services

The personnel employed for headquarters operations should be based in Singapore.

Approved Royalties Incentive

This scheme provides for full or partial exemption on withholding tax for royalty payments or technical assistance fees payable to non-residents. This includes royalties, fees and contribution to R&D costs paid for the transfer of technology and know-how to Singapore. The technology or know-how must be more advanced than the prevailing industry average.

Innovation Commercialization Scheme

This scheme provides grants for co-funding of proof-of-concept projects such as prototyping related services, manpower, equipment, intellectual property and professional services. It is open to companies registered in Singapore and the project must lead to a prototype demonstrating proof-of-concept.

Innovation Development Scheme

This scheme provides grants to support innovation in products, processes and applications such as expenditure on manpower, equipment, intellectual property and professional services. It is open to companies registered in Singapore and the project must lead to the build-up of innovation capabilities.

Patent Application Fund Plus

This scheme provides grants to help defray the costs of patent application so as to encourage innovation and commercialization of inventions. The commercial benefits from inventions must accrue to Singapore and the inventions should not be receiving any other government aid.

Research Incentive Scheme for Companies

This scheme provides grants to offset partial costs resulting from R&D projects such as in manpower training, equipment investment, intellectual property management, and professional services. The projects must bring in new R&D capabilities and result in increased hiring and training of research scientists and engineers.

Venture Capital Fund Incentive

The scheme is geared towards providing approved venture capital (VC) funds partial or full exemption of corporate tax on income from divestment of shares, foreign dividends and foreign interest income. The scheme is designed to encourage venture capital activity in Singapore.

Startup Enterprise Development Scheme

This scheme provides a dollar for dollar matching investment by the government up to a maximum of US\$ 200,000 for start-ups involved in developing new or better products, processes or applications. The start-up has to be registered in Singapore for tax purposes and is not older than three years and carrying out its core activities in Singapore.

Annex 3

A. The new institutions

The National Research Foundation (NRF) and the rebranding of Singapore Inc¹²

The EDB and its cluster of fellow agencies have served as Singapore's efficient implementers of government policies for the past several decades. In the 21st century, the “nuts and bolts” industries, while continuing to be important, must be complemented by state-of-the-art research and design industries if Singapore is to continue to be competitive, and maintain its First World status. This requires a rethink of the public/private sector model, and the NRF, with its cluster of councils, institutes, and agencies, is the new nerve centre to accomplish this task.

Singapore is building a knowledge-based economy to meet the challenges of the new millennium. Knowledge, creativity and innovation will be key determinants of long-term competitiveness. The development of a highly educated and flexible workforce is therefore very important. Singapore is cultivating its human capital by developing strong industries with a high level of innovation and technology, and building a wide pool of skilled knowledge workers.

In 2000, the Singapore Government made a significant commitment to develop the Biomedical Sciences (BMS) sector as a new growth area. This covered the Pharmaceutical, Biotechnology and Medical Engineering & Technology (Medtech) industries. The vision was for Singapore to be a leading international biomedical sciences cluster advancing human health, through the pursuit of excellence in research and development, manufacturing and healthcare delivery. Singapore adopted an integrated strategy to build up this sector, involving the development of Human Capital, Intellectual Capital and Industrial Capital. By 2005, the BMS industry had grown to account for 5 percent of Singapore's GDP. This effort is spearheaded by the Economic Development Board's (EDB) BMS group; its investment arm, Bio*One Capital; and the Agency for Science, Technology and Research's (A*STAR) Biomedical Research Council (BMRC).

The national effort, based on the model perfected during the first decades of development in agencies such as the EDB, IE Singapore, and Spring (See Appendix 1), has been further refined with the setting up of the National Research Fund. Public sector and private sector cooperation is achieved through the establishment of a series of boards, steering committees, and executive committees, designed to facilitate the coordination of Singapore's drive to carve a niche for itself in the international research arena.

National Research Foundation (NRF)

The National Research Foundation was set up on 1 January 2006 as a department under the Prime Minister's Office. The terms of reference of the NRF are fourfold:

- To provide Secretariat support to the Research, Innovation and Enterprise Council (RIEC), chaired by the Prime Minister;
- To coordinate the research of different agencies within the larger national framework in order to provide a coherent strategic overview and direction;
- To develop policies and plans to implement the following five strategic thrusts for the national R&D agenda:
 - To intensify national R&D spending to achieve 3 percent of GDP by 2010
 - To identify and invest in strategic areas of R&D
 - To fund a balance of basic and applied research within strategic areas

¹² The main sources for this appendix are the National Research Foundation website (2008) [online] <<http://www.nrf.gov.sg>>, and the Infocomm Development Authority of Singapore (EDA) [online] <<http://www.ida.gov.sg>>

- To provide resources and support to encourage private sector R&D
- To strengthen linkages between public and private sector R&D
- To implement national research, innovation and enterprise strategies approved by the RIEC, and to allocate funding to programmes that meet the NRF strategic objectives.

The National Research Fund, which provides for the establishment of a Statutory Fund facilitating the financing of R & D projects on a sustained basis, was set up by an act of parliament in 2006 (National Research Fund Act 2006).

The Fund was set up in order to jump start the expansion of Singapore's national expenditure on R&D, which stood at roughly 2.15 percent of GDP in 2003, lagging behind other leading innovative countries such as Finland and Sweden which spend over 3 percent of their GDP on R&D. The focus will be on areas of economic importance where Singapore can be internationally competitive. This is in accordance with government thinking that Singapore needs to concentrate its resources around a small number of strategic areas to develop a critical mass of research capabilities. Singapore intends to deepen its capabilities in existing key clusters such as electronics, chemicals and marine engineering, and biomedical sciences, by continuing to invest in R&D and manpower development. The NRF has identified Environmental and Water Technologies (EWT) and Interactive and Digital Media (IDM) as two new growth areas for Singapore.

The Fund was created because within selected strategic areas, Singapore must be prepared to fund a broad spectrum of research, ranging from basic investigator-led research to applied and mission-oriented research. Encouraging more private sector R&D is a key priority, as companies are best placed to decide which areas of R&D to invest in, and to align R&D investments with commercial opportunities. Singapore's economic promotion agencies (such as EDB, IE Singapore) will therefore have a critical role to facilitate and catalyze private investments in research and innovation. Singapore will review incentive packages to better attract more global R&D centres and activities to Singapore.

To achieve the 3 percent R&D target by 2010, Singapore must leverage better on public sector funding to increase private sector research. The aim is to eventually have two-thirds of R&D, mainly on the Development side, performed by the private sector and one-third of R&D, primarily on the Research side, performed by the public sector agencies. EDB will play a critical role in rapidly catalyzing a research and innovation driven economy, and to draw in investment projects that will complement the transformation of the economy.

Singapore's institutions have to improve on their ability to commercialize their research results, and have closer collaboration with industry. Singapore will review how to strengthen the technology transfer framework, as well as how to reach out more effectively to local enterprises—for example, by promoting technology innovation in local enterprise through stronger co-funding frameworks between public and private sector. In particular, polytechnics, which have developed strong applied research and downstream capabilities and industry networks, will be encouraged to link up with industry associations to collaborate on R&D initiatives.

The National Research Foundation (NRF) is headed by a CEO functioning as the nation's Chief Scientific Officer, assisted by a Chief Operating Officer. The CEO reports to the NRF board. As a department under PMO, there is a supervising permanent secretary designated as PS (National R&D), PMO. The NRF facilitates the activities of two key institutions, the Research, Innovation and Enterprise Council (RIEC), and the Scientific Advisory Board (SAB).

In 2007, the NRF Board is a high-powered coordinating body. Members are appointed by the Prime Minister for three year terms. Dr Tony Tan, former Deputy Prime Minister, is Chairman of the NRF Board, with Lim Hng Kiang (Minister for Trade and Industry) and Tharman Shamugaratnam (Minister for Education and 2nd Minister for Finance) as deputy chairmen. Board members include an additional three ministers, five permanent secretaries, the heads of leading statutory boards, private sector CEOs, and heads of tertiary educational institutions.

As the secretariat to the RIEC, the NRF integrates the R&D of various agencies to provide a coherent strategic overview of R&D and R&D policies in Singapore. The NRF coordinates and evaluates project proposals, recommends appropriate funding, identifies key performance indicators and monitors the progress of approved projects. Inputs on the merits of projects are solicited from NRF's Scientific Advisory Board (SAB). Projects are submitted to NRF through the relevant government ministries and agencies. The NRF also looks at long-term technology, social and demographic trends and identifies areas of strategic importance to Singapore for R&D investment.

Research Innovation and Enterprise Council (RIEC) / Scientific Advisory Board (SAB)

The Research Innovation and Enterprise Council (RIEC) is chaired by the Prime Minister, Lee Hsien Loong, and meets annually. The Council's second meeting was held in March 2007. The RIEC advises the Singapore Cabinet on national research and innovation policies and strategies, and leads the national drive to promote research, innovation and enterprise, by encouraging new initiatives in knowledge creation in science and technology. Dr Tony Tan, Chairman of the NRF Board serves as the Deputy Chairman of the RIEC, and members include seven ministers, and senior board members from 3M, Dupont, Mitsui Chemicals, Novartis, DBS Group Holdings, and ExxonMobil, Siemens, and Venture Corp.

The Scientific Advisory Board (SAB), which held its second annual meeting in January 2007 highlights critical issues and emerging global trends in basic and investigator-led research where Singapore could fill a gap or meet a need. It also assists in identifying new areas of research where Singapore can reap the benefits of cutting edge science and build the foundation for enterprise and industry growth. SAB reviews proposals and plans prepared by the NRF, and assists the NRF on the management of R&D, including the allocation of funding and the assessment of research outcomes.

Members of the SAB are appointed by the chairman of the NRF Board for three-year terms. The SAB is co-chaired by two eminent scientists from Europe (Prof Ulrich Suter, ETH Zurich) and the US (Dr Curtis Carlson, SRI International), and comprises 13 other members. It is a multidisciplinary international board that specializes in broad areas of technology.

The NRF adopts both top down and bottom up approaches in driving national research and development. It has identified three areas for initial research: Environmental and Water Technologies; Interactive and Digital Media; and Biomedical Sciences. A high level ministerial steering committee and an executive committee have been formed to coordinate the development of each of these areas to generate maximum impact. NRF also encourages good ideas to surface through a bottom up approach for funding.

Environmental and Water Technologies (EWT)

Environmental and Water Technologies (EWT) are expected to become increasingly important issues internationally. Countries and cities are looking for solutions to their water management issues and shortages, as well as for environmentally sustainable solutions for waste treatment and disposal. The aim of the EWT Strategic Programme is to develop Singapore into a Global Hydro-hub by 2015 through a holistic approach involving industry and technology development, with R&D as the key driver. The EWT Steering Committee and Executive Committee have been established to provide leadership as well as coordinate the efforts of the various Ministries and agencies in this sector.

Interactive and Digital Media (IDM)

Interactive and Digital Media (IDM) has been identified as a new area for focused attention and development. The IDM sector is poised for rapid growth in Asia and the world, fuelled by technological advancements and adoption trends; lower entry barriers due to sunk costs of the dotcom era; and democratization of content creation. The aim of the IDM Strategic Programme is to develop this sector through leveraging on existing strengths, plugging existing strategic gaps and enhancing its potential through R&D. To give the sector stronger focus, leadership and coordination, the IDM Steering Committee and Executive Committee have been formed to coordinate the activities of the various Ministries and agencies in this sector.

Infocomm Development Authority (IDA)

The main government body responsible for the development of the Interactive and Digital sector is the IDA, the Infocomm Development Authority. IDA was formed on 1 December 1999 when the government merged the National Computer Board (NCB) and Telecommunication Authority of Singapore (TAS), as a result of a growing convergence of information technology and telephony. Prior to the merger, NCB, which was formed on 1 September 1981 under the auspices of the Ministry of Finance, one of the board's most crucial functions was to implement the computerization of the civil service. NCB also served as the central authority in promoting, implementing and co-ordinating information systems development work in government ministries. Telecommunication Authority of Singapore (TAS) acted as the national authority and to advise the Government on matters relating to information communications.

IDA's strategic goal is to cultivate a vibrant and competitive infocomm industry in Singapore—one that attracts foreign investment and sustains long-term GDP growth through innovative infocomm technology development, deployment and usage in Singapore—in order to enhance the global economic competitiveness of Singapore. IDA is the infocomm industry champion, the Government CIO (Chief Information Officer), and the national infocomm master-planner and developer.

Backed by its strong domain knowledge of the government sector and how infocomm technology can be applied to the vertical sectors of the economy, IDA is well placed to function as the infocomm technology industry champion. IDA's regulatory role works in tandem with its industry development arms to help infocomm companies roll out new technologies for widespread adoption in Singapore and beyond.

IDA also functions as the Government CIO for the public sector. In this capacity, it helps in the running of an effective and efficient government, which would boost Singapore's national competitiveness as a location of choice for foreign investors and businesses. As the Government CIO, the IDA is responsible not just for master-planning, but also for project-managing and implementing various infocomm systems and capabilities for the government. IDA's government-related knowledge, expertise with infocomm technologies, and track record in e-government projects makes it uniquely qualified in this role. As the infocomm master-planner and developer for Singapore, IDA provides the necessary infocomm infrastructure and technology standards, and promotes the adoption of infocomm technology as a key enabler to enhance Singapore's economic competitiveness as well as for innovation in key sectors.

Biomedical Sciences (BMS)

In the third target area, Biomedical Sciences, the NRF has a Steering Committee on Life Sciences, with the mandate to co-ordinate the activities of ministries such as MTI, MOE and MOH in R&D, industry development, healthcare and education to support the growth of the Life Sciences sector. The Steering Committee is also tasked with providing policy guidance in addressing health, ethical and legal concerns which may arise from biomedical research, healthcare and industry development. The chairman of the BMS steering committee is Dr Tony Tan, chairman of the NRF Board. Members include the Minister for Trade and Industry, the Minister for Education, the Minister for Health, the Minister for Community Development, Youth and Sports, and the Minister of State for Trade and Industry.

In keeping with its chosen organizing structure, the NRF also has a Biomedical Sciences Executive Committee (BMS Exco) which is tasked with identifying the current gaps in Singapore's Intellectual Capital, Human Capital and Infrastructure Capital (collectively the 3 Cs) for translational and clinical research. The Exco will also establish the framework for developing and strengthening the 3 Cs to support the translation of discoveries at the "bench" into clinically useful and commercially viable applications at the "bedside". BMS Exco is also tasked with evaluating and allocating appropriate resources, including funding from NRF, for the respective agencies and Ministries to implement and realize the changes needed. BMS Exco also oversees the implementation of multi-agency, inter-Ministry initiatives and programmes to support and enable biomedical research spanning basic to translational and clinical research. It reviews the progress and outcomes of initiatives and programmes supported by the BMS EXCO and institutes changes, where necessary, to ensure that goals are met.

The goal is to develop the Biomedical Sciences (BMS) cluster —comprising pharmaceuticals, medical technology, biotechnology and healthcare services - into a key pillar of the Singapore economy. But unlike the other two NRF target areas, BMS has a history —albeit a short one— in the Singapore scheme of things. From 2000, the EDB's BMS group and Bio*One Capital, as well as A*STAR's BMRC have worked in close partnership. The three groups adopt an integrated approach to develop Singapore's industrial, intellectual and human capital to support the BMS initiative. This integrated approach involves various initiatives such as supporting the industry, establishing the right infrastructure, providing venture capital support and strengthening manpower capabilities.

The EDB Biomedical Sciences Group (EDB BMSG) is responsible for the development of the Biomedical Sciences industry. The BMS Group works closely with A*STAR's Biomedical Research Council (BMRC), Bio*One Capital and other agencies to develop human, intellectual, and industrial capital in Singapore, in support of the Biomedical Sciences industry.

A*STAR is Singapore's lead agency for fostering world-class scientific research and talent for a knowledge-based Singapore. The agency actively nurtures public sector research and development in Biomedical Sciences, Physical Sciences and Engineering, with a particular focus on fields essential to Singapore's manufacturing industry and new growth industries. It oversees 12 research institutes and supports extramural research with the universities, hospital research centres and other local and international partners. At the heart of this knowledge intensive work is human capital. Top local and international scientific talent drive knowledge creation at A*STAR research institutes. The Agency also sends scholars for undergraduate, graduate and post-doctoral training in the best universities.

The Biomedical Research Council (BMRC) oversees the development of core research capabilities within A*STAR research units specializing in bioprocessing; chemical synthesis; genomics and proteomics; molecular and cell biology; bioengineering and nanotechnology and computational biology. Through competitive grants, the Council also supports research in the wider scientific community such as public universities and hospitals. As part of its efforts to advance human healthcare, BMRC actively promotes translational medicine and cross-disciplinary research. The Council also engages in human capital development in the biomedical sciences and promotes societal awareness of biomedical research through outreach programmes.

Bio*One Capital Pte Ltd is a leading, dedicated biomedical sciences investment management company in Asia with a worldwide presence. With funds of over USD 600 million, investments are focused on promising global biomedical companies where Bio*One Capital can play a value adding role in bridging and supporting companies' growth strategies in Asia through their operations in Singapore. Bio*One Capital offers a strong combination of financial, business, scientific and investment know-how to enhance the value of companies from intellectual property generating research, to clinical and product development, manufacturing and commercial activities. Through its extensive networks with global pharmaceutical, biotechnology, medical technology companies and venture capital corporations, Bio*One Capital proactively facilitates partnering and collaborative opportunities to help its portfolio companies grow into sustainable and successful ventures.

Critical to understanding Singapore's success, is grasping the manner in which Singapore pools resources and research to achieve concrete results. One example is the recent opening of the National RFID (Radio Frequency Identification) Centre, which is a collaboration between A*STAR, the Economic Development Board (EDB), Infocomm Development Authority (IDA) and SPRING Singapore. RFID is a new technology with a diverse range of applications in logistics, retail, healthcare, lifestyle, transport and security.

Annex 4

A. Insights into the bigger picture¹³

Two key institutions that underpin public/private cooperation in Singapore are first, the intricate and efficient tripartite model of labour relations which Singapore constituted early on in the 1960s, and which has been scrupulously maintained ever since. The second is the Singapore civil service, its organization and ethos, and its relationship with the private sector, and with the ruling political party.

Tripartite Formula

Singapore has since the 1960s worked hard to stay at the forefront of the world's most competitive economies. Today it is an open market economy with a global network. It has a highly efficient, flexible and qualified workforce. The tripartite cooperation among workers, labour unions and the government means domestic stability and peace, with little disruption over the last 30+ years. How does tripartism work in Singapore?¹⁴

Firstly, Singapore has created and cultivated the foundation for regular dialogues amongst workers, employers, and government. The most prominent is the National Wages Council (NWC), but other avenues are provided in statutory bodies, and in ad-hoc committees dealing with specific issues. Secondly, the union leadership, through the NTUC (National Trade Union Congress) has maintained the trust of the members. When difficult measures had to be adopted, workers had to be assured of fair play. So, when a company does well, workers would get their fair share. Thirdly, there must be trust and mutual respect among the tripartite partners. Key players must know how to work with one another.

The key body in this tripartite process is the National Wages Council (NWC). Members of the NWC represent an employer's group, an employee's group, and a government group. Chairman of the NWC 2007/2008 is the retired VC (Vice Chancellor) of the National University of Singapore (NUS), Prof. Lim Pin. The employers' group includes the heads of the Singapore Business Federation, the Singapore National Employers Federation, the Chinese Chamber of Commerce & Industry, the Singapore National Employers Federation, the Japanese Chamber of Commerce and Industry, the Singapore-German Chamber of Industry & Commerce, and the American Chamber of Commerce in Singapore.

The employees are represented by senior officers of the NTUC, the Amalgamated Union of Public Employees (AUPE), the United Workers of Electronic Industries, the Singapore Industrial & Services Employees' Union, and the Healthcare Services Employees' Union. Government is represented by the permanent secretaries of the PSD (Public Services Division), MTI (Ministry of Trade and Industry), MOM (Ministry of Manpower), the MD of EDB, and the Chief Executive of the Singapore Workforce Development Agency (WDA).

Singapore's tripartism rests on one fundamental principle, from which it never wavers —that wages should be determined by productivity. In their annual wage recommendations in May 2007, the NWC expressed concern over the slow pace at which companies are adopting flexible wage systems, which it views as the critical element in wage negotiations. According to labour chief Lim Swee Say, "... the question really is: How will this affect the medium-term competitiveness of business operations, and also how will this enhance the interest of the workers? That is why on the part of the labour movement, we feel it's important that we don't get carried away by all these very seductive measures, because any easy measure that is not the right measure will hurt us." The emphasis is therefore on

¹³ Various websites were visited in collecting information for this Appendix. These include the following: Singapore Government Online [online] <<http://www.gov.sg>>; Public Service for the 21st century (PS21) [online] <<http://www.ps21.gov.sg>>; Institute of Policy Development (IPS) [online] <<http://www.ipd.gov.sg>>.

¹⁴ Material for this section on Tripartitism in Singapore is taken from a speech By Mr Lim Boon Heng, Secretary-General, National Trades Union Congress, And Minister, Prime Minister's Office, at the Tripartite Industrial Relations Seminar, held in Singapore, 20 November 2006.

variable bonuses pegged to company performance, and for the civil service and holders of political office, the performance of the Singapore economy in general. No 5 percent growth, no bonus.

Singapore Civil Service

The Singapore Civil Service is the key to understanding Singapore's development trajectory. The Singapore Civil Service boasts roughly 64,000 members, including the staff of statutory boards. The brain centre of this entire organization is a small group of very elite civil servants who are chosen to serve in the Administrative Service and are known as Administrative Officers (AOs). This group of only 230 officers, aged between their late 20s and late 50s, undergo a rigorous selection and renewal process, with senior AOs retiring, and younger AOs being adopted into the service. There is a tremendous esprit d'corps amongst these officers, who have often known each other from their school days, and are generally government scholarship holders. The major issue is paying these elite officers a sufficiently attractive wage to continue in the service. Here the critical age is considered to be the late 20s, and early 30s, when the temptation to quit the government service for the private sector is highest. This "wage debate" was raised again this year, in the context of the million dollar salaries paid to ministers and senior civil servants. The issue is discussed in detail below.

The civil service in Singapore has a long tradition, dating back to the days of the British colonial administration, which ruled Singapore from its founding in 1819, to eventual self-administration in 1959. The system has continued to evolve until the present. Briefly, in 1855 the British set up the Civil Service Commission, on which Colonial Commissions would later be based. In 1947 the Public Services Salaries Commission of Malaya recommended the setting up of a Public Services Commission (PSC), and in 1949 the PSC was constituted to advise the British governor on matters of recruitment, appointment and promotion of civil servants. In 1956, the government issued the Statement of Policy - Malayanisation (Command Paper No. 65 of 1956), to speed up the pace of localising the public service. The exodus of British expatriate officers was accelerated after Singapore's self-government in 1959. Thus the search for talent, and the granting of scholarships was an early feature of the Singapore PSC

Over the years, awarding scholarships, picking the right people for the civil service, grooming and deploying them, and tracking their progress and performance became critical roles for the PSC. The PSC Scholarship became a household word in Singapore. In 1983 the Public Service Division was set up as part of the Ministry of Finance, (now part of the PMO). The PSC handed over personnel management of the civil service to the PSD. In 1990, two sub-Commissions were set up under the PSC, namely the Education Service Commission and the Police and Civil Defence Service Commission, to take charge of the personnel management of the larger number of teachers and uniformed staff from the Home Affairs Ministry respectively. In 1995 the centralised system was further devolved to effect a more responsive and effective personnel management system in the civil service.

Public Service Commission (PSC)¹⁵

The Singapore Constitution provides for the PSC to comprise a Chairman and not less than 5 and not more than 14 other Members. The President in consultation with the Prime Minister appoints each member. PSC members hold office for a 5-year term in the first instance, which can be renewed. To ensure an independent and neutral PSC, the Constitution disqualifies the following persons from appointment to the PSC: a public officer; an elected or nominated Member of Parliament; a member of any political association; a member of a trade union or any body or association affiliated to a trade union. Members appointed to the PSC are not allowed to hold any positions in the Public Service after their terms of office. The current PSC Chairman is Dr. Andrew Chew Guan Khuan, who has held the post since August 1998. Other members include retired civil servants, professionals, and academics.

The PSC Secretariat provides administrative support to the Commission and is a department within the Public Service Division, Prime Minister's Office. The PSC Secretariat is headed by the Secretary, whose responsibilities are defined under the Constitution as supporting the work of the

¹⁵ Information for this section is drawn from the Public Service Division homepage [online] <[http:// www.psd.gov.sg](http://www.psd.gov.sg)>.

Commission. He is a public officer appointed by the President upon advice of the Commission. The PSC Secretariat has three functional branches, viz. the Secretariat Branch, Selection & Development Branch and Policy & Corporate Communications Branch.

The PSC also has a number of non-statutory functions, which include the selecting and managing of PSC scholars. This is the most important aspect of civil service renewal. The award of PSC scholarships aims to attract and groom talent for the Singapore Civil Service. The PSC Secretariat supports the Commission in its role to identify and nurture the best and brightest as potential leaders of the Civil Service. Recipients of PSC and also President's scholarships, are carefully tracked, and nurtured within the civil service. The PSC also considers the suitability of candidates for appointment as Chief Executive Officers of Statutory Boards, where the jobs are at an equivalent grade to senior management ranks in the Civil Service (i.e. Superscale D or Grade 7 and above). The PSC also considers the suitability of the Chief Executive Officers for promotion to Superscale Grade D or Grade 7 and above.

Public Service for the 21st Century (PS21)

In May 1995, the Singapore Public Service embarked on a movement called "Public Service for the 21st Century" or "PS21" for short. PS21 has two basic objectives. First, to nurture an attitude of service excellence in meeting the needs of the public with high standards of quality, courtesy and responsiveness, and second, to foster an environment which induces and welcomes continuous changes for greater efficiency and effectiveness, by employing modern management tools and techniques. While the first objective is more tangible, the second is far more fundamental. It underlines the core purpose of PS21 -- to prepare the Singapore Public Service for the future by anticipating, welcoming and executing change.

While the theme of PS21 revolves around change, it is not about affecting change to a specific final state. Rather, it is accepting the need for change as a permanent state. And PS21 involves transforming mindsets and creating different organisational culture and norms. In 2005, three new Public Service Committees were set up to drive PS21 in the Public Service. The committees focus on three key aspects: developing people; building systems; and inculcating a citizen and customer-centric mindset.

In typical Singapore fashion, the entire Administrative Service has been galvanized to inculcate PS21 into the civil service. All Permanent Secretaries, Chief Executive Officers of major Statutory Boards, and key Service Chiefs are directly involved in either one of the committees. This way, they drive PS21 at the Public Service level. A PS21 EXCO, comprising the chairmen of the Public Service Committees, has also been set up to coordinate the work of the three committees. Existing PS21-related committees are either subsumed under the three main committees, or remain independent yet mindful of keeping the relevant Public Service Committees in the loop about their progress. This new structure aims to re-invigorate PS21, by engaging significantly more Public Service leaders in taking ownership of driving PS21 in the Public Service.

Civil Service Pay Scales

The Singapore civil service and political office holders are some of the highest paid in the world. After 2007 salary revisions, the President gets an annual salary of USD 2.1 million, while the Prime Minister receives USD 2.07 million. After revision the two benchmark grades of MR4 for ministers and senior permanent secretaries is USD 1.1 million, while the entry into Superscale salaries for Administrative Officers at SR9 is USD 256,000.¹⁶ Rank and file entrants' pay into the civil service is also monitored and benchmarked to graduates' joining the private sector. For example, in 2007, starting pay for honours graduates into the civil service went up 10 percent to USD 1733 per month.

There is also an elaborate system of performance-based bonuses for both political office bearers and senior civil servants. For example, a larger proportion of ministers' pay will be linked to performance. Almost half their salaries will be made up of a variable portion based on two factors: performance on the job, and how well the economy does. If the economy grows by 5 percent, ministers

¹⁶ See The Straits Times, 10 April 2007.

will be eligible for a three months bonus. If growth reaches 10 percent, they will receive a maximum of 8 months bonus. If, however, the economy grows by 2 percent or less, there will be no bonus.

The recent debate (April/May 2007) on ministerial and civil servant pay increases yielded some interesting insights into the ethos and motivation for Singapore's unique public sector/political leadership linkages. The pay scales of ministers and senior civil servants are linked, and both are derived from benchmarking against private sector remuneration schemes. This raises the awareness of the interdependency amongst senior bureaucrats, political office bearers, and the elite of the private sector. This in turn facilitates the "Singapore Inc" ethos.

Civil service salaries are closely monitored to ensure that government remuneration remains competitive with private sector pay scales. Although this functions across the board in the 64,000 strong civil service, the most important debates revolve around the remuneration of the civil service elite, the Administrative Officers. These 230 elite officers range in age from the late 20s to the late 50s, and their number is fixed. There is thus a constant renewal, where older officers retire from the admin service, while younger, high fliers (usually President and PSC scholarship holders), join the admin service.

Officers in the Admin Service are generalists who are expected to be knowledgeable about policy issues and can offer a range of solutions to a problem and the trade-offs involved. Together with the permanent secretaries of ministries they are involved in crafting policies – anything from free trade agreements to projecting housing and education trends. They are also responsible for rolling out policies once these are approved by the Cabinet. Beyond performance, these officers also need to show potential to eventually become at least a deputy secretary in a ministry, or a chief executive officer of a statutory board to stay in the service.



UNITED NATIONS

Serie

ECLAC

comercio internacional

Issues published

A complete list as well as pdf files are available at

www.eclac.org/publicaciones

99. The Singapore success story: public-private alliance for investment attraction, innovation and export development, Sree Kumar and Sharon Siddique (LC/L.3150-P), Sales No. E.09.II.G.123 (US\$10), March 2010.
98. Trends in United States: trade with Latin America and the Caribbean and trade policy towards the region, Craig VanGrasstek (LC/L.3151-P), Sales No. E.09.II.G.124 (US\$10), December 2009.
97. Latin American and Asia Pacific trade and investment relations at a time of international financial crisis Mikio Kuwayama, José Durán and Marcelo LaFleur, (LC/3133-P), Sales No. E.09.II.G.108 (US\$10), November 2009.
96. Public-private partnerships for innovation and export development: the Irish model of development David O'Donovan (LC/3128-P), Sales No. E.09.II.G.104 (US\$10), November 2009.
95. Alianza público-privada. Fomento de la exportación e innovación en PYMES: el caso de España, Antonio Bonet Madurga (LC/L.3127-P), Sales No S.09.II.G.103 (US\$10), November 2009.
94. Brazil's emergence as the regional export leader in services: A case of specialization in business services, Lia Valls Pereira, Ricardo Sennes, Nanno Mulder, (LC/L.3124-P), Sales No S.09.II.G.102 (US\$10), octubre 2009.
93. Crisis internacional y oportunidades para la cooperación regional, (LC/L.3113-P), Sales No. S.09.II.G.91 (US\$ 10), October 2009.
92. Quality of Latin American and Caribbean Industrialization and Integration into the Global Economy, Mikio Kuwayama, (LC/L.3107-P), Sales No. S.09.II.G.88 (US\$10), September 2009.
91. Weak links between exports and economic growth in Latin America and the Caribbean, Nanno Mulder, (LC/ 3015-P), Sales N° S.09.II.G.25 (US\$ 10), February 2009.
90. Trato especial y diferenciado y comercio de servicios, Sebastián Sáez, (LC/L.2992-P), Sales No S.08.II.G.98 (US\$10), December 2008.
89. Oportunidades de una economía pequeña y remota en el mundo global: Uruguay como exportador de servicios, Marcel Vaillant, (LC/L.2978-P), Sales No S.08.II.G.87 (US\$ 10), November 2008.

- Readers wishing to obtain the listed issues can do so by writing to: Distribution Unit, ECLAC, Casilla 179-D, Santiago, Chile, Fax (562) 210 2069, E-mail: publications@cepal.org.

Name:
Activity:
Address:
Postal code, city, country:.....
Tel.:..... Fax: E.mail: