



BUILDING HUMAN CAPITAL

LESSONS FROM COUNTRY EXPERIENCES

SINGAPORE

ABOUT THE AUTHOR

SHAHID YUSUF is Chief Economist of The Growth Dialogue at the George Washington University, School of Business in Washington, DC; a Non-Resident fellow of the Center for Global Development in Washington, DC; and Adjunct Professor at the Paul H. Nitze School of Advanced International Studies, Johns Hopkins University.

He holds a Ph.D. in Economics from Harvard University, and a BA in Economics from Cambridge University. Prior to joining the Growth Dialogue, Dr. Yusuf was on the staff of the World Bank. During his 35-year tenure at the World Bank, Dr. Yusuf was the team leader for the World Bank-Japan project on East Asia's Future Economy from 2000–2009. He was the Director of the *World Development Report 1999/2000, Entering the 21st Century*. Prior to that, he was Economic Adviser to the Senior Vice President and Chief Economist (1997–98), Lead Economist for the East Africa Department (1995–97) and Lead Economist for the China and Mongolia Department (1989–1993).

Dr. Yusuf has written extensively on development issues, with a special focus on East Asia and has also published widely in various academic journals. He has authored or edited more than 25 books and monographs on industrial and urban development, innovation systems and tertiary education, many of which have been translated into a number of different languages. His publications include: *China and the Global Economy*; *Development Economics through the Decades*; *Under New Ownership*; and *Privatizing China's State-owned Enterprises* (co-authored with Dwight Perkins and Kaoru Nabeshima); His current research is on technology development and on the role of global value chains. Dr. Yusuf lives in the Washington.



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How Singapore Does It

Shahid Yusuf
Growth Dialogue
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Building Human Capital

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1818 H Street NW

Washington DC 20433

Telephone: 202-473-1000

Internet: www.worldbank.org

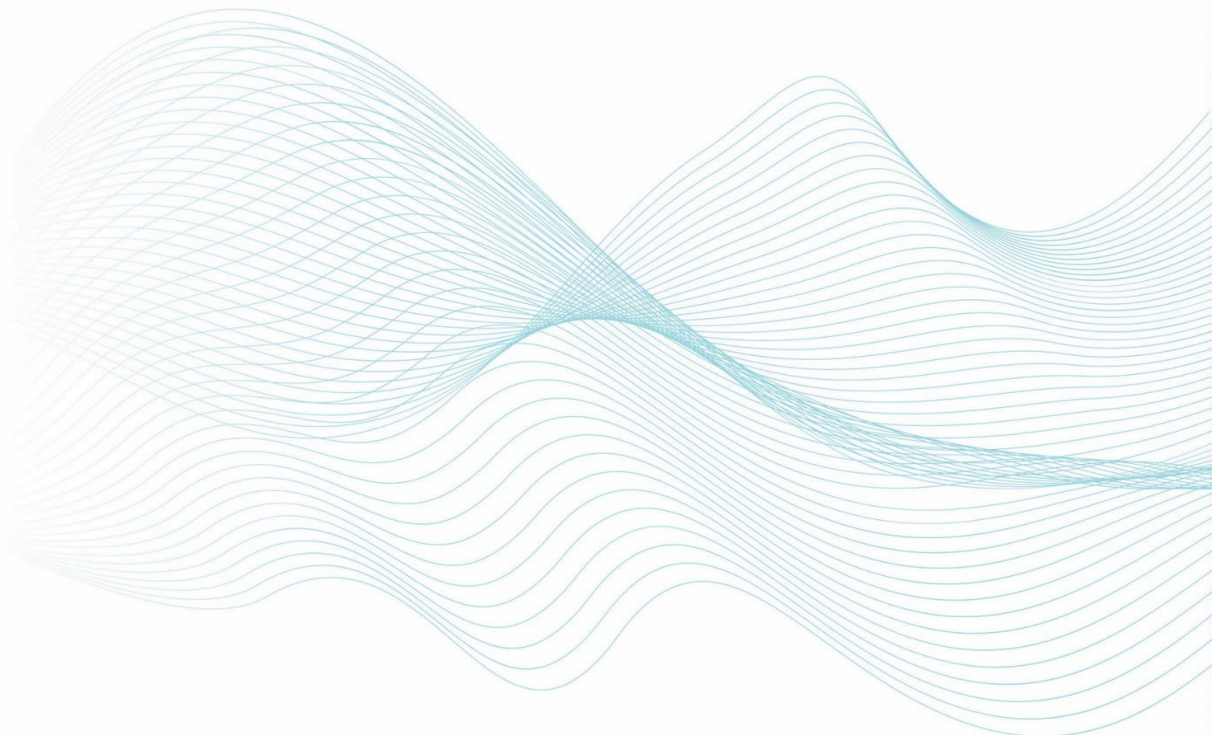
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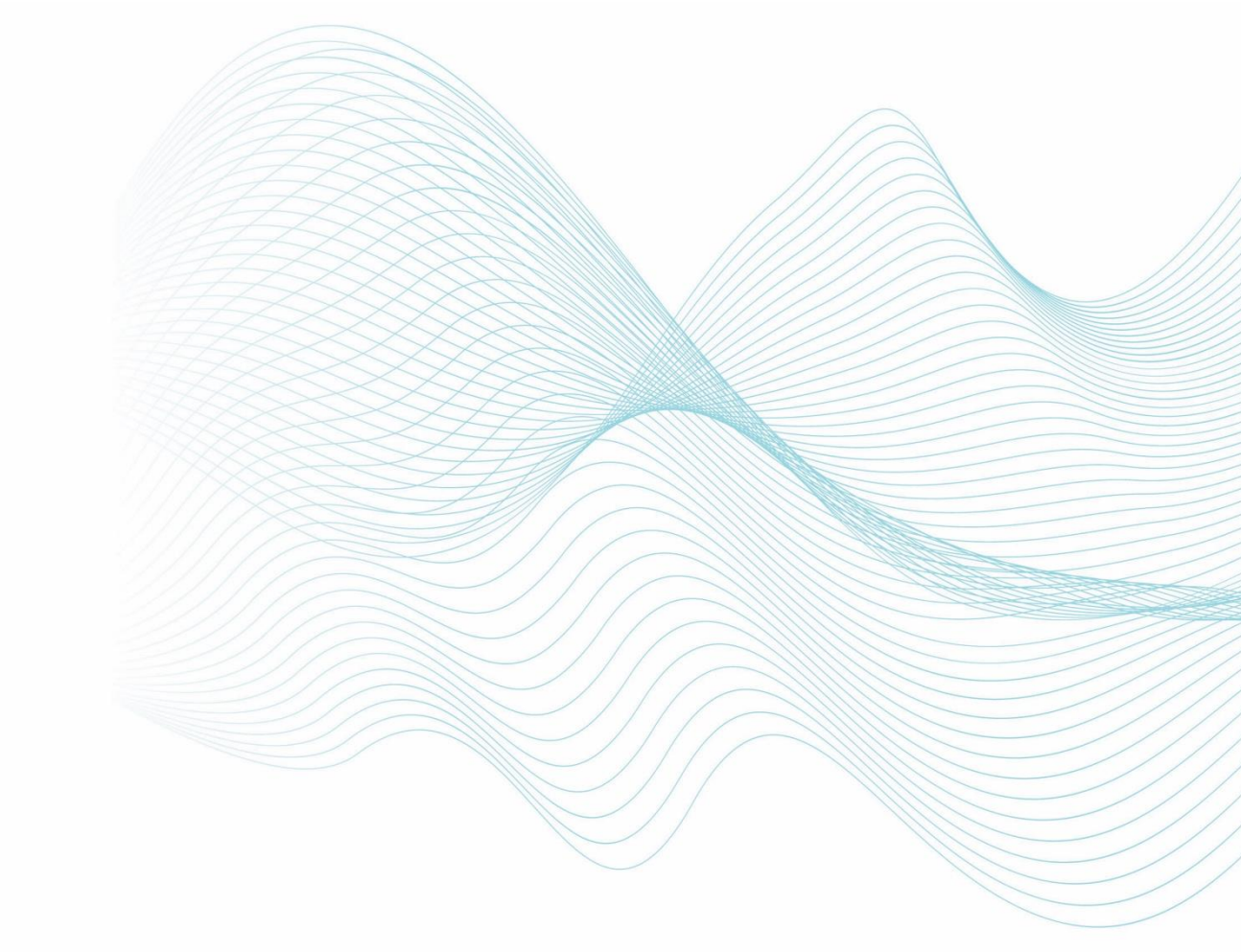


Abstract

Singapore has demonstrated that investing in human capital can have a high payoff and that nothing is impossible. Its example should inspire others to redouble their own efforts, not to replicate the model in its entirety necessarily but to take full advantage of the various lessons that can be learned from the arc of its successful development strategy.

Many elements of the Singapore model are today considered conventional wisdom. While many developing countries have attempted to pursue similar strategies, few have fully succeeded in achieving similar results. This case study examines the policies, programs and processes Singapore has pursued from 1960 to the present to pull ahead of other economies.

It identifies several factors that have undergirded Singapore's successful implementation of education and health strategies. First, collecting and analyzing data to harness them for policymaking purposes. Second, able and incorruptible leaders who set high standards for themselves and others and have lived up to these standards. Third, Singapore created a meritocratic and largely non-politicized bureaucracy that could strategize, make far-sighted policies, and implement them in a coordinated way. Coordinated implementation is key to delivering results. Fourth, national leadership maintained harmony in a multi-ethnic society and proactively defused tensions. Fifth, Singapore attracted immigrants—both skilled and unskilled. Sixth, leadership mobilized domestic resources which played a critical role in financing infrastructure, housing, and other vital investments. Lastly, Singapore has never been comfortable to rest on its laurels and has always been open to ideas, eager to learn, ready to innovate, and to leverage new technologies.



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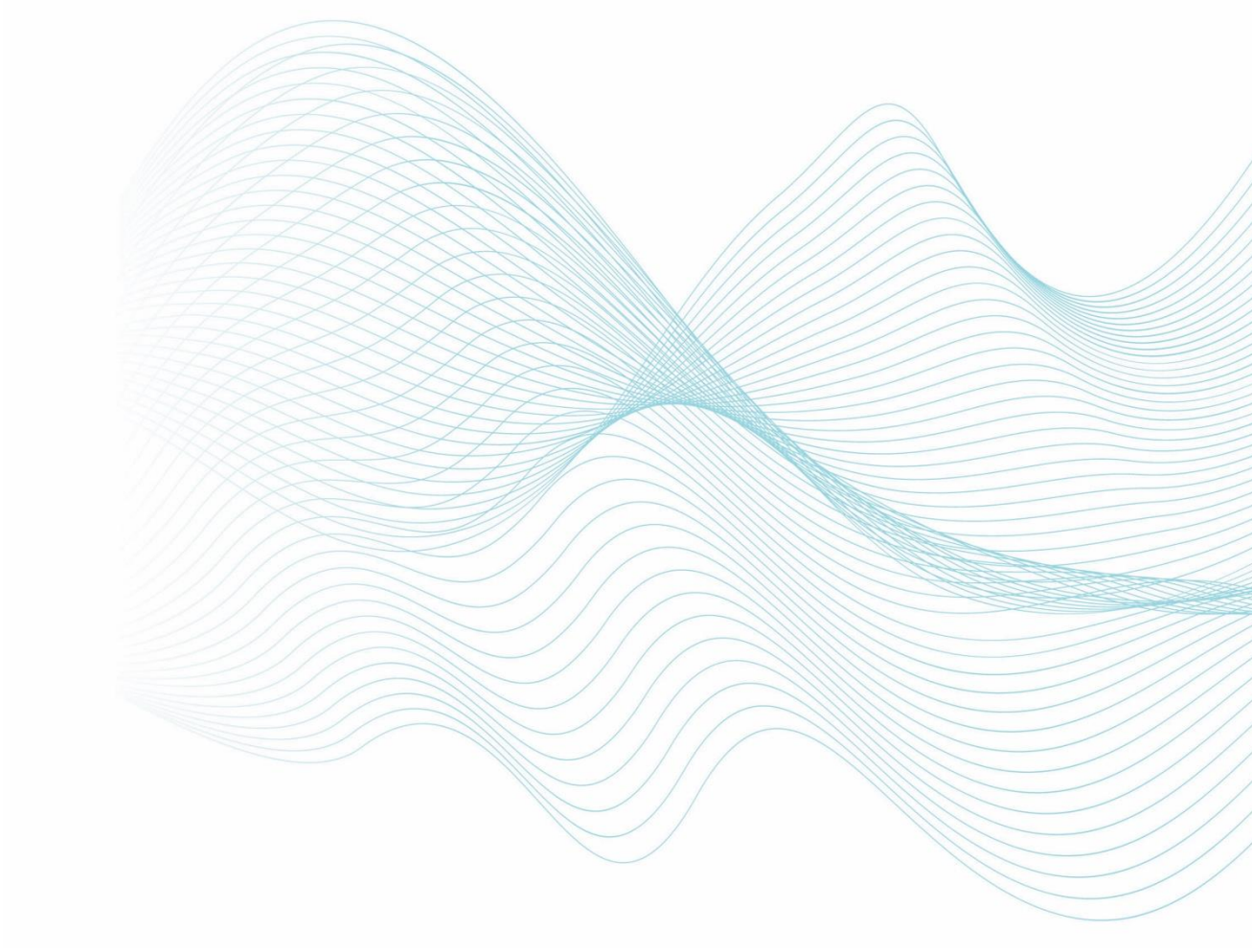
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1. Introduction

Governments around the world vary in their ability to develop the human capital of their workforce and foster its productivity. Some governments are consistently among the world's top performers on standardized tests of learning achievement and in delivering quality healthcare, while others struggle to provide even the most basic services.

The Human Capital Index is a cross-country metric measuring the human capital that a child born today can expect to attain by her 18th birthday, given the risks of poor health and poor education prevailing in her country. The HCI brings together measures of different dimensions of human capital: health (child survival, stunting, and adult survival rates) and quantity and quality of schooling (expected years of school and international test scores). Using estimates of the economic returns to education and health, the components are combined into an index that captures the expected productivity of a child born today as a future worker, relative to a benchmark of complete education and full health. The index reveals that a child in one country might grow up to be only 29 percent as productive as she could be. That same child, in another country with stronger systems for health and education outcomes, could reach 88 percent of her potential productivity.

There is growing global evidence that outcomes have improved in many countries. Yet less evidence is available on the policies, programs and processes that these countries have used to achieve their results. Having information on *how* these countries have invested in their people and on what has and has not been effective would be useful for other governments as they strive to improve their own outcomes.

The goal of this case study is to assess the human capital development trajectory of Singapore – a country that was at the top of the global 2018 HCI rankings. It examines the factors that drove that trajectory and draws lessons from this experience. The study explores not only *how* improvements were achieved but also *what else* could be done in the future to sustain and amplify the government's investments in its people.

Analytical Framework

This case study uses a whole-of-government lens to look at issues of human capital investment and accumulation. This approach is based on three inter-related principles:

- *Continuity* – sustaining effort across political cycles
- *Coordination* – ensuring that sectoral programs and agencies work together
- *Evidence* – expanding and using the evidence base to improve and update human capital strategies.

These basic elements not only cut across politics, institutions, and silos of knowledge but often characterize the investments being made by the best performing countries throughout

a person's life. Some of these countries have achieved complete economic and social transformations in just a few decades. While the study focuses on cross-sectoral efforts, it also examines the key sectoral initiatives that laid the necessary foundations on which other sectors have been able to build.

2. Singapore's Economic Performance and the Role Played by Human Capital

Among East Asia's four charter "tiger economies,"¹ Singapore is indisputably the leader,² a distinction supported by key economic indices and rankings.³ Its per capita GDP increases have outpaced those of the other tigers since 1975 (Figure 1), and Singapore scores highly on indices of competitiveness (third in the International Institute of Management Development's 2018 World Competitiveness Rankings and second in the World Economic Forum's (WEF) 2018 Global Competitiveness Ranking).⁴ It was also deemed to be the fifth most innovative economy in the world in the Global Innovation Index 2018.⁵ In 2016, Singapore was in fifth place on the Observatory of Economic Complexity's (OEC) Economic Complexity Index.⁶ It has the second most enabling business environment according to the World Bank's Doing Business Index 2019⁷ and had the highest Networked Readiness scores in the 2016 Global Information Technology Report.⁸ To top it all, Singapore heads the World Bank's newly devised Human Capital Index.⁹ Singapore has pulled ahead of other East Asian economies because it has never rested on its economic laurels.

Since becoming an independent republic in August 1965, Singapore has steadily improved its economic performance by dint of far-sighted policymaking and rigorous implementation as well as by anticipating challenges on many fronts.¹⁰ To paraphrase Lee Kuan Yew, the man who made Singapore what it is today, "Through unrelenting effort, the impossible can be made to happen."

¹ The four tigers who launched the "East Asian Miracle" between 1965 and 1990 were Hong Kong, the Republic of Korea, Singapore, and Taiwan.

² Kumar and Siddique (2010), <https://repositorio.cepal.org/handle/11362/4443>, and Calder (2016).

³ Deciphering Singapore's economic prowess, its political system and the attributes of its leaders is an active academic cottage industry. The author's keyword searches uncovered 45,300 articles published between 1993 and 2016 with 200 academic articles on the Singapore model alone.

⁴ <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>; <https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2018/>

⁵ <https://www.globalinnovationindex.org/gii-2018-report#>

⁶ <https://atlas.media.mit.edu/en/rankings/country/eci/>

⁷ http://www.worldbank.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2019-report_web-version.pdf

⁸ <http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/>

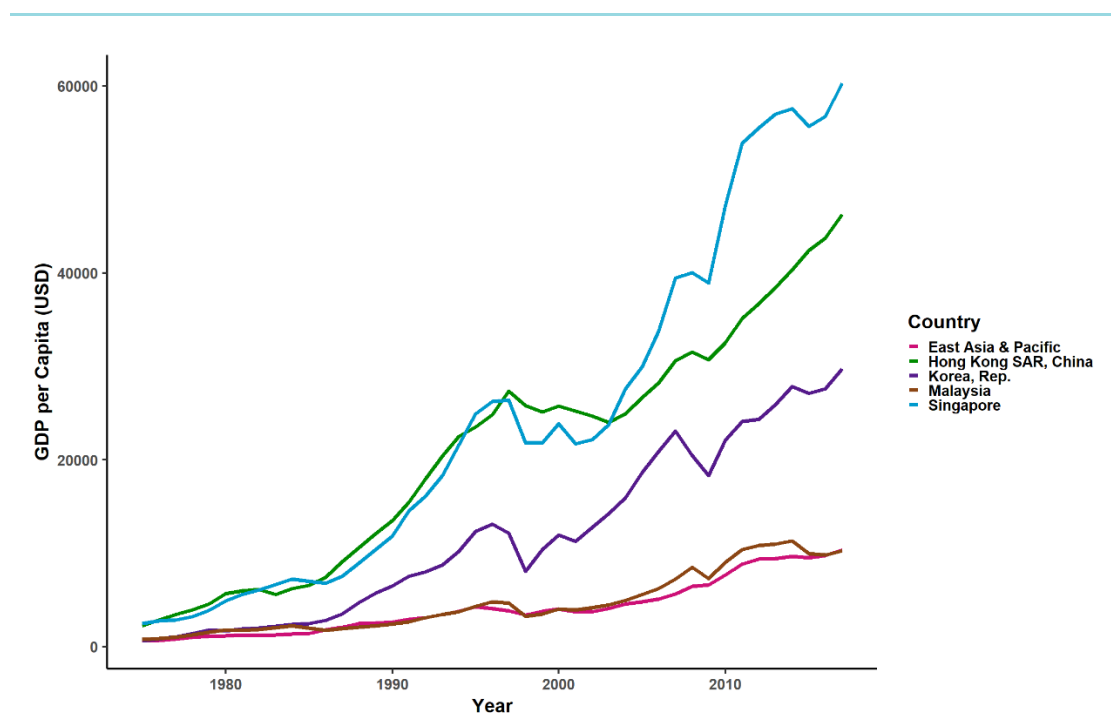
⁹ However, Singapore does not ace each and every index. Unlike the Nordics (Booth, 2016) who are at the upper end of the Happiness Index, Singapore was ranked 34th in 2018, a big drop from 26th place in the previous year. It has the highest incidence of mental depression in South East Asia (<https://www.propertysoil.com/2018/03/27/singapore-not-happiest-country/>). A recent book (Mau, 2019) cautions against relying excessively on the scores, rankings, and ratings that continue to proliferate. They redefine what is deemed desirable and can undermine substantive policymaking.

¹⁰ Neo and Chen (2007) encapsulated Singapore's model of dynamic governance as one requiring those at the helm to "think ahead, think again and think across."

Singapore

On Independence Day, Singapore's prospects looked bleak. The leadership of the People's Action Party was challenged on the political front by the communist party (*Barisan Socialis*) and had to cope with ethnic tensions,¹¹ while on the economic front unemployment was high. There were unsettling developments around the region as well. In China, Mao Zedong was preparing to launch a Cultural Revolution, and in nearby Vietnam, a long running conflict was intensifying. Shortly thereafter in 1967, Singapore's economic and security problems were compounded by the British government's decision to withdraw its forces from the country and to shutter its naval and air bases.¹²

Figure 1 : Per Capita GDP of East Asian Economies: 1975–2017



Source: World Development Indicators

Under Lee's leadership, the Government of Singapore adopted a fast-paced industrialization strategy to create employment for a workforce with few skills and to generate export earnings. As in the other "tigers," the strategy began with the manufacture of garments, footwear, toys, wigs, and light consumer electronics. However, the government had set its sights on achieving rapid industrial diversification and deepening with the aim of ascending the income ladder. To realize this objective, the small island economy needed to attract investment from multinational corporations (MNCs) and integrate local industries into their emerging global value chains. Singapore's strategic location on the busy Straits of Malacca passageway was already an asset, but the government set about improving the odds in the country's favor. It did so by developing industrial land supported by state-of-the-art hard

¹¹ <https://medium.com/@patcheezie/the-myth-of-multiculturalism-in-singapore-d0712706db4>

¹² Calder (2016).

and soft infrastructure, by reforming laws to end endemic labor strife, and most importantly, by assembling an efficient, merit-based bureaucracy to plan and implement policies and to do so in a manner that minimized transaction costs for businesses. Realizing that the quality of the workforce would be one of the key attractions for MNCs, from an early stage the government began to lay the groundwork for a training system that would teach the skills needed to underpin a modern industrial economy.

In the 1960s, Singapore's per capita GDP was \$500,¹³ and its literacy and morbidity rates were on par with other lower middle-income economies at that time. Arguably the government's single most transformative achievement was to build the stock of human capital, enabling Singapore to leapfrog from the production of low-value items in the early 1960s to the assembly of hard disk drives and the manufacture of precision machine tools in less than two decades.¹⁴ Workers with the quality of skills needed to assimilate new technologies, bring in waves of foreign direct investment (FDI),¹⁵ and sustain relatively inclusive growth were developed by single-mindedly focusing on schooling, on inculcating technical skills, and on eradicating endemic diseases. And this was achieved while keeping public spending on education and healthcare as a share of GDP below 6 percent in the 20 years between 1965 and 1985 and below 8 percent into the first decade of the 21st century.¹⁶

3. Driving Economic Growth in a Resource-poor Economy

The quality of human capital, managerial skills and intangible capital have all had a strong bearing on Singapore's economic performance.¹⁷ They have served as the focus of development policy and the country has been remarkably successful in continually upgrading its workforce to accommodate the demand for an increasingly sophisticated mix of skills. The Nobel Prize-winning American economist Gary Becker¹⁸ maintained that we are living in an "age of human capital in the sense that human capital is by far the most important form of capital in modern economies. The economic successes of individuals, and also of whole economies, depends on how extensively and effectively people invest in themselves."

¹³ However, in some respects, Singapore was better positioned than most other countries in the region to forge ahead. Only Japan and Hong Kong had higher per capita incomes, and Singapore was an important Crown Colony with a major port that had spawned shipbuilding, banking, insurance activities, and some basic light manufacturing.

¹⁴ Maitra (2016) <https://journals.sagepub.com/doi/10.1177/0972150915619819> and <https://www.oecd.org/dev/asia-pacific/Singapore.pdf>. Recent economic statistics can be found in the SingStat Yearbook https://www.singstat.gov.sg/-/media/files/publications/reference/yearbook_2017/yos2017.pdf.

¹⁵ In addition to foreign capital, Singapore also benefitted from an influx of foreign workers who brought with them the skills that Singapore lacked.

¹⁶ This is well below the 5 percent rate of countries in the UNDP's very high human development category. As of 2013, World Bank data showed expenditures falling below 3 percent. <http://hdr.undp.org/en/content/expenditure-education-public-gdp>; <https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?locations=SG>

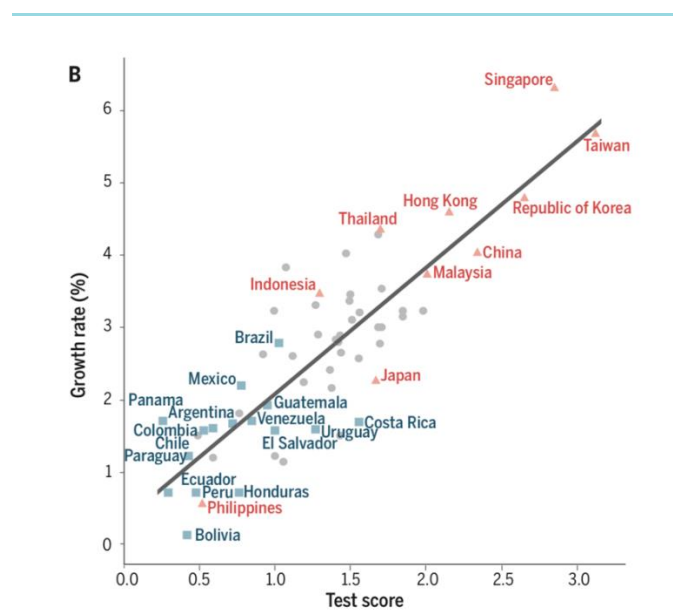
¹⁷ Jorgenson and Vu (2018), Vu (2018), and Nomura and Amano (2012).

¹⁸ http://media.hoover.org/sites/default/files/documents/0817928928_3.pdf

Capitalizing Learning

Several studies have shown that it is not school attainment (years of schooling) that contributes the most to individual productivity and GDP growth but how much learning is achieved, which is proxied by the science and math test scores of graduates. While years of schooling are weakly correlated with growth, knowledge capital, which captures learning, is strongly related to growth both in terms of magnitude and significance. And the capability of teachers and instructors strongly determines how much learning is imparted.¹⁹ That knowledge capital is a driver of growth is convincingly illustrated in Figure 2, which compares the performance of East Asian countries with Latin American countries between 1960 and 2000 using math and science test scores as an explanatory variable. Singapore leads with other East Asian economies clustered nearby, while the other countries are bunched in the lower left-hand side of the chart.²⁰ High-quality literacy and numeracy skills acquired through schooling pay off over an individual's entire working life and facilitates their acquisition of new skills that sustain or enhance their productivity.²¹ Moreover, as Heckman (2006) pointed out, “early mastery of a range of cognitive, social, and emotional competencies makes learning at later ages more efficient and therefore easier and more likely to continue.”

Figure 2: Knowledge Capital and GDP Growth: Comparing East Asia with LAC 1960–2000



Source: Hanushek and Woessmann (2016)

¹⁹ Hanushek et al (2018) and Chetty et al (2012 and 2014) found that the cognitive skill of teachers makes a lasting imprint on the fortunes of students later in life whether this is manifested by their progression to the tertiary level, by whether they bear children out of wedlock in teenage years, or by their lifetime earnings.

²⁰ Hanushek (2015). The embodied learning matters far more than the years of schooling—see Pritchett (2013 and 2018) and World Bank (2018).

²¹ The 2011–2012 PIAAC survey empirically demonstrated how superior cognitive skills increase lifetime earnings (Hanushek et al, 2015).

Managerial skills are as important as technical skills and the skills needed on the shop floor. Bloom et al (2017) have estimated that as much as 30 percent of the differences in productivity among countries and firms within a country can be explained by the practices followed by management, which are engendered by the training that they received and what they have learned from experience. According to the authors' measurements, about a quarter of the differences in productivity between American and European firms are because American firms are better managed than their European counterparts. The authors also concluded that MNCs generally have superior managerial capabilities than export-oriented firms. Thus, managers in Singapore have benefitted not only from the training that they received but also from skills transferred by MNCs, and they have further honed these skills by focusing their efforts on external markets.²²

Cognitive and non-cognitive skills influence economic performance through the formation of intangible capital. This can happen through investment in scientific research as well as in non-scientific R&D that enlarges the fund of scientific knowledge. It can also happen through changes in how organizations work that increase workers' productivity, and it can happen through the tacit knowledge of workers that improves their performance on the job.²³ Superstar firms are increasingly those that have been able to harness and commercialize digital technologies by investing in intangible, cognitive, non-routine analytical skills.²⁴ As the grip of digital technologies tightens, intangible capital is becoming the backbone of advanced economies, and investments in these skills are approaching the level of investments in tangible assets.²⁵ As noted by Brynjolfsson et al (2018), digital technologies are creating entirely new asset classes and are presenting entrepreneurs with opportunities to deploy labor and capital in novel ways, creating intangibles that could in time result in a productivity J Curve – an initial decline followed by an increase.²⁶

Capitalizing Health

A healthy population is the necessary precondition for building knowledge capital. This was highlighted decades ago by Becker and American health economist Michael Grossman among others.²⁷ Starting from early childhood and continuing through adulthood, poor health due to insufficient and/or unbalanced nutrition, unsanitary living conditions, exposure to infectious diseases, and limited access to preventive medicine and general

²² Bloom and van Reenan (2008).

²³ Corrado et al (2012), van Ark and Hulten (2007), Corrado et al (2006), Hulten and Hao (2012), and Chun et al (2015).

²⁴ Ayyagari et al (2018)

²⁵ "Intangibles generally play an increasing role in investment. This is largely a consequence of the prominent role that digitization, information and communication technology play in what is often called the third industrial revolution...Once the fixed costs of IT hardware have been paid, human capital and intellectual property gain importance relative to physical capital." (Constancio et al, 2017). See also Haskel and Westlake (2017).

²⁶ Productivity "initially dips while the investment rate in unmeasured capital is larger than the investment rate in other types of capital, then rises as growing intangible stocks begin to affect measured production," hence the trajectory that follows a J curve.

²⁷ Becker's contribution to the role of health in the building of human capital is reviewed by Soares (2014).

medical care negatively affects infant mortality, morbidity, and height, and most critically, an individual's capacity to learn and be productive.²⁸

Although causation is difficult to establish, health variables such as infant mortality, life expectancy, and prevalence of malaria are correlated with GDP.²⁹ Exposure to malaria, particularly in tropical countries, leads to higher morbidity and mortality rates. It is also linked with lower per capita GDP and greater prevalence of poverty.³⁰ This is connected with the state of the living environment in both urban and rural areas that a host of authors have identified as being responsible for the persistence of infectious diseases.³¹ Nutrition and nurturing during early childhood appears to be a determinant of cognitive skills, scholastic performance, and earnings later in life.³² Using data from 21 OECD countries, Madsen (2012) found that a healthier, longer lived population is likely to acquire and benefit from education and to be more innovative, thus promoting growth.³³ Furthermore, healthier workers are more robust mentally and physically, can work more productively, tend to earn higher wages, are less likely to be absent because of an illness, and, when longer life years are spent in good health, the time that they spend participating in the workforce can be extended.³⁴ Thus, focusing on healthcare has direct and indirect consequences for the macroeconomy by way of fiscal sustainability, the accumulation of human capital, labor force participation, work effort, and income inequality.

4. The Making of a World Class Schooling System

After independence, Singapore inherited a mix of schools balkanized along ethnic lines. English, Chinese, Malay, and Tamil schools each had their own language of instruction and curriculum.³⁵ During colonial times, English language schools were favored by the administration and provided the local population with an avenue for upward mobility, but the majority of students attended schools in which English was not the language of instruction. The first order of business for the newly created state was to integrate Singapore's schools into a unified system and, in the interests of the country's future outward-oriented development strategy, to expand the use of English as the medium of instruction so that the

²⁸ Kim (2018).

²⁹ Causation tends to be bidirectional, making it difficult to isolate the degree to which health drives growth. The complementarity between health and education introduces an additional complication as the Preston Curve can also be explained by reference to education. An educated population is more likely to be health conscious, to adopt healthy lifestyles, and to take advantage of primary healthcare. How health influences growth also depends on what proxies are used. For example, whether the independent variable is morbidity or mortality has consequences for the results. For a review of empirical findings and some of the issues that are encountered in econometrically pinning down the relationship, see Bloom et al (2018b).

³⁰ Orem et al (2012) and Gallup and Sachs (2001).

³¹ Zivin and Neidell (2013)

³² The literature survey by Bleakley (2010) covers most of the bases.

³³ By increasing aggregate savings, longer life spans can lower the rate of interest and thereby support investment in innovative projects arising from R&D (Prettner, 2013).

³⁴ Bloom, D. et al (2018a); Bloom, D. E. et al (2004); Coile et al (2016); <https://www.wsj.com/articles/healthy-workers-are-more-productive-study-finds-1502219651>; however, also see the mixed results reported by Jones et al (2018)

³⁵ Goh and Gopinathan (2008) and Foo Seong (2008) in Lee et al (2008). Koh (2010) in Nakamura (2010). Postlethwaite and Thomas. (1980).

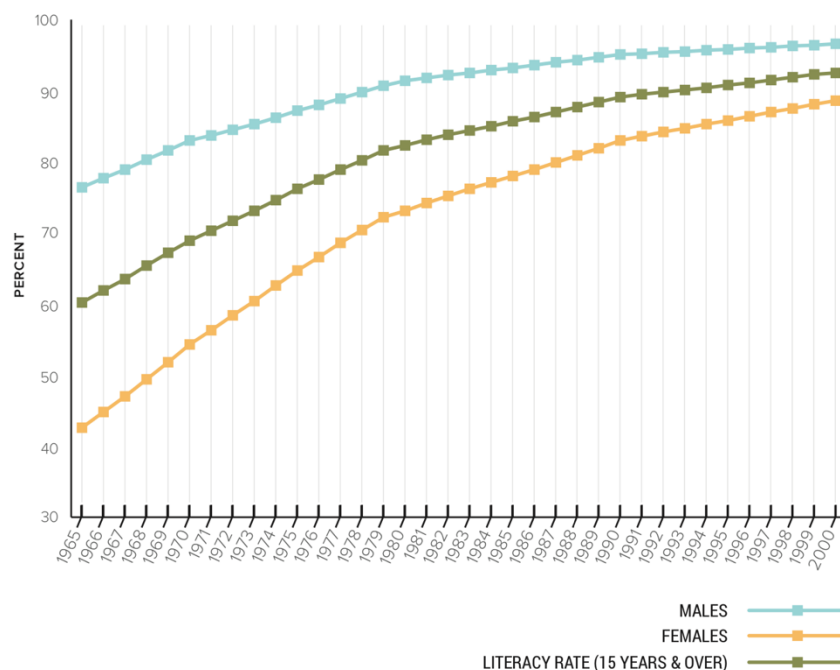
future workforce could communicate with foreign corporations. Figure 3 presents a timeline of the measures introduced in pursuit of these goals and other significant developments between 1965 and 2015. Figure 4 tracks gains in literacy for those over the age of 15, while Figure 5 shows the years of schooling attained by those over the age of 25.

Figure 3: Singapore Education System Timeline 1965–2015

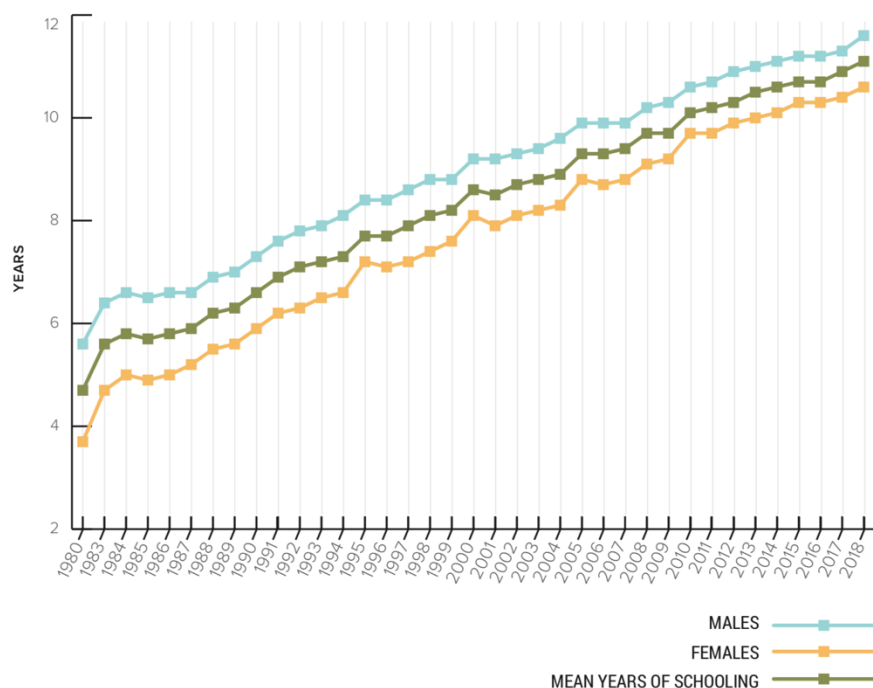
1960–1970 Survival-driven phase	1970–1980 Efficiency-driven phase	1980–1990 Ability-driven phase	1990–2000 Thinking Schools, Learning Nation	2000–2010 Teach Less, Learn More
<p>1960 Bilingualism</p> <p>1965 Universal Primary Education</p> <p>1965–1970 Enrollment in secondary schools almost doubled</p>	<p>1970 Universal Secondary Education</p> <p>Vocational and Industrial Training Board (VITB)</p> <p>1976 Technical Education</p> <p>1979 Introduction of streaming</p>	<p>1987 English taught as a first language in Singapore schools</p>	<p>1995/1999 Trends in International Mathematics and Science Study (TIMSS)</p> <p>1997 Launch of master plan for IT in education</p> <p>By 2000 Curriculum content cut by 30 percent</p>	<p>2002 Integrated Programme</p> <p>2003 Innovation and Enterprise</p>

Source: <https://www.straitstimes.com/singapore/education/the-education-system-over-the-years>

Figure 4: Literacy Rates for Singapore 1960–2016, Total, Male, and Female



Source: Statistics Singapore <https://www.tablebuilder.singstat.gov.sg/publicfacing/displayChart.action>

Figure 5: Mean Years of Schooling, Total and by Gender, 1980–2016

Source: Statistics Singapore <https://www.tablebuilder.singstat.gov.sg/publicfacing/displayChart.action>

Round One of Education Reform

The first Five Year Plan (FYP, 1961–1965) initiated the process of integration by permitting education in all four languages but requiring all students to acquire proficiency in English as a second language.³⁶ A common syllabus was introduced in all schools.³⁷ Six years of primary schooling became universal, and, in order to accommodate the student population, the government began a massive school construction program. As teachers with the requisite language and other skills were scarce, it also began to intensively recruit and train teachers, with trainees spending the mornings learning and the evenings teaching classes that were run in two shifts each day because of space constraints. At the end of six years, primary school students had to pass the Primary School Leaving Exam (PSLE), which determined whether they could continue on to general secondary school (or enroll in a vocational training program) and how they would be streamed subsequently.³⁸ During the 1960s and well into

³⁶ Although Malay remains the national language, official business was conducted in English, which was the medium of instruction at the University of Singapore (Malaya). The focus on English aroused concern, especially among the Chinese population, who feared that cultural values would be sacrificed if the young drifted away from their mother tongue. To allay these fears, bilingual education was sustained, which did give rise to problems as some students found it harder to follow instruction and material in a non-native language. Ng (2014); Gopinathan et al (1998).

³⁷ Students in four different language streams received textbooks loaned to them free of charge by the government.

³⁸ Starting in the latter part of the 1970s, students were divided into three streams according to their demonstrated cognitive ability and bilingual skills.

the 1970s, the government's objectives were focused on equipping students with skills which were relevant to industrialization.

This first round of schooling reforms was accompanied by the creation of a Technical Education Department (TED) in the Ministry of Education (MOE) to enlarge the supply of basic industrial skills. TED established a dozen vocational schools to inculcate the kind of expertise that was in demand from the factory sector. Once demand shifted to higher order skills in the 1970s, vocational training evolved in step. Vocational schools were converted into industrial training centers complemented by an additional six training centers created by the Economic Development Board (EDB) plus others that were set up in cooperation with MNCs, all aimed at meeting emerging industrial needs. Persuading students and their parents that vocational training offered a good career prospect for those who were not academically inclined was an uphill battle. However, the government persisted, steadily raised the caliber of teachers and facilities, and channeled trainees into good jobs.

Given the limited resources available to the government to staff and manage schools during this first decade, it was inevitable that learning outcomes fell short of expectations. A large minority of students were unable to master two languages. Literacy scores were low, the dropout rate was excessive, too few students went on to secondary school, and teacher morale was in the doldrums. Because by the mid-1970s, Singapore was setting its sights on advanced manufacturing that would increase the value added domestically, the government took steps to remedy the problem.

Round Two

In 1979, then-Deputy PM Goh Keng Swee issued a report³⁹ that initiated a second round of reforms (the New Education System) to improve education quality, enhance bilingual capabilities, and foster science and engineering skills so that the economy could transition to the next stage of industrialization in a cost-effective way, which had been an overriding concern of the government from the very outset.

The objective of the reforms triggered by the Goh Report, which continued throughout the 1980s, focused on improving school management, pedagogical practices (rote learning), the knowledge content imparted by the curriculum, teacher training, high drop-out rates,⁴⁰ the assessment of performance, and the oversight provided by the MOE. Henceforth, a more rigorous approach was taken in selecting school principals who were now guided by a comprehensive Principal's Handbook and required to submit periodic reports on the performance of the teachers and the school and to propose desirable changes that could be incorporated into the newly introduced School Rolling Plan. A calibrated strategy of

³⁹ The Government of Singapore (1979).

⁴⁰ To minimize dropout rates, primary school streaming was introduced in 1979 beginning with the 1979 Primary 3 cohort. Students were then channeled into Normal, Extended, and Monolingual streams in their upper primary years based on their performance in English Language, Mother Tongue Language, and Math. From 1981 onwards, three courses, namely the Express Course, the Normal (Academic) course, and the Normal (Technical) Course, were offered at the secondary level to cater to the different abilities and learning pace of students based on their PSLE performance.

decentralization increased the autonomy of school principals, and schools were allowed some leeway to experiment but were also held accountable for their performance.

In order to enable the MOE to monitor the performance of schools and cater to the needs of the industry, a Systems Branch was added to its Planning and Review Division to gather and process information (including on manpower requirements), assist with planning, and implement programs to improve how schools functioned. Also, the MOE established the Curriculum Development Institute of Singapore (CDIS) to bring what was taught in schools in line with Singapore's longer-term industrial ambitions. The CDIS also developed print and audio-visual material to assist teachers and to standardize the quality of the instruction, especially in the teaching of science and mathematics.

Through this multi-pronged approach, the MOE sought to challenge school administrators to deliver better results. Principals and faculty members were provided with greater support by way of teaching material and a repertoire of tools to engage students with differing capabilities⁴¹, and the MOE installed an information-gathering mechanism that helped school administrators to assess the strengths and weaknesses of their own institution and to track student performance (using a Pupil Data Bank) and enabled the MOE to keep closer tabs on how individual schools were doing. Self-assessment by schools was combined with an external validation exercise conducted every four to five years by independent evaluators who spent time in each school and carefully scrutinized its operations and outcomes.

Recruiting teachers from the cream of the secondary school graduates and then training them to the highest standards became a priority. To this end, the National Institute of Education (an autonomous institute of Nanyang Technological University) was established in 1991 by merging the Institute of Education (previously the Teachers' Training College) and the College of Physical Education to strengthen the quality of teaching excellence through pre-service training, in-service upgrading, and professional development. In order to attract students from the top third of the class, the pay scales of teachers were made comparable to those of engineers and lawyers. Teachers are highly regarded in Singapore and are trained to 21st century standards.⁴²

Industrial imperatives were not neglected by the reform. The MOE's Technical Education Department (TED) was superseded by a statutory Industrial Training Board in 1973, and this in turn was folded into a Vocational and Industrial Training Board (VITB) in 1979. The VITB was then replaced by the Institute of Technical Education (ITE) in 1992.⁴³ The purpose of these institutions was to further strengthen the quality and increase the relevance of the

⁴¹ https://www.aps.sg/files/principia/principia_newsletter_-_v10.pdf

⁴² Each teacher is entitled to 100 hours of fully subsidized training annually and is eligible for professional development leave to augment his or her skills.

⁴³ The ITE became the principal provider of career technical education in Singapore at the technician or semi-professional level and the principal authority for national occupational skills certification and standards (<https://www.ite.edu.sg/wps/portal/aboutite/>).

vocational training provided in Singapore and to back this up with appropriate certification linked to nationwide standards.⁴⁴ As with schools, success hinged on recruiting qualified individuals to become teachers and putting them through the necessary training regimen. Vocational training institutes were an alternative channel for those students who found general secondary education a less appropriate route. They also allowed adults to acquire a higher certification in their current profession or learn new skills. Each year, around 50,000 workers receive vocational training.

Part of the funding used to ensure that the Singapore education system could produce the skills demanded by employers came from the Skills Development Fund (SDF) disbursed by the Economic Development Board (EDB). The introduction of polytechnics, some of which have benefitted from foreign funding and MNC participation, took skill development up an additional notch by familiarizing students with technologies that companies were beginning to adopt, and graduates who satisfied their requirements received a diploma. Vocational training costs a third more per capita than general education, but the long process of its development has increased the employability of a sizable segment of the workforce.

Round Three

A sharp economic downturn in the mid-1980s convinced the authorities that further tweaking of the education system was needed to prepare Singapore's workforce for a changing industrial landscape that would increasingly be dominated by tradable and non-tradable services. A government study "The Singapore Economy: New Directions"⁴⁵ called for the pursuit of excellence, and, in anticipation of the changing demands on the workforce, tasked schools not just with imparting knowledge but also with equipping students to think critically, be creative, and fully exploit digital technologies. The new paradigm that emerged in the latter part of the 1990s following the issuance of the report "Thinking Schools Learning Nation,"⁴⁶ was of a system geared to ability and the capacity of people to learn throughout their working lives. In short, the watchword for the education system had become quality, with teachers taking the lead in encouraging students to be more creative, to work in teams, to gather and process information, and to be more entrepreneurial.

Raising the educational achievement and improving the quality of education made it possible for Singapore to make the transition from labor-intensive industrialization to a more technology-intensive strategy and then to a growth strategy that relies on tradable services and complex manufacturing activities operating in parallel.⁴⁷ Closer to the present day,

⁴⁴ The institutes offered training in artisanal skills (such as bricklaying), in commercial skills (such as bookkeeping), and in other skills such as bus driving, nursing, cosmetology, and cooking.

⁴⁵ <http://eresources.nlb.gov.sg/printheritage/detail/d08447b5-ce22-4de2-9d6c-89cd9cb95074.aspx>

⁴⁶ Government of Singapore (1997).

⁴⁷ The transition to a technology and knowledge-intensive economy was facilitated by immigration that supplemented home-grown skills and made up for deficiencies in specialized fields. Singapore has also relied on immigrants to meet the demand for many unskilled and semi-skilled jobs in factories and in the services sector. As of 2018, of Singapore's total population of 5.64 million, 3.47 million were citizens, 0.52 million were permanent residents, and 1.64 million were non-residents. <https://www.singstat.gov.sg/-/media/files/publications/population/population2018.pdf>

policymakers have come to recognize the importance of post-secondary education and encouraged the expansion of Singapore's tertiary-level institutions (the ITE, polytechnics, universities, and satellites of leading foreign universities and business schools) to accommodate the increasing number of graduates⁴⁸ who want to earn higher degrees that will be needed to find well-paid jobs as automation and the use of artificial intelligence spreads and eliminates a host of mid-range white collar, clerical and administrative occupations.

Financing Education

The country's budgetary outlay on education was high during the 1970s—over 40 percent—when Singapore was building the necessary hard infrastructure and recruiting and training the teaching workforce. Once the country was over the hump, budgetary expenditure gradually tapered down to between 17% and 22% (see Figure 6). Public expenditure on education rose from 2 percent to 3 percent of GDP in the 1960s and 1970s to over 4 percent in the 1980s before settling into the 3 or more percent range since, which is roughly in line with the average for East Asia. Singapore's investment was lower than Korea's but somewhat higher than Hong Kong's, with all three achieving broadly comparable results over the long run (Figure 7). Moreover, by keeping a tight rein on fiscal expenditures, Singapore has maintained direct tax rates that are significantly lower than the OECD average and have helped to attract FDI (Figure 8). In all three economies, household spending on private tutoring and other education-related expenses have been high. In Singapore, the average household spent \$71,000 on primary through tertiary schooling according to the HSBC Bank's Value of Education Report.⁴⁹ An earlier report by the World Bank estimated that private outlay on education in Singapore amounted to 1.2 percent of GDP.⁵⁰ Every Singaporean child between the ages of 7 and 16 has an Edusave account into which the government pays \$200 annually so long as the child is enrolled in a fulltime program school, vocational, or Special Education program. This money is designed to defray household expenses on schooling. Each child can also have a Post-Secondary Education Account for post-secondary education, and the government will match any payments made into this account up to a certain limit till the child is 18.⁵¹ Any funds in this account that are not used to cover tertiary training are transferred into the individual's Central Provident Fund (CPF) account—Singapore's mandatory social security savings scheme. In addition, there are awards and scholarships for meritorious performance.

The Central Provident Fund (CPF) is the lynchpin of the government's housing, retirement, education, and healthcare programs. Each individual and his/her employer make monthly contributions to the CPF that are distributed among three accounts owned by the individual:

⁴⁸ Singapore also hosts thousands of foreign students and is becoming a regional education hub.

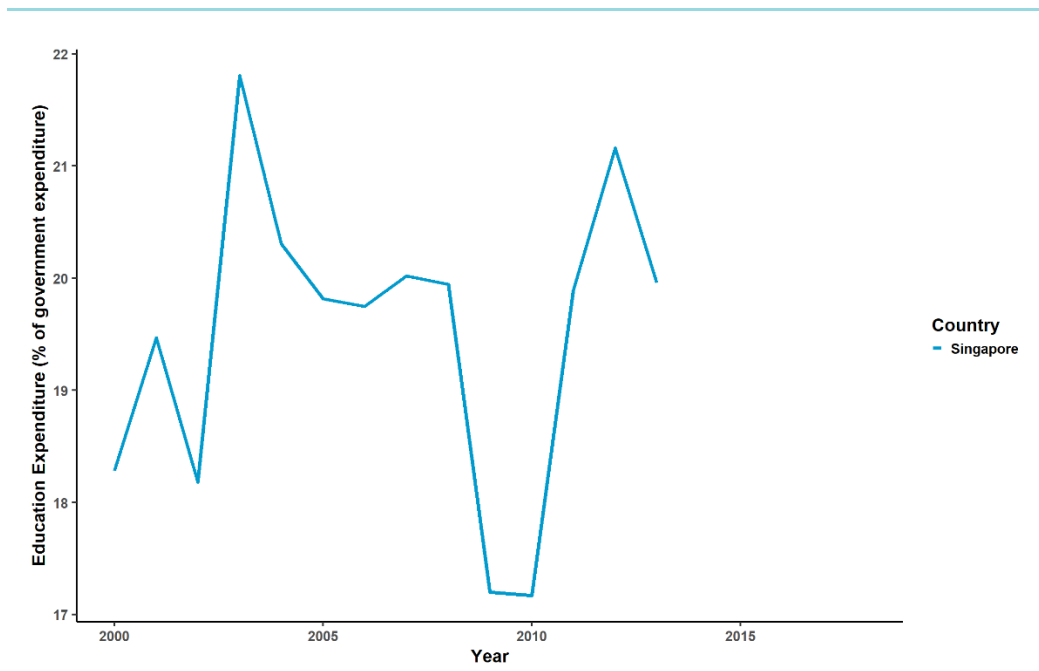
⁴⁹ HSBC (2018). <https://www.straitstimes.com/singapore/spore-parents-pump-96k-into-kids-education>: <https://www.us.hsbc.com/value-of-education/>

⁵⁰ World Bank (2013).

⁵¹ The individual needs to have first set up a Child Development Account and not already met the matching limit before the unspent amount is transferred to the Post-Secondary Education Account (PSEA).

(i) an ordinary account for housing and retirement purposes; (ii) a special account that is primarily for retirement; and (iii) a Medisave account that is used to cover medical expenses. The government supplements the contributions of low-income earners through a Workfare scheme and adds to the Medi-savings of senior citizens. Thanks to the savings accumulated via the CPF, public housing is affordable and accommodates 80 percent of the population,⁵² with each household having a 99-year lease (virtually all land is owned by the government) on a tangible economic asset.

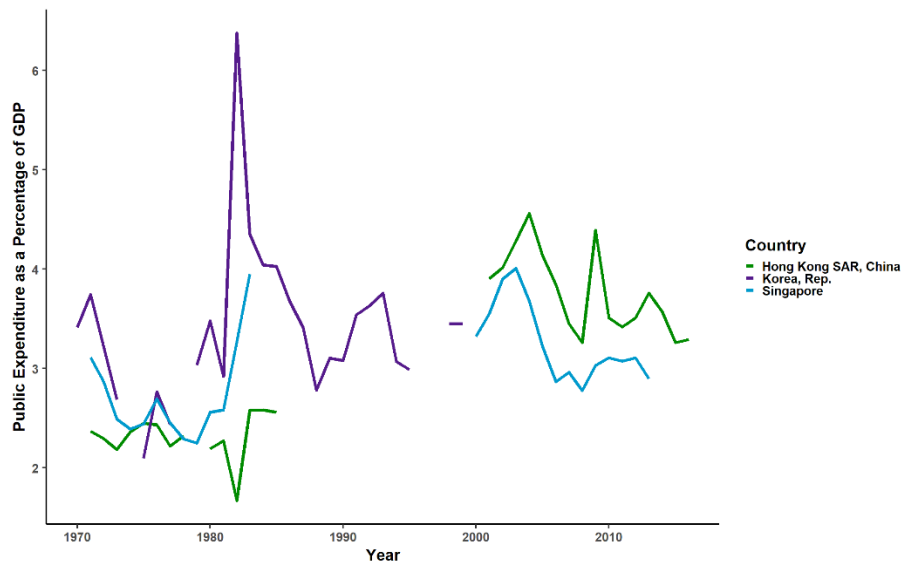
Figure 6: Public Expenditure on Education as a Percentage of the Government Budget 1970–2014



Source: World Development Indicators

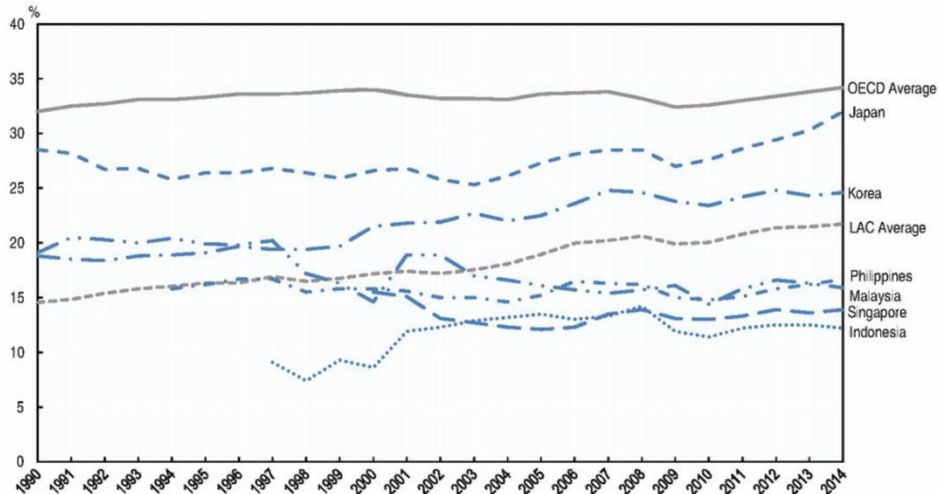
⁵²The British colonial administration began building public housing in the 1920s, but, as of 1959, such housing was available to only 9 percent of the population. Construction accelerated following the creation of the Housing Development Board in 1960. The Land Acquisition Act of 1965 eased constraints on building activities.

Figure 7: Public Expenditure as a Percentage of GDP, 1970–2016



Source: World Development Indicators

Figure 8: Tax/GDP ratios 1990–2014



Source: https://read.oecd-ilibrary.org/taxation/revenue-statistics-in-asian-countries-2016_9789264266483-en#page16

As always, policymakers in Singapore closely observe and internalize global trends. They are keenly aware that global competition is mounting. Because intangible capital and innovation will be the principal determinants of future productivity gains, the quality of human resources, the excellence of Singapore’s researchers, and the capabilities of its managers—of public agencies, businesses and schools—will determine whether Singapore can remain at

the forefront of the former tiger economies and Asia's emerging economies. Its small size and administrative strengths make Singapore agile, but being small also means that the margin of error is much reduced. A misstep can have serious long-run consequences.

5. Making Human Capital Healthy

When Singapore commenced its economic ascent in the mid-1960s, it faced a host of epidemic diseases common to countries in the tropical zone as a hot and humid climate with abundant rainfall is ideal for the propagation of most pathogens.⁵³ Infectious diseases such as malaria, dengue, cholera, and viral hepatitis were endemic as were others such as tuberculosis (TB) and sexually transmitted diseases (STDs).⁵⁴ The government put a high priority on bringing these diseases under control and expanding access to clinics and hospitals along with other policies aimed at improving the quality of the workforce, attracting FDI, and creating a competitive base of export-oriented industries.

Controlling Disease and Mitigating Effects of Heat

As part of the government's public health campaign to check infectious diseases, starting in 1966, the government pursued vector control, inoculation and other measures. Reducing pools of brackish water that are the breeding grounds of the anopheles' mosquito was a first step in combatting the incidence of malaria. Moving people out of *kampongs* and Chinatown's slums and into high rises with modern sanitation curbed water borne diseases such as cholera and typhoid.⁵⁵ The Destruction of Disease Bearing Insects Act of 1968⁵⁶ permitted inspectors to enter homes to search for and remove items (such as flower pots and roof gutters) that could collect water and attract dengue-causing *Aedes* mosquitos that prefer urban surroundings and deposit eggs in fresh water. Households that were found to have containers harboring larvae on their premises could be fined. The effort to control dengue fever spanned several decades and included "public health education and community participation, active breeding site detection [of mosquito larvae], environmental management, reactive insecticide fogging, and geo-referenced entomologic and clinical surveillance systems. [Over time] the *Aedes* household index (the percentage of all properties with breeding sites of *Aedes* mosquitoes) was reduced from over 50 percent to less than 1 percent."⁵⁷ The emphasis on stringent regulations and their tough enforcement that commenced in the 1960s has continued since, though the disease still periodically resurfaces and is endemic in Southeast Asia.⁵⁸ The Infectious Diseases Act of 1976 expanded the scope

⁵³ Yoshikawa (2011). <https://englishkyoto-seas.org/wp-content/uploads/010205.pdf>

⁵⁴ http://factsanddetails.com/southeast-asia/Singapore/sub5_7c/entry-3776.html; Chee and James (2003) <https://www.who.int/bulletin/volumes/81/3/Chee0303.pdf>

⁵⁵ A fire that swept through and destroyed many kampongs in 1961 led to the rapid relocation of the population from traditional to modern housing as part of the public housing campaign.

⁵⁶ In 1998, this was replaced by the Control of Vectors and Pesticides Act.

⁵⁷ Egger et al (2019).

⁵⁸ <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>

of the government's program to include other more recalcitrant infectious diseases and TB through public health and environmental management, the use of vaccines, and treatment with follow-up health visits.⁵⁹

Complementing the drive to control diseases was a nationwide program to make primary health services widely available for a nominal fee. This was a strategy that enabled the government to hold down costs while still substantially improving healthcare. These centers provided basic services and medications, immunization, health screening and advice, dental care, X-rays, and clinical services, thus relieving pressure on the few general hospitals. Over time, the clinics were converted into modern well-equipped and professionally staffed polyclinics that dispense primary healthcare and increasingly diagnose and treat those suffering from chronic diseases. With rising incomes and increased longevity, chronic ailments have become more widespread.

A wealth of research has established that heat has a pronounced negative effect on labor productivity and per capita income and has emphasized the importance of air conditioning in ameliorating this effect, as well as improving the cognitive skill development of school-age children. Combatting the impact of heat on labor effort and productivity in Singapore was another objective of then-Prime Minister Lee.⁶⁰ When asked many years later what initiatives were responsible for Singapore's success, Lee answered that it was "Air conditioning. Air conditioning was a most important invention for us, perhaps one of the signal inventions of history. It changed the nature of civilization by making development possible in the tropics. Without air conditioning you can work only in the cool early-morning hours or at dusk. The first thing I did upon becoming prime minister was to install air conditioners in buildings where the civil service worked. This was key to public efficiency."⁶¹

Staffing and Providing Healthcare

Throughout the 1970s, medical specialists remained scarce, and improvements in morbidity and life expectancy were largely the result of disease vector control measures and provision of primary health services. It was only in the 1980s that the government was able to initiate a Healthcare Manpower Development Program to train doctors locally and abroad. Entering partnerships with foreign health organizations and hospitals also alleviated the lack of specialists. Once the program was in full swing, the shortages were largely erased, and the government were able to create specialist centers such as the Singapore National Eye Center (1990), the Singapore Heart Center (1994), the National Dental Center (1997), and the National Cancer Center Singapore (1999). These together with investments in modern well-equipped

⁵⁹ As late as 1990s, the incidence of TB remained high, and an elimination program was launched with the use of directly observed therapy (DOT) backed by a National Treatment Surveillance Registry and the detention of defaulters and non-compliant patients (Chee, 2003).

⁶⁰ See Heal and Park (2014), Heal (2015), Zivin and Kahn (2016), and Goodman et al (2018). In the future, Zhang et al (2017) expect that rising temperatures will lead to a significant decline in China's economic output.

⁶¹ <https://www.vox.com/2015/3/23/8278085/singapore-lee-kuan-yew-air-conditioning>

hospitals meant that Singapore emerged as the premier medical destination in Southeast Asia.

A key achievement was the introduction of a National Health Plan (NHP) in 1983 to provide all citizens with affordable healthcare and simultaneously keep healthcare expenses in check.⁶² The nationally administered plan emphasized personal responsibility and financial liability. This philosophy has evolved into a mixed healthcare financing system, with multiple tiers of protection (as shown in Figure 9).

- *Government subsidies.* The government provides extensive patient subsidies across the various care settings, all of which are means tested so that they are targeted to lower-income patients to ensure equitable access to basic healthcare.⁶³
- *Risk-pooled insurance.* MediShield Life (launched in 1990) is a universal basic health insurance that protects Singaporeans against large hospital bills and selected costly outpatient treatments such as dialysis and chemotherapy treatment for cancer. But it incorporates high co-payment features that are burdensome for users in lower income brackets although they do minimize over-consumption and over-servicing and help keep premiums broadly affordable. Individuals are also able to purchase private insurance in addition to MediShield Life for additional coverage. For the severely disabled, Singapore has a national long-term care insurance scheme, ElderShield, that provides basic financial support to those who need long-term care⁶⁴ (LTC), especially during old age. ElderShield will be enhanced to a new scheme called CareShield Life by 2020.
- *Personal savings.* MediSave (initiated by the NHP) is a mandatory savings accounts for medical expenses with contributions from employees and employers. It can be used for the co-payment of personal or immediate family's hospitalization, day surgery, and certain outpatient treatments.
- *Discretionary financial assistance.* Medifund⁶⁵ is a government endowment fund established in 1993 that functions as a safety net for patients who still face difficulty paying their healthcare bills after subsidies, insurance, MediSave, and cash.⁶⁶

⁶² See Chiu and Haseltine (no year).

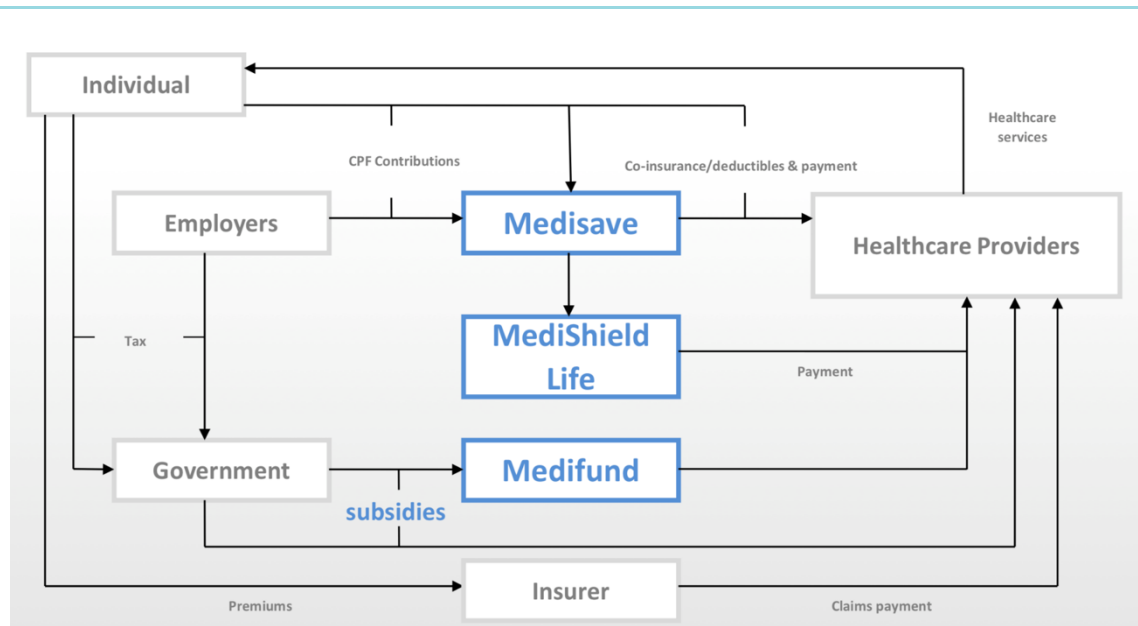
⁶³ "Through the tiered care system and its public hospitals, the government has a great deal of control over inpatient care. It allows a private system to challenge the public one, but the public system plays the dominant role in providing services." <https://www.nytimes.com/2017/10/02/upshot/what-makes-singapores-health-care-so-cheap.html>

⁶⁴ Long-term care refers to the personal, custodial, and medical care needed when a person's functional ability declines with age or adverse health conditions.

⁶⁵ Medifund Junior finances a range of services for children from poor families. <http://assets.ce.columbia.edu/pdf/actu/actu-singapore.pdf>

⁶⁶ <http://assets.ce.columbia.edu/pdf/actu/actu-singapore.pdf>

Figure 9: Healthcare Coverage and Responsibilities in Singapore

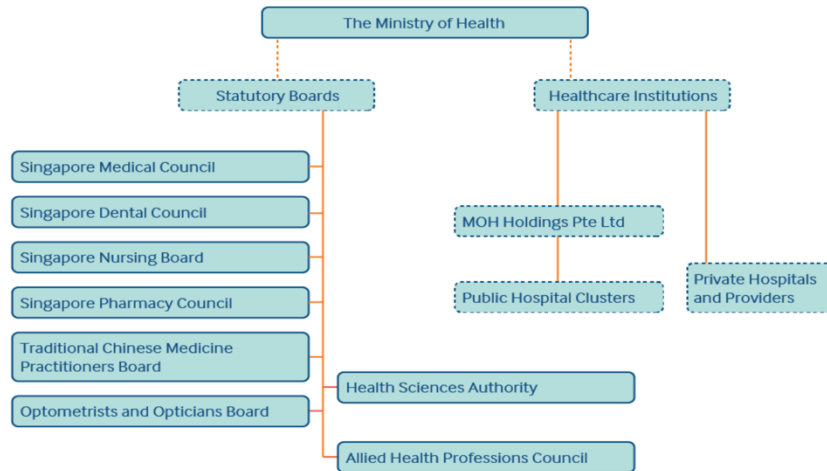


Source: Leong (2016)

Primary responsibility for the management of healthcare in Singapore rests with the Ministry of Health (Figure 10 shows how the system is organized).⁶⁷ Responsibility for the MediSave account rests with the Central Provident Fund (CPF), while the Monetary Authority of Singapore is empowered to regulate medical insurance and to safeguard the rights of policy holders under the Insurance Act.

⁶⁷The MOH “is in charge of promoting health education, monitoring the accessibility and quality of healthcare services, preventing and controlling diseases, allocating resources and specialists, and administrating required licenses for healthcare establishments” Bai et al (2014).

Figure 10: Organization of Singapore’s Healthcare System



Source: Liu and Haseltine (no year).

A focus on preventive medicine, the National Health Plan, and cost control achieved by regulating physician salaries and through bulk buying of drugs were all instrumental in keeping public expenditure on healthcare to less than 3 percent of GDP throughout the early 2000s. Private household expenditure on healthcare from disposable income was under 4 percent until the 1990s and under 6 percent in the 2000s.

Building hospitals and clinics and adding to the stock of health professionals was one facet of the healthcare strategy. As Haseltine (2013) noted, because Singapore was and is a densely populated highly urbanized city state, “health [is] affected by almost every aspect of life in an urban setting: housing, water supply, food supply, air quality, waste disposal, road traffic, parks, tree planting, and more. Ensuring the health of the people of Singapore had to be built into every aspect of urban planning, requiring a comprehensive approach and the cooperation of numerous ministries over all the various sectors of government.” Ultimately it was this comprehensive and coordinated approach and the attention given to tailoring the built environment that delivered results in a humid tropical setting, results that other countries in similar latitudes rightly envy.

Statistics on life expectancy and child mortality speak for themselves (see Figures 11 and 12). From 1965 onwards, life expectancy at birth has risen year on year (from 67 in 1965 to 83 in 2017, and infant mortality has been on a downward slope from 27 in 1965 to 2 in 2017. Now Singapore scores a perfect 100 on the health pillar of the WEF Competitiveness Index.⁶⁸ The National Population Health Survey conducted in 2016–17 showed that 8 of 10 people between 18 and 69 were physically active. However, almost three quarters of all deaths are now caused by noncommunicable diseases (NCDs) chiefly cardiovascular disease, cancer, chronic

⁶⁸ <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>

Singapore

respiratory disease, musculoskeletal disorders, and diabetes. Because of the increasing prevalence of NCDs, the average Singaporean is living with many more years of disability, which erodes the benefits from greater life expectancy. The increasing incidence of NCDs is caused largely by a more sedentary lifestyle that is making the population more prone to obesity and susceptible to diabetes and high blood pressure. By 2017, overweight and obesity had emerged as the fifth ranked risk factor up from eight place in 1990.⁶⁹ Tobacco consumption further exacerbates the exposure of the population to the leading NCDs.⁷⁰ To control the incidence of such ailments, the authorities have promoted workplace level programs for SMEs, and others such as the "National Steps Challenge - Corporate Challenge", and "Eat Spin Win". In addition, there are programs encouraging people to give up smoking, and to join group fitness and mental health programs. The success of these programs in changing lifestyles will determine whether more Singaporeans enjoy good health as they advance into deep old age and is the primary challenge for Singapore's healthcare services.⁷¹ Although the country is doing better than many in the OECD, its public spending on healthcare is rising and is now more or less on par with that on education and defense (Figures 13, 14, 15 and 16).⁷²

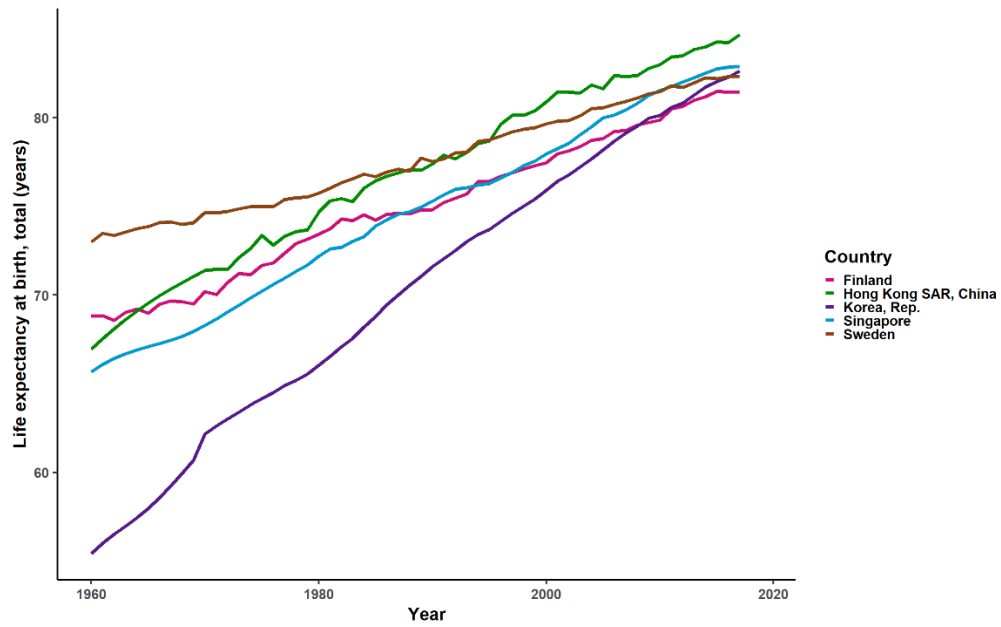
⁶⁹ http://www.healthdata.org/sites/default/files/files/policy_report/2019/GBD_2017_Singapore_Report.pdf

⁷⁰ https://www.who.int/nmh/countries/sgp_en.pdf?ua=1 and <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6888317/>

⁷¹ There are only 24 doctors per 10,000 population (WHO, 2018 and Liu and Haseltine, 2016). The principal causes of death in 2017 were cancer, pneumonia, heart disease, and stroke (MOH, 2017 and <https://www.moh.gov.sg/resources-statistics/singapore-health-facts/principal-causes-of-death>).

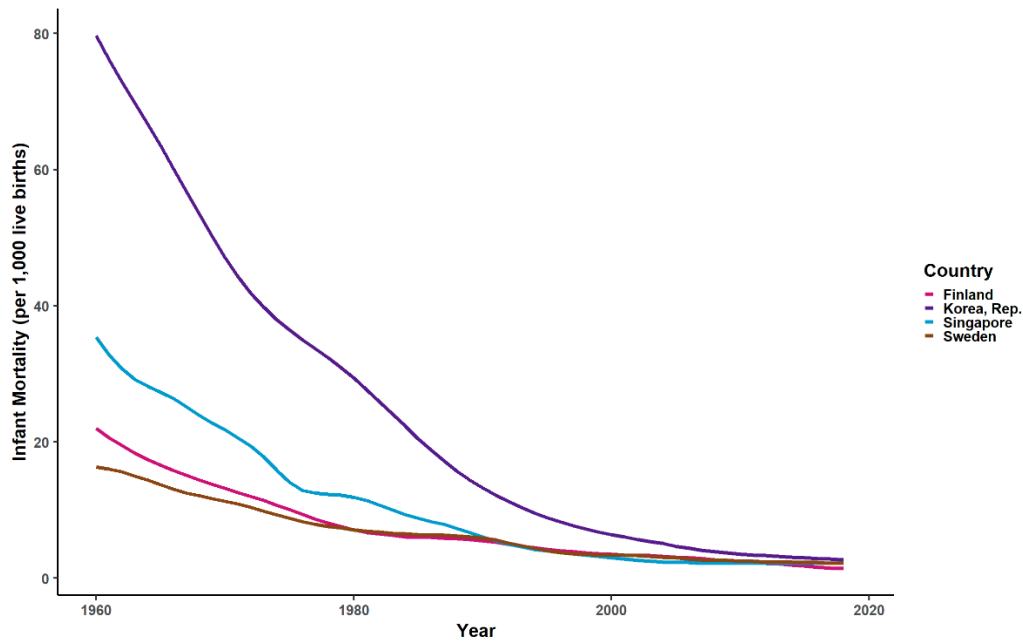
⁷² Government spending as a percentage of GDP rose by 5 percent between 2012 and 2016, largely due to increased spending on healthcare and infrastructure. However, because Singapore has hewed to a prudent fiscal policy, it has maintained a fiscal surplus throughout and thus has built up substantial fiscal headroom (IMF, (2018)).

Figure 11: Life Expectancy at Birth in Singapore in comparison with Finland, South Korea, Sweden and Hong Kong, 1960–2017



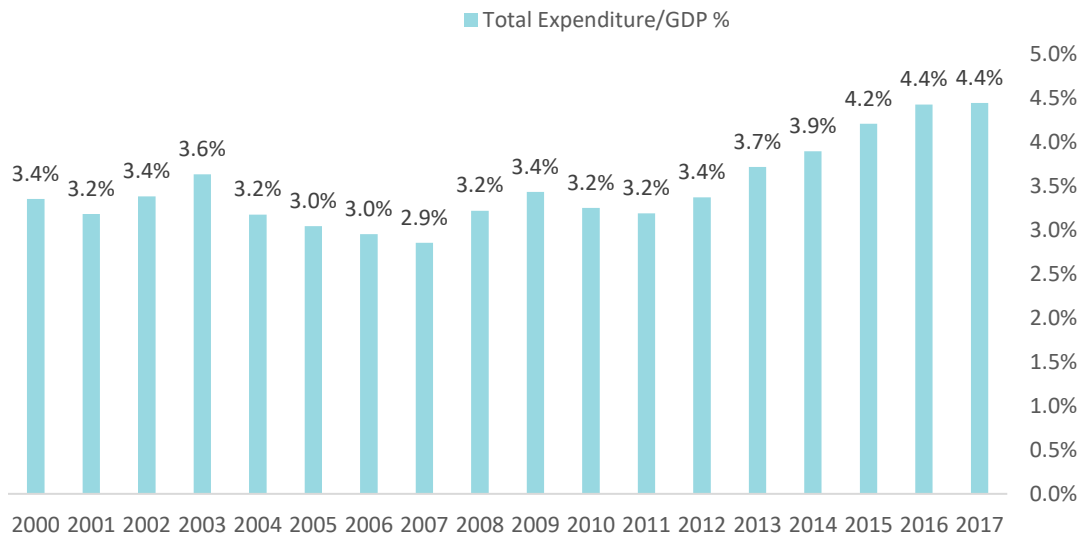
Source: World Development Indicators

Figure 12: Infant Mortality in Singapore in comparison with Finland, South Korea and Sweden (per 1,000 live births), 1960–2017



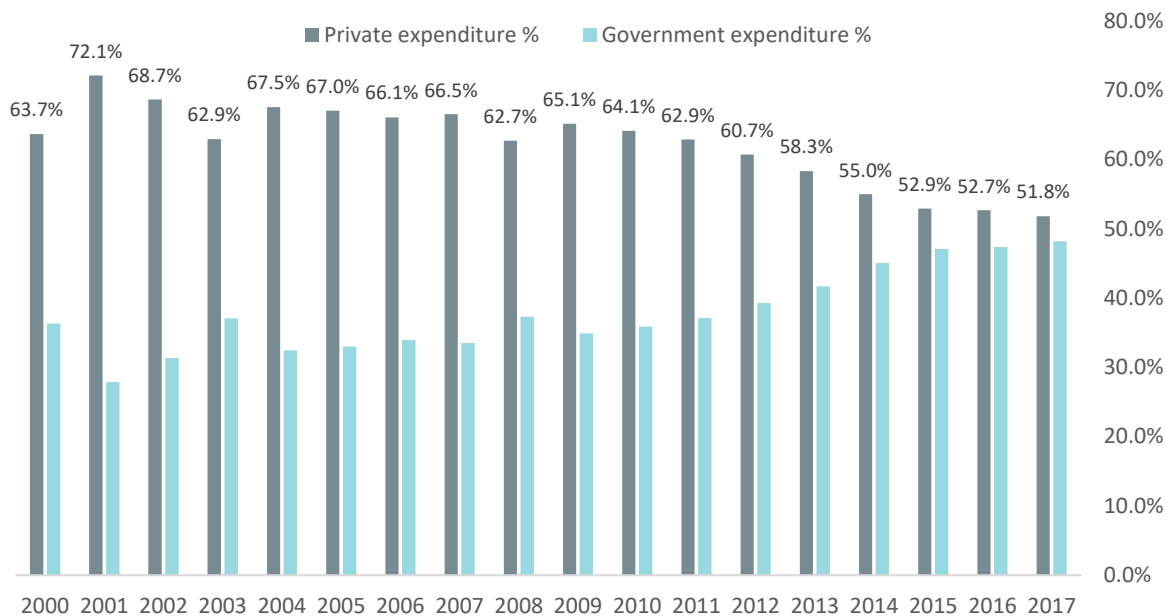
Source: World Development Indicators

Figure 13: Healthcare Expenditure in Singapore as a Percentage of GDP



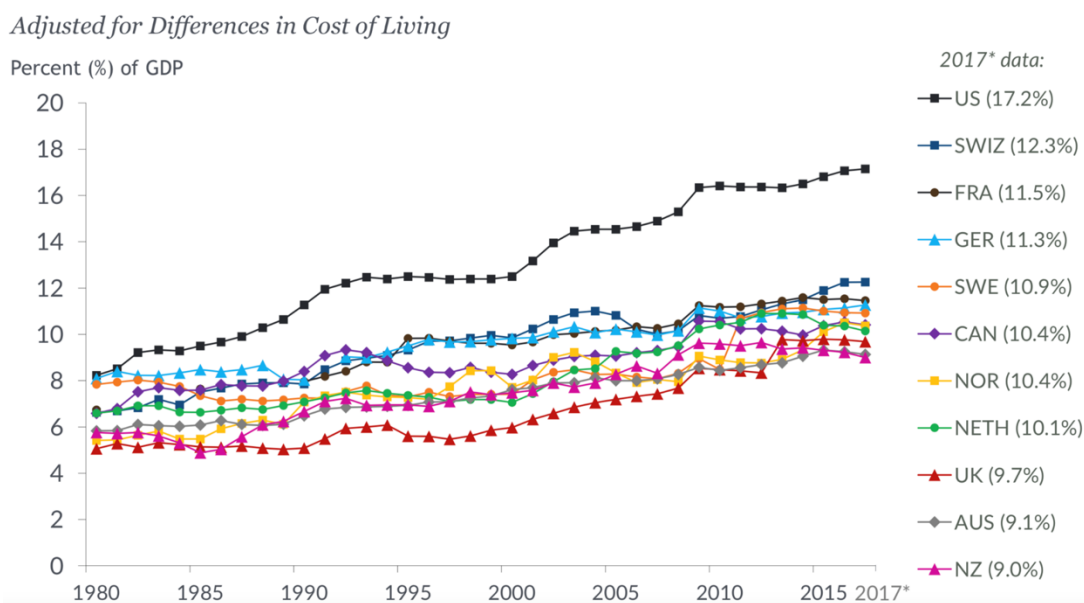
Source: World Development Indicators

Figure 14: Shares of Public and Private Expenditures on Healthcare in Singapore

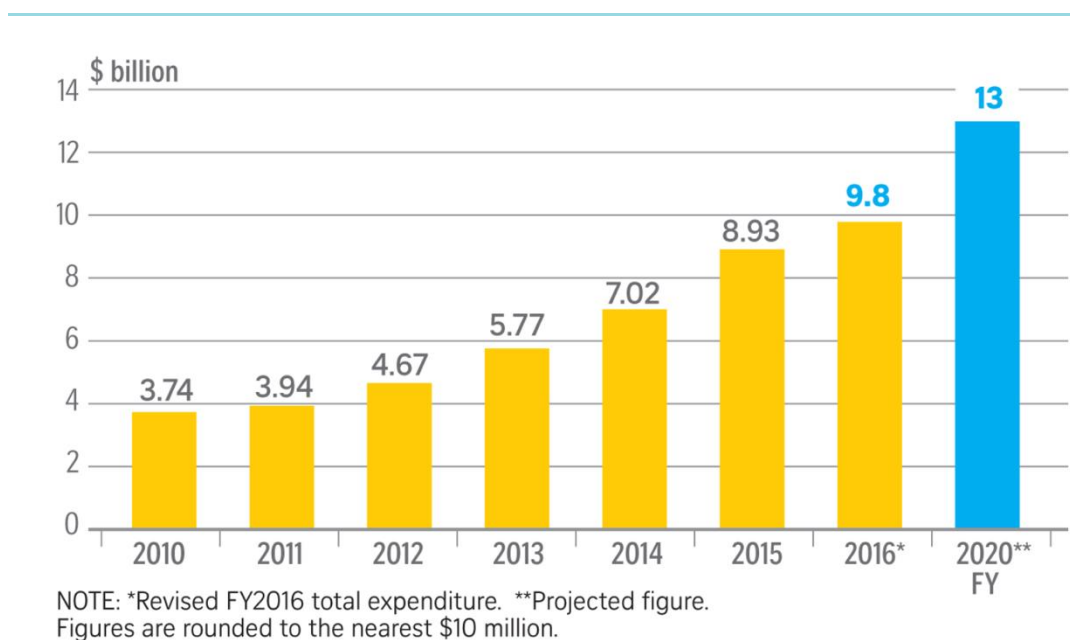


Source: World Development Indicators

Figure 15: Healthcare Spending as a Percentage of GDP for Selected OECD Countries, 1980–2017



Source: Tikkanen (2018)

Figure 16: Annual Spending on Healthcare in Singapore

Source: <https://www.straitstimes.com/politics/singapolitics/finding-a-cure-for-rising-costs-in-healthcare>

6. Key Lessons on Building a World Class Education and Training System

Singapore, a compact city state, is unlike most developing nations today. Therefore, it may be a stretch for other countries to replicate its human development strategy in its entirety. Nevertheless, there is much to be learned from the more than four decades of experience described here.

Haseltine (2013) rightly observed that, “Three compelling qualities woven into the fabric of the country have enabled it to achieve outstanding successes in so many areas. They are long-term political unity, the ability to recognize and establish national priorities, and the consistent desire for the collective well-being and social harmony of the country.”

Singapore made human capital development an integral part of its economic modernization and development strategy. Singapore’s backwardness in the mid-1960s induced the authorities to prioritize universal primary education. This became the fundamental building block that paved the way for the later expansion of the education system. Even though school facilities were limited and there were not enough teachers, the government persevered in investing as fast as it could in infrastructure and recruiting teachers as rapidly as resources

permitted. Language barriers were a serious handicap, which were overcome with considerable effort and in the face of political opposition by opting for bilingual schooling and requiring all schools to teach English with the objective of making it the lingua franca. Policymakers knew that, if Singapore was to attract foreign investment and become a hub of commerce, it needed to equip its workforce with basic literacy and the capacity to communicate even minimally in English, which was already the official language. By expanding the supply of industrial workers with adequate language skills and by offering other incentives, Singapore's policymakers initiated an FDI-led virtuous spiral of industrialization that successfully launched not only Singapore's own economy but also that of several other East Asian countries. During the first stage of their economic development, it was mainly the quantity of human capital that mattered as light manufacturing industry needed a disciplined workforce with a basic education.

It was when Singapore was preparing to enter a more advanced stage of industrialization that the quality of education became crucial as it has remained ever since. The urgent efforts to expand the quantity of workers (including immigrant workers) had succeeded, but even in the early 1980s, the literacy, numeracy, and bilingual skills of the workforce were weak, the school dropout rate was high, and progression to secondary and tertiary education was lower than expected. Starting with the Goh report of 1978, what followed was a succession of reforms spread over the next almost three decades that made schooling in Singapore a byword for excellence. For most emerging economies and lower middle-income countries that have already achieved high rates of primary enrollment, improving the quality of education becomes their primary concern and Singapore was no exception. Five major lessons can be learned from the way in which its policymakers responded to the challenge:

- 1) Singapore set clear long-run policy goals and government institutions coordinated with each other to implement the human capital development strategy.⁷³ After each milestone was passed, the government raised its sights and aimed higher. This vision went hand-in-hand with a clearly delineated strategy and its implementation by an increasingly capable and competitively compensated bureaucracy. Education policy was spearheaded by the MOE which was led by a succession of ministers who were among the best and brightest and who had held (or would go on to hold) other ministerial-level positions.⁷⁴ Coordination failures are often the bane of developing economies,⁷⁵ but not so in Singapore where "it [was] simply assumed that ministers will work as a team on issues that need interdepartmental cooperation."⁷⁶ Effective coordination between the MOE, the EDB, the schools, the National Institute of Education (NIE), the Institute of Technical Education, polytechnics, and other institutions facilitated the implementation of the strategy. Careful tracking of trends

⁷³ Because the ruling party, the People's Action Party (PAP), faced little political opposition, it was not constrained by short-term political expediencies and instead could pursue long-term objectives.

⁷⁴ Goh Keng Swee, Tony Tan, Tharman Shanmugaratnam, and Heng Swee Keat

⁷⁵ See, for example, Rodriguez-Clare (2005)

⁷⁶ Haseltine (2013).

in labor demand and regular consultation with businesses minimized any mismatches between the skills being produced by the education system and the market's needs. This coordinated implementation was buttressed by the provision of adequate funding for the education sector, the lack of which can often be a reason for failure. However, expenditures were tightly managed, and waste was minimized by severe sanctions on corrupt practices.⁷⁷ Knowing that the stakes for Singapore were high, administrators tried hard to obtain value for money.

- 2) Once the quality of education was given high priority, the recruitment of teachers from among the most able graduates became particularly important. Alongside this, the MOE emphasized the need to select principals capable of effectively managing and improving their institutions as well as mentoring and supervising their staff. Policymakers incentivized the teaching profession by offering attractive salaries and career prospects and respected status to teachers and by doing so persuaded top students who might have chosen other professions to become teachers. Staffing the ranks of teachers at every level with some of the country's brightest graduates was the first step,⁷⁸ and the next step was to train them to the highest level of proficiency at the NIE. Those who measured up to the high standards set by the government were then certified, and once they were inducted into the system, in-service training and retooling programs ensured that they constantly honed their skills and learned new ones as technologies and demands changed.⁷⁹ An increasing emphasis on analytical skills, team work, and creativity in the education system has been paralleled by the granting of more autonomy to teachers to adapt their pedagogical styles and to make fruitful use of ICT to further enhance the quality of student learning.⁸⁰ Teachers are evaluated each year, rewarded with annual raises and bonuses when appropriate, and promoted depending on how they fare on the Enhanced Performance Management System, which is a part of the career and recognition system under the Education Service Professional Development and Career Plan (EDU-PAC).⁸¹
- 3) Policymakers gave the selection of school principals from the ranks of teachers singled out for leadership roles with reference to their performance, the same scrupulous attention. Singapore's schools have functioned as well as they have because principals delivered the managerial inputs that enhance school performance. In addition to a careful evaluation of prospective candidates for principal posts and

⁷⁷ The British established the Corrupt Practices Investigation Bureau in 1952 and embedded the rule that all were equal before the law. Once in office, the PAP sought to legitimize its authority by cracking down on corruption. It strengthened the Bureau, and under the Prevention of Corruption Act of 1960, stepped up enforcement and increased the severity of punishments.

⁷⁸ Only one of eight candidates were selected.

⁷⁹ The Singapore Teacher Education Partnership model and the Teacher Education 21 model reflects the tight nexus between the policy direction provided by the Ministry, teacher training by the NIE and schools where teachers translate the policies and their training into practice.

⁸⁰ Reimers and Chung (2016).

⁸¹ <https://www.seiservices.com/APEC/WikiFiles/6.22.pdf>

the provision of suitable training both in Singapore⁸² and overseas, starting in the late 1980s, principals have been given more latitude to experiment within broadly defined parameters while still being held strictly accountable for their schools' performance. Those who excelled are allocated to lower performing schools to bring them up to standard and to share their experience with others in the teaching community.

- 4) The systematic and timely collection of data on schools, other training institutions, helped strengthen Singapore's human capital.⁸³ Data are also gathered through multiple channels on the skills currently in demand on the market and those that are likely to be needed five and ten years into the future as technology and the production structures evolve. This data gathering is facilitated by Singapore's vigilant public agencies and statutory boards, its state-of-the-art digital infrastructure, tech savvy administrators, and experienced teachers. Policymakers use the data to assess school and student performance, control costs, and help managers and teachers to make decisions at every level and to do workforce planning so that Singapore can catch the next technological wave as it is building. Because managing costs is a priority, the government periodically makes upward adjustments to the still modest fees paid by students who are citizens or permanent residents.⁸⁴ Forecasting the developing demand for technical and other skills, which requires considerable lead time, requires analysis of local data and feedback from businesses. Singaporean policymakers and educators also have to examine trends in other advanced economies and to divine labor demands to come. By being approximately on the mark, Singapore has sustained its growth momentum over decades.
- 5) ICT has been making inroads into education but only slowly, and the impact of computerization on learning has yet to be convincingly established.⁸⁵ Nevertheless, Singapore is at the forefront of countries that are advancing the frontiers of pedagogy by choosing a few experimental schools to serve as pathfinders. This is a lesson for other countries. Education is a major labor-intensive sector of the economy that has registered little or no increase in productivity,⁸⁶ so improving education quality and increasing productivity will require fresh thinking.⁸⁷
- 6) The Singapore authorities have worked hard to convince parents and students that vocational training is the right choice for those who may not be academically

⁸² Teachers chosen for their potential to be principals must go through the Leaders in Education Program, launched in 2000, which includes mentoring by and exposure to leaders in industry.

⁸³ The utility of data-driven decision-making using information collected by a nationwide survey is examined by Custer et al (2018) <https://www.brookings.edu/wp-content/uploads/2018/02/toward-data-driven-education-systems.pdf>

⁸⁴ Primary education is essentially free to citizens and permanent residents aside from some miscellaneous expenses. Non-residents pay much higher fees.

⁸⁵ On the contrary, high spending on ICT has delivered no measurable improvement in educational performance in advanced countries. However, some studies conducted in low-income economies have suggested that healthcare initiatives, better nutrition, and early childhood education might yield higher returns over a student's lifetime.

⁸⁶ Singapore is not unusual. The education sector contributed minimally to productivity in the US between 1947 and 2014 (Jorgenson et al, 2016). It is one of the sectors most exposed to Baumol's cost disease.

⁸⁷ Smaller class sizes, extra textbooks and laptops have had only a marginal—if any—positive effect on learning.

inclined. They have enjoyed a measure of success by investing in training facilities and teaching staff so that students do not feel as if they are being shortchanged. The training institutions continuously seek feedback from the business community to ensure that they are imparting the right mix of operational skills and that students are trained using equipment that is up to date. This training and coordination with employers mean that most graduates of vocational schools can find jobs that offer a decent wage.

There are other aspects of Singapore's school system that need to be viewed more cautiously. Students are distributed across three streams: (i) Express; (ii) Normal Academic; and (iii) Normal Technical. Before it was abolished in 1995, there used to be another category as well called the Special stream. When the Special stream was in effect, the 10 percent of students in that category were expected to go to a university;⁸⁸ currently, the two-thirds on the Express track can end up either at a junior college or polytechnic; students on the Normal Academic track are likely to end up at a polytechnic, and the Normal Technical track students are expected to make their way to the Institutes of Technical Education.⁸⁹ There are mixed views regarding the usefulness of streaming, with some researchers having found evidence that it can amplify differences in attainment between students.⁹⁰ The current mode of streaming will be abolished by 2024, as Singapore moves towards Full Subject-Based Banding, where students will be able to take subjects with varying levels of difficulty based on their ability and interest.

Although there is a move away from rote learning, classroom instruction is by and large highly focused on equipping students to pass national examinations. According to one study,⁹¹ "teachers rely heavily on textbooks, worksheets, worked examples, and lots of drill and practice. They also strongly emphasize mastery of specific procedures and the ability to represent problems clearly, especially in mathematics. Classroom talk is teacher-dominated and generally avoids extended discussion. Singapore's teaching regime is one primarily focused on the transmission of conventional curriculum knowledge and examination performance. And clearly it is highly effective, helping to generate outstanding results in international assessments." Singapore policymakers are now attempting to move away from this top-down exam-centric approach, and it is not obvious that this kind of pedagogy is ideal for other middle or upper middle-income countries. Attaching such importance to exams and grades means that students are under great pressure and spend hours after school being

⁸⁸ <https://www.moe.gov.sg/microsites/cos2019/subject-based-banding.html>;

<https://www.todayonline.com/singapore/timeline-how-secondary-school-streaming-evolved-over-decades>;

<https://www.todayonline.com/singapore/secondary-school-streaming-be-abolished-2024-replaced-subject-based-banding>

⁸⁹ Students enter university after junior college or polytechnic, rather than directly from secondary school. Technically, those in the Express track can enter junior college, polytechnic or ITE.

⁹⁰ Johnston and Wildy (2016), Chiu et al (2017), and Barrington (2018) Also, a study based on streaming in state-owned primary schools in the UK found that students from lower socioeconomic backgrounds often ended up in lower streams and this tended to reinforce educational disadvantages (<https://www.theguardian.com/education/2014/sep/25/school-streaming-pupils-english-primaries>).

⁹¹ Hogan (2014).

drilled by private tutors and doing homework. While the time devoted to study has yielded impressive PISA and TIMSS scores, students have had to cope with high levels of stress.⁹²

As noted above, preparing students for the job market that they will encounter when they enter the workforce is the foremost objective of Singapore's education and training system. A narrowly instrumental approach to education has its advantages but depending upon other countries' circumstances, they may need to take other considerations into account. Philip Altbach (2016) is of the view that "workforce development" is becoming a national obsession in Singapore. He agrees that "universities have to be aware of the employment market... but increasingly people think that education is for instrumental or vocational needs." He feels that there is a risk that in trying to meet the "demand for skills by specific industries, universities will become vocationalized." As Hanushek et al (2017) have pointed out, narrowly defined vocational skills and academic specializations can ease the transition of students into the job market in the short term, but if these skills become obsolete, switching jobs later in life can become harder. While much is made of lifelong education, there is little evidence to show that it is helping middle-aged or older workers in advanced countries to find alternative employment if their particular skillset is no longer in demand.⁹³ As it is becoming even more difficult to predict what sort of jobs will be most prevalent in the future because of advances in digital technology and artificial intelligence, emphasizing a broad education that leans towards STEM disciplines and instills scientific literacy in all may be in order.⁹⁴ This aspect of Singapore's education system is worthy of being emulated by other countries.⁹⁵

7. Singapore's Healthcare Recipe

Singapore has implemented a comprehensive strategy aimed at eliminating infectious diseases to reduce mortality and emphasizing preventive medicine in order to achieve longer life expectancy while holding down costs. These policy initiatives are now the stuff of conventional wisdom for developing countries in the tropics. In fact, the current policy

⁹² <https://www.scmp.com/lifestyle/families/article/2111822/downsides-singapores-education-system-streaming-stress-and>. The MOE is attempting to reduce the over-emphasis on academic results and to encourage schools to adopt a more holistic approach to education.

http://www.nas.gov.sg/archivesonline/data/pdfdoc/20110929001/wps_opening_address_%28media%29%28checked%29.pdf and <https://www.moe.gov.sg/news/speeches/opening-address-by-mr-ong-ye-kung--minister-for-education--at-the-schools-work-plan-seminar>.

⁹³ Singapore's SkillsFuture movement is an attempt to help workers adjust their skill sets at any stage in the life cycle in order to take advantage of emerging opportunities. <https://www.skillsfuture.sg/AboutSkillsFuture>

⁹⁴ Striking the right balance is going to be a challenge as the US is currently discovering. A report from a think tank, the Council of Foreign Relations (2018), spells out the problem. "The primary focus of the educational system [is] the formal education of young people...But that system is often inadequate in preparing Americans for many faster growing, better paying jobs in which employers are looking for some mixture of soft skills, specific technical skills, some practical on-the-job experience and a capacity for lifelong learning." This is a tall order that will require close collaboration between employers and educational institutions and, more importantly, a substantial expansion of training by the employers themselves to impart specific skills and experience, which they have so far been unwilling to do. Few employers have any relationship with local community colleges, and most have scaled back their training programs, preferring to let educators and the government do the work for them. Many educators (in the US) prefer to keep employers at arm's length from the curriculum and pedagogical routines. Teaching soft skills and identifying the specific technical skills that will be in demand a few years down the road is proving to be an uphill battle.

⁹⁵ The purpose of Singapore's SkillsFuture Initiative is to help workers to cope with and take advantage of changing employment opportunities. <https://www.skillsfuture.sg/AboutSkillsFuture>

emphasis in low- and middle-income countries alike is on preventive medicine and primary care delivered via clinics staffed by paramedics with hospitals providing curative treatment. Singapore was ahead of the curve in the 1960s and 1970s, but now the lessons from its experience have been learned and followed by other countries, although few have matched its achievement because almost no other country is quite like Singapore in terms of size, organizational capabilities, and public institutions. Furthermore, few countries have followed Singapore's lead in complementing their healthcare initiatives with innovative urban design and urban infrastructure investments that reduce the population's susceptibility to tropical pathogens and exposure to unrelenting heat.

What Singapore has managed to do better than many other countries is to provide the entire population with affordable, high-quality care while containing costs as it has transitioned from an epidemiological profile dominated by infectious diseases to one that reflects the chronic ailments. Providing universal healthcare in Singapore costs the government less than half of what it costs the Government of Japan and two-thirds of what it costs the United States government.⁹⁶

The paradigm that underlies Singapore's healthcare story—and successful education system as well—is minimalist and enabling. Instead of providing expensive government entitlements, administered by an expensive government bureaucracy, it prepares its citizens to face sickness, retirement and other lifecycle challenges.⁹⁷

- 1) The system provides primary healthcare that is on balance affordable for the majority and simply administered, with government subsidies tailored to the patient's age and ability to pay. However, users incur high co-payments financed from mandatory health saving accounts, which may be higher than the international norm.
- 2) Beyond basic care, the indigent, the disabled, and individuals belonging to Singapore's pioneer generation⁹⁸ are entitled to more comprehensive treatment.
- 3) Patients can choose the level of accommodation and comfort that they desire. The lowest tier in a hospital facility involves sharing a ward with six other patients, while the highest tier offers a private room with other amenities, but all tiers provide round-the-clock nursing care. The user pays additional charges out of pocket if he or she wants extra amenities.

⁹⁶ Approximately 70 percent of the cost of publicly provided healthcare is paid for by the government.

⁹⁷ Calder (2016).

⁹⁸ The generation born on or before December 31st, 1949 and obtained citizenship before December 31st, 1986, some 450,000 of whom benefit from the Pioneer Generation Package. <https://www.pioneers.sg/en-sg/Pages/Home.aspx>

- 4) High co-payments, mandatory saving for healthcare, tiered accommodation and care, and the absence of an entitlement culture all greatly reduce the burden on the government.
- 5) Regulation and bulk buying of drugs also keeps pharmacy costs in check. Thus, public expenditure on healthcare in Singapore constitutes only one-third of overall expenditures on health as opposed to 81 percent in Japan and 84 percent in the UK.⁹⁹

8. Concluding Observations

There can be little doubt that the quality of human capital in a developing country must be a priority regardless of whether or not it is well-endowed with natural resources. Singapore has shown how upgrading human capital can accelerate development and drastically reduce poverty in a resource-poor economy, and its experience has been validated by other similar economies in East Asia. However, are Singapore's education and healthcare models replicable in other lower-middle- and middle-income countries?

As stated earlier, some elements of these models have been absorbed into conventional wisdom. Providing universal primary education, emphasizing teacher quality, focusing on learning, particularly in the STEM disciplines, collecting data for decision-making, strengthening the management of schools, systematically evaluating the performance of schools and students, and keeping costs under control are intrinsic to the education strategies of most countries. Likewise, eliminating diseases, focusing on preventive and primary care rather than acute care, and sharing healthcare costs between the public and the government are also among the primary objectives of other countries. Many developing countries have made steady progress in building and improving their human capital, but few are entirely satisfied with their performance and enhancing their implementation capability is a widely acknowledged priority.

This brings us to the seven factors that have undergirded Singapore's successful implementation of their education and health strategies to build human capital, factors that might prove difficult to replicate elsewhere (Figure 17). *First*, as discussed above, data gathering and policy implementation is easier in a compact city state, but digital technologies are making it easier for all countries to collect and analyze data and to harness them for policymaking purposes. *Second*, ever since independence, Singapore has been governed by the People's Action Party (PAP) with, until recently, little opposition from other parties. As a result, the country's government has tended to be of the top down kind. However, Singapore has been fortunate in being governed by leaders who set high standards for themselves and others and have lived up to these standards. By upholding high standards of morality and performance, political leaders elsewhere can unleash the potential of their own economies.

⁹⁹ Calder (2016).

The role played by political leaders cannot be minimized. As Ho (2018) has noted, “The roots of the Singapore model were established not from a position of power but from a position of weakness, in which its very statehood was not and could not be taken for granted, instead requiring the ingenuity of Lee and his team of first-generation leaders to establish.” Then-Prime Minister Lee’s most outstanding achievement, according to Kassim and Ali (2016), was the “self-confidence [that] he instilled in the citizens... that they [could] build a multi-cultural modern nation... that will prosper for a century or more.”

Third, starting in the 1960s, the Singapore government began creating a meritocratic and largely non-politicized bureaucracy that could strategize, make far-sighted policies, and implement them in a coordinated way. The coordinated implementation was key because the government prided itself on delivering results and was fully aware that the country’s survival depended on steady economic progress.

Fourth, then-Prime Minister Lee and the PAP leadership skillfully managed to maintain harmony in a multi-ethnic society and defused tensions that had arisen in the 1960s. Had these tensions persisted, it would have been far more difficult to attract FDI and push through the reforms that incrementally added to Singapore’s prosperity. Fifth, in a related point, in order to supplement domestic human capital and labor, Singapore has depended on large numbers of immigrants, some of whom have become permanent residents while others are on temporary visas. Integrating and efficiently using this heterogeneous workforce while minimizing frictions between foreign workers and locals has also required skillful management.

Sixth, the leadership was able to mobilize domestic resources through the Central Provident Fund (CPF) to an extent that few other countries have been able to achieve. The CPF has played a critical role in financing infrastructure, housing, and other vital investments. It has also underpinned healthcare financing through Medisave and has fostered citizens’ responsibility for their own welfare.

Lastly, Singapore has always been open to ideas and eager to learn,¹⁰⁰ ready to innovate and to leverage new technologies (such as e-government and using electronic records in education and healthcare) to increase efficiency and to stay one step ahead of the competition. For example, the government is actively building intangible capital (such as intellectual property (IP), design, brands, and firm-specific knowledge),¹⁰¹ and agencies such as the EDB, Enterprise Singapore A*STAR, and the National Research Foundation investing large sums in research to enlarge the economy’s growth potential. This unwavering focus on

¹⁰⁰ Then-Prime Minister Lee observed that, “70 percent of the governance ideas in Singapore were learned and adapted from elsewhere.” The location of Changi Airport, the training of the Singapore military, making Singapore a garden city, and the appraisal system of the civil service among others drew from the experience institutions, and practices of other countries.

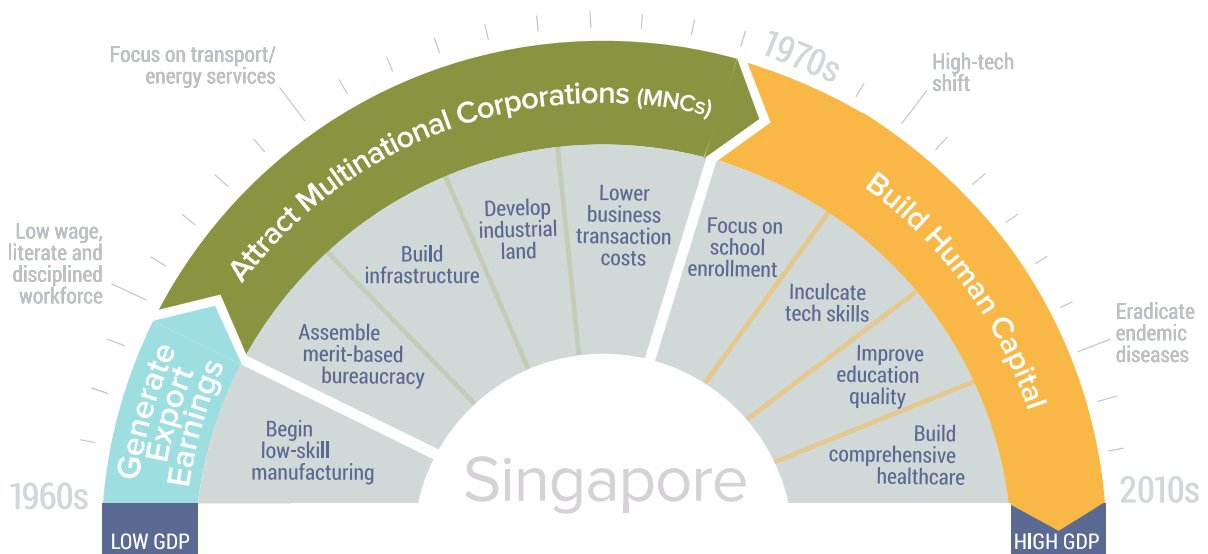
¹⁰¹ Firms in Singapore are investing more in intangible capital with the stock having increased by 30 percent per annum between 2013 and 2016 (IMF, 2018).

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human capital, infrastructure, and innovation to promote growth is one that other countries could emulate.

Singapore has demonstrated that investing in human capital can have a high payoff and that nothing is impossible. Its example should inspire others to redouble their own efforts, not to replicate the Singapore model in its entirety necessarily but to take full advantage of the various lessons that can be learned from the arc of its successful development strategy.

Figure 17: Elements of Singapore's Development Strategy



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