



SCHOOL OF  
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## From the Third World to the First:

Examining the role of the state in Singapore's economic  
development path

By Minxiao Chang

[minxiao.chang.1335@student.lu.se](mailto:minxiao.chang.1335@student.lu.se)

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Supervisor: Tobias Axelsson

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# Table of Contents

|   |           |
|---|-----------|
| <b>1.Introduction</b>   |           |
| 1.1 Aim & Research questions.....                                   | 7         |
| 1.2 Scope and Relevance.....  | 8         |
| 1.3 Delimitation .....  | 9         |
| 1.4 Thesis outline .....  | 9         |
| <b>2. Context</b>   |           |
| 2.1 Historical context.....   | 10        |
| 2.2 Economic Development .....                                      | 10        |
| 2.3 Singapore’s Achievement.....                                    | 11        |
| <b>3. Literature Review.....</b>                                    | <b>13</b> |
| <b>4.Theoretical Framework</b>                                      |           |
| 4.1 Early development of ‘the developmental state’ theory.....      | 17        |
| 4.2 The developmental state defined.....                            | 18        |
| 4.3 Models and characteristics of the developmental state.....      | 19        |
| 4.4 The limitations of the developmental state model.....           | 20        |
| <b>5.Methodology &amp; Data Selection.....</b>                      | <b>22</b> |
| 5.1 Research Design.....  | 22        |
| 5.1.1 Research Design Limitations.....                              | 22        |
| 5.2 Methodology.....  | 22        |
| 5.3 Data Selection.....   | 23        |
| <b>6.Analysis.....</b>  | <b>25</b> |
| 6.1 Invigorating the economy.....                                   | 25        |
| 6.1.1 Public Sector.....  | 25        |
| 6.1.2 Private sector.....   | 26        |
| 6.1.3 Foreign Direct Investment.....                                | 26        |
| 6.1.4 Second Wing.....  | 27        |
| 6.2 The integration of authoritarian government in the economy..... | 29        |
| 6.3 Singapore's industrial policy - "picking winners".....          | 30        |
| 6.3.1 Establishment of export-oriented manufacturing industry.....  | 30        |
| 6.3.2 Incentives for the innovation sector.....                     | 32        |
| 6.3.3 Forced Savings.....   | 34        |
| 6.3.4 Building financial credibility.....                           | 35        |
| 6.3.5 Human capital development.....                                | 36        |
| 6.4 Changes in state power with economic development.....           | 37        |
| 6.5 Discussion- The Singapore model.....                            | 38        |
| <b>7.Conclusion.....</b>  | <b>39</b> |
| <b>References.....</b>  | <b>41</b> |
| <b>Appendices.....</b>  | <b>46</b> |

# Map



Figure 1: Political Map of Singapore, Source: Dilanka Kamali Ratnayake

## List of Abbreviations:

EDB Economic Development Board

FDI Foreign Direct Investment

GDP Gross Domestic Product

GIC Government of Singapore Investment Corporation

GLCs Government-Linked Companies

HDB Housing and Development Board

HPAEs the High Performing Asian Economies

ICT information and communication technology

MAS Monetary Authority of Singapore

MNEs Multinational Enterprises

NRF National Research Foundation

NTUC National Congress of Trade Unions

PAP The People's Action Party

R&D Research and Development

RIEC Research, Innovation and Enterprise Council

DOS Singapore Department of Statistics

USPTO United States Patent and Trademark Office

## List of Figures:

Figure 1: Map

Figure 2: Singapore's Annual and 10-Year Moving Average Growth, 1965–2010

Figure 3: GDP (current US\$) - Singapore

Figure 4: Singapore's Direct Investment Abroad By Industry Abroad (Stock As At Year-End), Annual

Figure5: Singapore's International Investment Position, (End Of Period), Annual

Figure 6: Compensation of Employees in Manufacturing Industry

Figure 7: Total Manufacturing Output Annual, 1980-2020

Figure 8: Top ten Patent Assignees in Singapore

Figure 9: Remuneration In Manufacturing By Industry, Annual

Figure10:Gross National Income, Gross National Saving and Gross Capital Formation expressed in current prices (Million US\$)

## Abstract

Over the past half century, Singapore has gone from a tiny island in Southeast Asia to becoming one of the world's most developed countries. Singapore's achievements are reflected not only economically, but also in its emergence as a global innovation and financial services center. The intrinsic single-case study country narrative approach will be used in this study to explore the nature and evolution of the role of the state in Singapore's economic development over the decades through a combination of primary and secondary data analysis. The cooperation between various sectors of Singapore's economy and the implementation of industrial policy are investigated. Based on Chalmers Johnson's (1982, 1999) model of the developmental state as the theoretical framework, this study analyzes the role and influence of authoritarian state power in promoting economic development. The primary and secondary qualitative data are presented in graphic form, and indicate that the government has indeed driven Singapore's economic success.

The study found that during the survey period, the Singapore government used state-owned enterprises to explore emerging markets, then gradually and cautiously handed them over to the private sector as they matured. The state used foreign direct investment (FDI) to stimulate the vitality of the domestic market and drive the inflow of technology. The country's small but sophisticated bureaucracy operated efficiently, playing the role of an entrepreneur in economic development. The government directly participated in economic development and guided the capital flow to specific industries through the implementation of industrial policies to help Singapore achieve industrialization and technological innovation. The survey results also show that the state power of the government has not gradually weakened with the economic development of Singapore, which is mainly due to the vulnerability of the economy to external shocks. It is precisely because of the government's continuous intervention in the economy that Singapore's economy is resilient and has recovered strongly despite experiencing several financial crises.

*Keywords: Singapore, authoritarian government, government intervention  
industrial policy, economic development*

## 1. Introduction

Hong Kong, Singapore, Taiwan and South Korea are the four East Asian nations which comprise the Asian Tigers. These economies captivated the attention of the world when they underwent rapid economic growth during the 1960s to 1990s. Among them, Singapore's economic development is particularly notable. Compared with the other three economies, Singapore faced the situation of today's third-world countries, including political problems and natural endowment limitations. However, under the guidance of the Singapore government, the local economy has found its own development path and gradually entered the ranks of developed countries. Singapore has become famous for its economic development model which, according to Findlay and Wellisz (1993), is driven by "a highly interventionist, state-dominated political system". They assert that the state played a central role in the development of Singapore. The core of the Singapore model is the social contract between the government and the Singaporean people. Singaporeans are more willing than any other country in the world to accept government control and give up some of their individual rights in order to create more prosperity and attain a higher quality of social development.

Under government's guidance, Singapore has grown into one of the world's most successful economies (Lim, 1983) and is one of the most successful development stories among the Asian Tigers of the last 30 years. According to the World Bank, Singapore's per capita GDP reached \$11,861 in 1990, and this figure grew at an annual rate of about 10% from 1990 to 1997. By 2000, Singapore's per capita income was the 7th highest in the world, and 96% that of the United States. Singapore also ranked among the top three of the most competitive economies in the world in the 2015 World Economic Forum's Global Competitiveness Report due to its remarkable economic achievements.

### 1.1 Aim & Research questions

Using data from the report on government industrial policy released by the World Bank and OECD, the purpose of this study is to study the economic functions of a state and explore the relationship between government intervention and economic growth. This thesis attempts to examine the extent to which authoritarian government is effective at fostering economic growth by investigating the coordination between various economic sectors and the implementation of industrial policies by the Singapore government. This paper will focus its analysis on how Singapore achieved rapid and sustainable economic development under the guidance of the government, compare its economic development policies with those of other economies, and then analyze the reasons behind Singapore model's remarkable success. In addition, the researchers of the report analyzed the relationship between several factors, such as government spending, and medium- and long-term rapid economic growth, in order to reflect the appropriate degree of government intervention in the economy. Based on this, I formulated the following research question:

*Since Singapore became fully independent in 1965, in what ways has the government*

*promoted the local economy and maintained its vitality?* In order to conduct an effective analysis of this issue, I pose four more specific sub questions that consider it from different aspects.

*(1) How does the government coordinate the operation of public sector, private sector and foreign capital in the economy?*

*(2) How does a strong state role fit into economic development?*

*(3) How does the state use industrial policy to stimulate economic dynamism (in order to achieve economic growth and structural change)?*

*(4) How does the influence of state power on the economy change over time and thus affect national autonomy?*

Among them, the first research question is descriptive, aiming to define the role of government in coordinating different sectors in Singapore's economic development, which provides background and factual basis for subsequent research on PAP government intervention. The following question is an analytical exposition, which focuses on the fit between Singapore's authoritarian government and economic development from the macro level. The third question aims to demonstrate the industrial policy's impact on Singapore's economic development. It examines the government's guidance of the economy from the micro level. The second and third questions pave the way for the last question while observing the role of government in economic development from different angles. The last question is exploitative which aims to investigate changes in the relationship between state power and the market in economic development over time.

## 1.2 Scope and Relevance

The discussion of which model is more conducive to promoting economic growth, whether the free-market or command economy, has always been controversial in academic circles. As one of the Asian Tigers, Singapore experienced rapid economic development after World War II. The existing literature mainly focuses on the economic development of Singapore since independence from the perspective of the traditional growth theory (catch-up effect) and free trade, but neglects the intervention of the state in the economy.

Investigating state power is relevant to assess how its influence on the economy is related to the development direction of a country. Authoritarian government plays a significant role in the economic development of Singapore given its contribution to structural transformation and promotion of the initial accumulation of capital. Regarding the scope of this research, it focuses on the Asian Tigers in general and the case of Singapore in particular. In attempting to understand Singapore government intervention, industrial policy and the improvement in economic structure, this thesis seeks to examine the role of state power in economic development from an institutional perspective, namely, how successful it is at stimulating economic vitality. This research focuses on the Singapore's economic development process from 1965 to 2010. The role of government intervention in stimulating economic dynamism from an institutional perspective has not been fully explored. This allows the present



study to provide new insights regarding Singapore's economic development since its independence, while also mapping the economic development path of other developing countries under the intervention of an authoritarian government.

### 1.3 Delimitation

The time period covered by this study is limited to 1965 to 2010, during which Singapore experienced different stages of economic development. Singapore became an independent economy after gaining independence from Malaysia in 1965, which became a milestone in its economic development. Data availability is another factor delimiting the scope of this research. The Singapore Department of Statistics (DOS) and the Economic Development Board (EDB) can only provide data after 1980. To offset this weakness, data from the Singapore Government, OECD and World Bank were used as supplements. The World Bank provides the collection of primary development indicators from 1965 to 2010, which is updated annually and covers all data needed within the scope of this research.

### 1.4 Thesis outline

As a successful model of a developing country and state capitalism, this research will analyze Singapore's developmental process from the perspective of state-led (characterized by strong government intervention) growth, taking into account Singapore's developmental history and endowment factors. The literature review section will examine government intervention in economic development in different countries, and take Singapore as an example to explore how the government should promote national economic development. In addition, the study will provide an in-depth analysis of the reasons why the Singapore model has achieved sustainable development and discuss the possibility of its replication in other developing countries. Based on this, the research puts forward the relevant theoretical framework of state capitalism. The following section explaining the methodology used in this research demonstrates the data as well as discusses some of the possible limitations of the methodology and the sources used. After that, this paper analyzes and discusses the previous research results. Finally, the study concludes by pointing out the uniqueness of the Singapore model and its implications for other developing countries.

## 2. Context

### 2.1 Historical context

As an island nation at the southern tip of peninsular Malaysia, Singapore was used by Britain as an entrepot base and military base after World War II, and initially relied on the export of raw materials to achieve economic growth (Rastin, 2003). Singapore was only fully separated from the British colonizers in 1963 and was incorporated into the Federation of Malaysia in the same year, and gained full independence as a sovereign state in 1965 (Freedom House, 2014). At the time, Singapore had the characteristics of a failed state by today's standards, including widespread poverty, high unemployment, lack of basic health facilities, inability to establish a central government and ethnic conflicts (Rastin, 2003). Singapore was an independent island sandwiched between two large, conflict-prone countries, Malaysia and Indonesia (Rastin, 2003). It is the only country in the developing world that exists as a city-state.

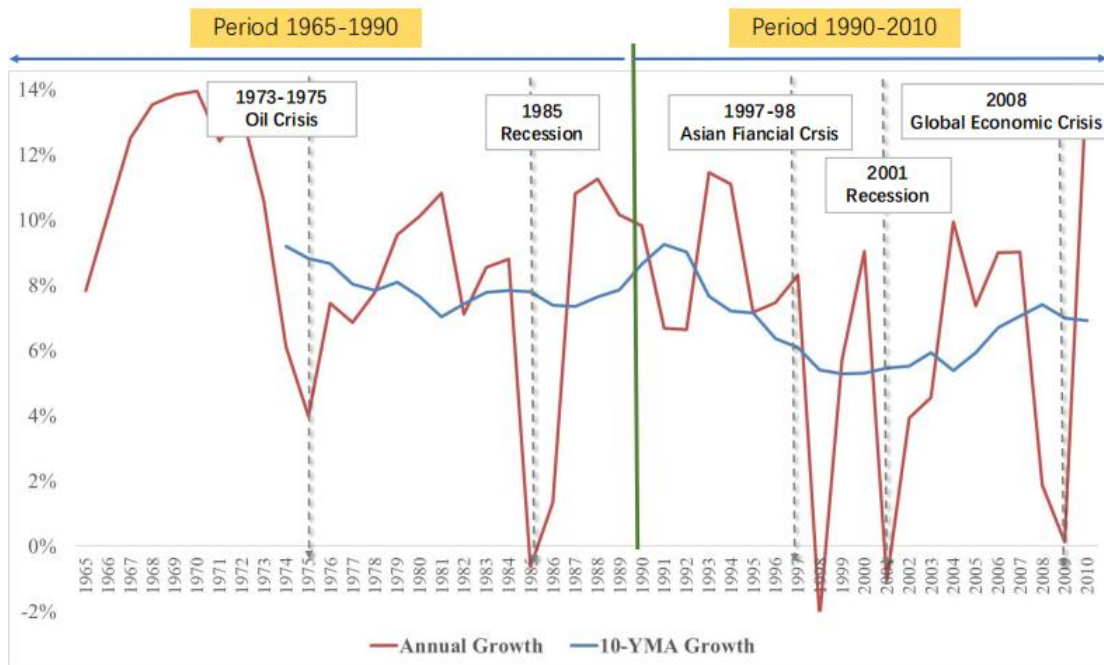
The ruling PAP was elected in 1959, and Singapore, freed from the control of the Malaysian federation, had an independent government, but the situation did not initially improve (Huff, 1995). The decline of the entrepot system and the shrinking of the British military base drained jobs and revenue streams from Singapore, leaving the isolated island nation facing more challenges and uncertainties (Rastin, 2003). The conventional wisdom of the 1960s was that every country that wanted to grow through industrialization, especially small countries, needed to grow by using the land around it (Huff, 1995). Singapore had no hinterland to rely on, no neighbours willing to trade with it, and no natural resources to exploit vigorously (Rastin, 2003). Under such circumstances, Singapore's model of economic intervention through state capitalism was established.

### 2.2 Economic Development

Singapore's economic growth from 1965 to 2010 can be roughly divided and studied in four phases: 1965-1980, 1980-1990, 1990-2000 and 2000-2010 (*Figure 2*). In the first two periods, 1965-1980 and 1980-1990, Singapore had just begun developing independently from colonial rule, while industrialization and infrastructure construction were still in their infancy (Khuong, 2011). During this time, the government promoted quantitative growth through the development of export-oriented industries and rapid capital accumulation. From 1965 to 1980, the government attracted FDI to increase domestic employment and productivity. Utilizing FDI to promote growth was the government's main policy objective during this period. In this period, despite the global recession of 1974-1975 caused by the oil crisis in 1973, Singapore's economy still completed its initial stage of industrialization and experienced rapid growth with the support of FDI (Khuong, 2011). The second round of rapid growth of Singapore in 1980-1990 was attributed to the economic policies launched by the government in the late 1970s and early 1980s, which aimed to adjust the industrial structure of the economy by focusing on the development of high-tech manufacturing and high value-added services (Khuong, 2011). Although

this period was marked by a deep recession in 1985 due to the contraction of global demand, Singapore still achieved the transformation of its industrial structure and rapid growth.

Figure 2: Singapore's Annual and 10-Year Moving Average Growth, 1965–2010



Data source: DOS

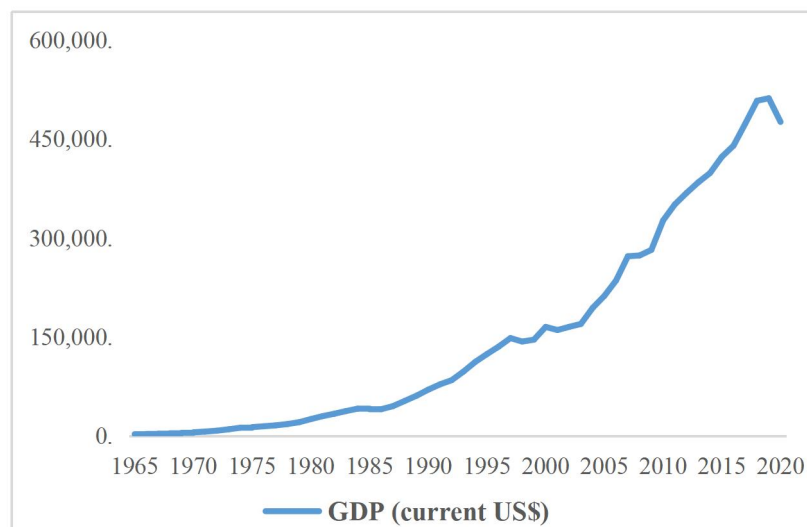
The two periods after 1990 were characterized by the government's emphasis on qualitative development and the national economy's strategic plan to transform it into a developed nation (Khuong, 2011). During these two decades of development, Singapore's economic development has been affected by external factors such as the Asian financial crisis of 1997-1998, the global recession caused by the dot-com crisis in 2000, the 9-11 terrorist attack in 2001, and the global economic crisis of 2008-2009 (Khuong, 2011). Meanwhile, the acceleration of globalization, the development of information technology and the intensification of the world economic turbulence in the two decades after 1990 also affected the economic development of Singapore (Khuong, 2011). Singapore's four periods of economic growth from 1965 to 2010 were marked by significant government intervention. Policies ranged from attracting FDI and fostering the development of domestic enterprises (1965-1980) to promoting strategic industries and improving factor conditions (1980-1990). It is important to highlight that policies evolved over time and significantly impacted Singapore's growth trajectory (Khuong, 2011).

### 2.3 Singapore's Achievement

In the research of developing countries, Singapore's experience of going from "Third World to First" (Lee, 2000) stands out. The leading role played by PAP government in the development process and its economic achievements have always attracted much attention. To achieve its social and economic goals, it has established a

corruption-free, meritocratic and efficient public sector (Rastin, 2003). Singapore's leaders have acted swiftly and decisively in both economic and social development. After gaining independence from Malaysia, the Singapore government adopted a series of measures, including legislative amendments, to present itself to the world as a safe, stable and investable economy (Sen Foundation, 2014). PAP government also established authoritarian rule over the country characterized by a high degree of intervention, ensuring that national policies are stable in the short term to attract foreign investors, and setting up plans for the country's long-term development (Rastin, 2003).

*Figure 3: GDP (current US\$) - Singapore*



*Data source: World Bank national accounts data, and OECD National Accounts data files*

On the whole, Singapore has achieved rapid economic and social development in all aspects since gaining its independence (*Figure 3*). Its GDP per capita surpassed that of Australia, Canada and the United Kingdom in 1994 (Menon, 2007). Singapore has defied the curse of the developing-nation trap to achieve sustainable growth, with per capita GDP ranking third in the 2014 IMF report. Singapore ranks 11th in the 2020 Human Development Index rankings published by the United Nations Development Programme (UNDP, 2020), alongside Finland. According to the 2015 IMD World Competitiveness Yearbook, Singapore is the second most competitive economy in the world, far ahead of other Asian countries. In terms of governance, Singapore was considered to be the fastest and most effective country in the world in terms of policy reform in 1997 by the Institute for Management Development. In 2014 Transparency International ranked Singapore as the fourth least corrupt government in the world.

### 3. Literature Review

To put Singapore's rapid economic growth and authoritarian government intervention in the four decades since independence into a broader context, this section will discuss the economic development in the same period of Taiwan, Hong Kong and South Korea which are among the High Performing Asian Economies (HPAEs). Among them, Taiwan, Hong Kong and South Korea, along with Singapore, are also known as the Four Asian Tigers, which achieved all-round economic and social development in the second half of the last century. Reviewing these three cases will help clarify the relationship between government, private sector and market as well as the impact of industrial policy on economic development in developing countries.

Among these economies, government intervention can be divided into two types: directive intervention and facilitative intervention (Wang, 2018). Directive intervention means that the government directly controls and participates in the economic activities, such as making investments and promoting the flow of capital to specific industries (Wang, 2018). They believe that some industries are more important than others, like light industries and labor intensive industries which can directly stimulate economic growth (Wang, 2018). Governments using facilitative intervention do not directly control or set production targets (Wang, 2018). They just provide advanced infrastructure and the education system in order to provide a positive environment for enterprises or selected industries (Wang, 2018). They establish policies to create conditions to facilitate the industries to improve, but not directly control them (Wang, 2018). Among the Asian Tigers, Taiwan and South Korea, just like Singapore, are led by directive intervention governments, whereas Hong Kong's government has adhered to facilitative intervention (Wang, 2018).

As two production-oriented economies, South Korea and Taiwan have adopted directive intervention measures and active resource allocation policies to promote industrial development. South Korea's interventionist policies in the early years of economic reconstruction relied on close co-operation between the state-owned financial sector and business leaders and conglomerates known as Chaebols. After this stabilization period, the Korean government increased subsidies to the R&D sector to develop its own core technologies by imitating those of developed countries (Mah, 2007). The Korean government is directly involved in economic activities, picking winners in a variety of industries, and developing the domestic semiconductor industry and other technology-intensive industries by directing the flow of capital to high-tech industries (Mah, 2007). According to Westphal (1990, p. 41), "The Korean government intervenes selectively to influence resource allocation in industrial activities." Wade (2005) also confirms that the South Korean government's directive intervention policies have different degrees of protection for different manufacturing sectors. The South Korean government continued to manage domestic market norms in the decades after World War II, playing a role in the economy by guiding and coordinating private sector strategy while not directing specific production outcomes

(Wade, 2005). Targeted government support and supervision of the development of key industries (such as in the telecommunications industry, e.g. Samsung) was effected.

Although Taiwan authorities did not implement systematic industrial structure adjustment policies like South Korea and Japan, they still promoted the development of specific industries through firm directive intervention policies, among which capital and technology-intensive industries were the most representative (Ho, 1987). Through policy incentives, the government encourages enterprises to shift to high value-added industries and persuades multinational enterprises (MNEs) to establish supply relations with the country. The government participates in economic activities to promote the flow of capital and high-quality talents to the innovation sector. As Wade (2005) mentions, Asian industrial policy is focused on picking winners. Internally, the economic reform (1950-1968) was directed to control the currency and combat the effects of inflation on import and export trade. The government introduced policies to directly control certain parts of the economy (Ho, 1987). By abolishing arbitrary import and export controls, the Taiwan government devalued the New Taiwan dollar, simplified the foreign exchange system, established export promotion programs and subsidized export credit (Chen, 2016). Through directive intervention in the market, the government protects specific industries to promote their development and thus achieve economic growth. Wade (2005) also admits that the government's investment incentive measures improved export volume and export orientation to a great extent. Ho (1987) claims that government-led resource allocation and export-oriented economic policies guide competition within Taiwan's market, which has encouraged all enterprises to improve productivity and product quality (Chen, 2016).

In South Korea, Taiwan and Singapore, three East Asian economies with low investment rates in the early 1960s, the governments guided the flow of capital to specific industries and sectors through directive intervention in the economy, including subsidies, cajoling and other incentives to stimulate private investment and promote domestic capital accumulation. Such direct intervention in industries through policy incentives and special protection to stimulate investment did help the three economies achieve rapid growth. According to Wade (2005), the economic development model of East Asian countries is more consistent with the promotion of foreign trade by national wealth rather than the promotion of economic growth by free trade. In contrast, a 1993 World Bank Report of the East Asian Miracle concluded that industrial policy and promotion of specific industries were often ineffective (Page, 1994). However, even though industrial policy had a positive impact on business conditions in the eight East Asian economies it studied, political constraints made it difficult for other developing countries to emulate it successfully.

By contrast, Hong Kong's government adopted facilitative intervention to regulate the market, which was less involved in the industry development and less active in

implementing various policies (Wang, 2018). Page (1994) argues that, compared with other Asian Tigers, the Hong Kong government has very limited interference in the economy, and the government's minimal participation in economic activities created a good market environment for enterprises which to some extent promoted local economic development (Wang, 2018). Hong Kong's industrialization began in the 1950s, and the number of small and medium-sized enterprises grew as the government's hands-off strategy provided an easy business environment for business to flourish. According to Morris' (1996) analysis Hong Kong is opposed to government intervention. It has a "positive non-intervention policy" in which the government has minimal power over the market and policies that promote industry. The Hong Kong government only provides advanced infrastructure and a sound education system for economic development, and does not interfere with production activities or set production targets (Wang, 2018).

Young (1995) agrees with that, pointing out that unlike the other three Tigers, Hong Kong did not rely on state-led industrialization. On the contrary, low taxes, lack of government debt and free trade are the pillars of Hong Kong's economic development. Moreover, Wang (2018) claims that the shrinkage of the technology industry in the early years was caused by the government's neglect and lack of policy support. Hong Kong spends less on R&D and patents than the other Tiger economies, but that doesn't hurt the innovation of its private sector. Facilitating government intervention has created a good environment for independent innovation in Hong Kong. In 2012, the number of R&D companies in Hong Kong was 6 times that of Singapore (ASTAR, 2013; C&SD, 2013).

The Asian Tigers helped their economies overcome the defects of the factor endowment by guiding intervention and promoting intervention respectively and achieved rapid growth in several decades (Quibria, 2002). The economic growth achieved by East Asian countries in which the government undertook activities pertaining to market management is contrary to the traditional economic analysis that the intervention of public institutions in the economic activities within a well-functioning market will affect sustainable development (Quibria, 2002). The oligopoly market under government intervention brought protection to the start-up companies that had not fully established comparative advantages. According to Wade (2005), in this market model, the country has enough space to shape and guide the comparative advantages of some industries, which are relatively common in the middle and high technology industries in Asia. Lin (2013) implies that minimal government intervention is not the optimal choice for the economic development of developing countries. Developing countries can make use of the advantage of being a latecomer and have the foresight to directly learn from the existing experience of developed countries and catch up by introducing technology. It is necessary for the government to play an appropriate role in certain industries. Wade (2005) argues that the government not only has the ability to promote the adjustment of domestic industrial structure and increase output by directly intervening in the market through

appropriate industrial policies, but also can help formulate foreign investment strategies that are in line with national interests.

This literature review has provided sufficient background and theoretical basis for this research related to industrial policy and government intervention, and also identifies several research gaps that this paper aims to fill. There are many studies on Asian Miracle countries' industrial policy and policy intervention in economic development in the existing literature, which provide solid empirical support for this research. That is, government intervention does affect the economic growth path of developing countries to some extent. Secondly, existing literature focuses on describing the specific ways and content of government intervention, while ignoring the relationship between industrial policy and market as well as the potential relationship between various departments of the state. Therefore, this paper aims to fill the research gap by answering the following four questions: (1) *How does the government coordinate the operation of public sector, private sector and foreign capital in the economy?* (2) *How does a strong state role fit into economic development?* (3) *How does the state use industrial policy to stimulate economic dynamism (in order to achieve economic growth and structural change)?* (4) *How does the influence of state power on the economy change over time and thus affect national autonomy?* Based on the data available, this paper uses explanatory methods to comprehensively explain the existence of policy intervention in various economic sectors of Singapore after 1965 and how it stimulates the internal vitality of the economy.



#### 4. Theoretical Framework

The aim of this research is to explore the role of government (or state power) in economic development, including how it coordinates the operation of various economic sectors, how industrial policy is used to stimulate economic vitality, and whether state power changes with economic development. Hence, Chalmers Johnson's (1982, 1999) model of the developmental state has been chosen as a theoretical framework for research. The model indicates that authoritarian-led economic development comes first, and the government can successfully promote economic development through direct and effective intervention (Johnson, 1982; 1999). The choice of this model is based on the review of previous literature, according to which the government plays a significant role in Singapore's economic development, both in domestic industrial policies and in attracting FDI. The model provides an entry point for research to examine the role of authoritarian government (state power) in economic development, and also provides theoretical support for the possibility of state power changing with economic development (Johnson, 1982; 1999).

Johnson's developmental state model was chosen to exclude the influence of other forces on economic growth and focus on the role of government in stimulating economic dynamism. The developmental state model is also closely related to industrial policy as a tool for economic development. Economic development means structural transformation, in which productivity is consistent in all kinds of economic activities. Moreover, a country's economic development potential and catch-up ability to a large extent depends on its contribution to the world market. Industrial policy was widespread after world War II, but its popularity and acceptance as a kind of economic policy changed greatly with the passage of time. This model provides a research framework for examining the role of industrial policy in different periods of Singapore's economic development.

In previous literature, Asian miracle economies represented by South Korea, Singapore and Taiwan have been observed to rely in their economic development on the developmental state approach. Existing literature suggests that the developmental state model differs from the neoclassical consensus based on the Solow growth model (1956). In the consensus, market-oriented reforms were emphasized in economic growth of developing states, with trade liberalization and exchange rate policies being the most central (Kim, 1993). This is also the reason why the classical catch-up theory is not chosen as the theoretical framework in this research. The author believes that it is inappropriate to interpret the success of East Asian Tiger economies as the victory of market ideology and export-oriented economy. This would overlook the particularity of East Asian economies characterised by authoritarian political regimes which goes against the assumptions of traditional economic theories and mainstream (Western) economic policies. Johnson's (1982;1999) developmental state model focuses on how government forces stimulate the dynamism of an economy and

protect it from the influence of certain 'market forces' emphasized in neoclassical economics. Similarly, Gershenkron (1962) had predicted in the early 1960s that government would be an important force for developing countries seeking to catch up with the West. This section first defines the concept of the developmental state, and then defines the intervention policies of authoritarian governments. Subsequently, this section points out the limitations of the model.

#### 4.1 Early development of 'the developmental state' theory

The emergence of the developmental state theory is not accidental in the development history of capitalism. Economic growth is the underlying logic of nation-state development, and the state has always sought to promote economic growth at the national level through law and policy intervention (Kim, 1993). The modern state has two basic forms when it comes to regulating the capitalist economy, the developmental and the liberal, which also directly affects the form of political organization of the state (Pereira, 2019). The liberal state limits government's role to securing property rights and contracts, controlling the national currency and maintaining healthy public finances, and relies more on the market itself to regulate the economy (Pereira, 2019). The developmental state not only coordinates the market through regulatory means, but also directly intervenes in economic development. The model of the developmental state proposed by Chalmers Johnson (1982, 1999) is characterized by the promotion of national economic development through direct intervention.

#### 4.2 The developmental state defined

On the whole, Chalmers Johnson (1982, 1999) defined the developmental state model as an economy in which economic development is the priority and public bureaucracies play an important strategic role in the economy. Countries in this category promote economic development through substantial policy interventions, including countries that yield small and sophisticated bureaucracies with substantial power to establish financial institutions in the public sector, and control exchange rates to protect domestic industries' final products from the impact of international exchange rate fluctuations, giving them a competitive advantage in the global market (Johnson, 1982; 1999). They also adopt a consolidated public investment budget, provide temporary credit and fiscal incentives that rely on intensive and continuous evaluation, as well as guide the high-tech industry. The developmental state model also includes protectionist and import substitution policy mechanisms that allow local firms to achieve scale production within protected domestic markets (Jones, 2017).

As a theoretical framework, the developmental state model is complementary to the economic development of East Asian Miracle countries. From the 1960s onwards, the Asian Tigers brought unprecedented growth to a region with poor factor endowments (lack of natural resources, capital and large domestic markets). Among them, the central feature of the development of East Asian Miracle countries is the government that provides human, material and resource systems to support regional economic

growth, which to some extent needs to be realized against market signals (Pereira, 2019). The East Asian Miracle also further reflected the consensus reached by many scholars on the indispensable role played by state power in the latecomers' economic development (Amsden, 1989; Evans, 1987; Evans & Rueschemeyer & Skocpol, 1985; Gerschenkron, 1962; Gold, 1986; Haggard, 1992; Johnson, 1982; Jones and Sakong, 1980; Lim, 1987). In their works, the strong state is almost equated with the authoritarian state. State strength is based on its capacity, i.e. the state apparatus that promotes the implementation of national policies, and state autonomy, i.e. state officials' independence of class interests and the demands of various groups (Rueschemeyer & Evans 1985: 50-53, 351). It is worth noting that the power of national autonomy in East Asian countries refers to the autonomy of government bureaucracies relative to dominant economic classes and social groups to ensure effective implementation of industrial policies (Rueschemeyer & Evans 1985: 46-50, 350-351; Skocpol, 1985: 9-11).

Meanwhile, the developmental state model also has internal logical contradictions. When the economic structure in a region is transformed or comprehensively reformed, uncertain new rules and institutions will be generated immediately, thus increasing the uncertainty of the further economic development of the developmental state (Przeworski, 1986). Secondly, as the economy develops, the market and the private sector will gradually expand their power, which means the government has to redefine the role of the state in economic development, and state's power often causes the erosion of autonomy (Pereira, 2019). Thus, this raises new challenges for the economic development of the developmental state with an authoritarian government, regarding a smooth transition into the ranks of developed countries. The internal logical contradiction of the developmental state model also provides an entry point for data analysis to observe the development of state power. As Singapore gradually steps into the ranks of developed countries, whether the relationship between the private sector and the public sector changes and whether the power of the government changes with the development of the economy will be the focus of the analysis in the following sections.

#### 4.3 Models and characteristics of the developmental state

The existing literature usually divides the developmental state into four categories according to the different stages of a country's industrial development and the country's position (core or edge) in capitalism when the Industrial Revolution occurred: (1) the original central model -- industrialized countries in the early 18th century represented by the United Kingdom; (2) the latecomer central model -- non-colonial countries that achieved industrialization late (Germany & Sweden); (3) the independent peripheral model -- a high level of autonomy after independence from colonial rule to achieve industrialization (Japan & Singapore); (4) the national-dependent peripheral model -- countries where the capitalist revolution occurred, but which lost their autonomy after the foreign debt crisis, and whose economies grow slowly (Brazil & Mexico) (Pereira, 2019).

In addition, the state of national development is also a continuum from limited to comprehensive. According to Johnson's definition (1982), a comprehensive developmental state has: (1) planning rationality rather than market rationality; (2) the orientation of industrial policy is developmental rather than normative; (3) the priority of industrial policy over foreign policy. Conversely, the limited developmental state pays more attention to the adaptive policy goals rather than the economic development itself, which has the following characteristics: (1) the economy gives consideration to the rationality of planning and the rationality of the market; (2) to strengthen supervision of the industry with market rationality; (3) major policy objectives include foreign policy and welfare development (Johnson, 1982; 1999).

The case of Singapore is generally regarded as a typical example of the independent peripheral model and a comprehensive developmental state. Singapore's institutions have a fundamental influence on its intervention policy. Peter Evans (1992) mentioned two characteristics -- bureaucratic capacity and embeddedness in its description of the role of state in East Asian developmental states. This characterization provides guidance for this thesis. In the data analysis section, the research focuses on how the state, as an agent of social change and economic development, integrates with various sectors of the economy. It also focuses on the embeddedness of state power in national economic development.

#### 4.4 The limitations of the developmental state model

The developmental state model does challenge neoclassical economic orthodoxy that focuses narrowly on market forces, but it also faces some criticism. Firstly, the economic policies adopted by the developmental state (including industrial policies) promote the development of the industry at the beginning of its development (when there is lack of resources and knowledge) (Kim, 2016). But when development succeeds, the state's interference can become, in part, a bureaucratic red tape that constrains economic dynamism. Secondly, the developmental state model's successful autonomy depends on the separation of political elite and capitalist classes to make officials immune from the influence of their own class interests (Kim, 2016). But this separation is usually a short-lived development and if the developmental state succeeds, the fusion of political and capitalist elites will inevitably weaken state autonomy.

Hence, this research needs a framework through which the role of state power in the process of economic development can be analyzed. "The developmental state" theory provides an entry point for the discussion of state power in the process of economic development in developed countries. Based on the developmental state model's definition of authoritarian government, we can learn from the formation of bureaucracy, financial institutions established by the government in the public sector, economic policies (exchange rate, currency and trade policies), industrial policies (picking winners), the role of state power in stimulating economic dynamism, and

how the state actually implements its development policy objectives based on an analysis of the subsidies for specific industries. The following sections will examine the integration of the role of the authoritarian government in Singapore's economic development and assess the extent to which it affects the path of economic development.

## 5. Methodology & Data Selection

This section introduces the research approach, methods and data used in this study. The analytic narrative approach of a single case was conducted based on mixed case studies based on qualitative data analysis and research reports from the World Bank, OECD, EDB and DOS. This section begins with an overview of the study design, followed by a data collation and analysis section, which includes a discussion of the value and limitations of the data sources. Finally, the limitations of research and data analysis are explained. Generally speaking, this research aims to investigate how the Singapore government stimulates the economic vitality, the applicability of the developmental state theory in the economic development of Singapore, and how various departments interact with each other in the economy.

### 5.1 Research Design

The method of this study is to conduct an in-depth analysis of the economic development case of Singapore by adopting the intrinsic single-case study country narrative approach (Rodrik, 2003). The design encourages recognition of the research context of an individual case in order to explore the case in depth and present the inherent complexity and comprehensiveness of the context of the case. This research not only examines the internal characteristics of Singapore's economy and economic policies, but also the parameters characterising their relation with the international background (openness, integration, mobility). Singapore is a unique presence in the East Asian Miracle, both in terms of limited resource endowments and geographical location, compared to other HPAEs. Therefore, Singapore's economic development should be analyzed as a unique single case. Modified case studies can address different design sources and research methods to ensure the comprehensiveness of measurement. The purpose of this research is not to merely describe the characteristics of the behaviour of the PAP government regarding economic development, but to explore the relationship between Singapore's economic development and its industrial policy, which has demonstrated top performance in reaching the level of developed economies.

#### 5.1.1 Research Design Limitations

Admittedly, single-case studies usually have low external validity. Studies usually only focus on the context and development of selected cases, ignoring the connections between similar cases and their potential universality. It is worth emphasizing that this study only focuses on the developmental state, i.e. the authoritarian government's stimulus measures for Singapore's economy, and does not extend the study to all HPAEs.

### 5.2 Methodology

This research adopts qualitative analysis to analyze the economic development path of Singapore since 1965. Qualitative analysis focuses on "sense making" or understanding of a phenomenon rather than prediction or explanation of the

phenomenon (Bhattacharjee, 2012). This approach focuses on the relationship among geographical location, political system and trade, which provides an answer to economic growth within the region with an analytical country narrative (Rodrik, 2003). The country narrative research approach explores the role of macro and micro economic policies in the economy in driving technological integration and original accumulation, which focuses on the role of political institutions (state power) in economic development from endogenous and exogenous factors (Rodrik, 2003). As a kind of case analysis method, country narrative method clearly demonstrates that "good" institutions must be considered in the context of national environment in promoting and maintaining economic growth (Rodrik, 2003). On this basis, the combination of country-specific experience (the Singapore Model) and economic growth experience provides background conditions for economic growth guided by authoritarian governments. Moreover, the research method of Hermeneutic Analysis will also be adopted. This research method was chosen because of its subjective intention to 'interpret' specific texts in the historical context and is considered an interpretive technique for qualitative data analysis (Bhattacharjee, 2012). Hermeneutic Analysis can more comprehensively reflect the historical and social context and better analyze qualitative data (Bhattacharjee, 2012).

Qualitative data sources for this research will be obtained from working reports of the World Bank, OECD, the Government of Singapore, EDB and DOS. Qualitative data provide the background and content required for this paper to demonstrate the role of the government in stimulating Singapore's economic vitality. Meanwhile, qualitative data intuitively show the rapid development of major industries in Singapore during the decades since 1965, the adjustment of national economic structure and the dramatic growth brought about by it.

### 5.3 Data Selection

This research examines the role of government in stimulating economic dynamism since Singapore's independence in 1965 through primary and secondary data. The primary data are from the World Bank's working report, including the growth of various pillar industries over several decades and the change of Singapore's outbound investment. The World Bank and the Singapore's EDB provided complete economic data related to Singapore during the analysis period. In addition, the World Bank has been considered a reliable source of data. Data information related to the economic policies (fiscal and monetary policies) of the Singapore government is obtained from the Monetary Authority of Singapore (MAS), which is Singapore's Central Bank and Integrated Financial Regulator. MAS and EDB are chosen not only because they constitute the most comprehensive and complete source of Singapore's economic policies, but also because it is the national bank of Singapore, and its interpretation of fiscal policies represents the official attitude of the PAP government. The two sources were combined to provide a more complete picture of the Singapore government's intervention in domestic market activities, and to ensure that the data could be cross-referenced, corroborated with each other or used to fill in the gaps of the other.

Secondary qualitative data were cited from academic journal articles and local newspapers. The author analyzed the data sources through Google Scholar and LUB Library. Due to abundant existing research on Singapore's economic development in particular and the East Asian Miracle in general, it is necessary to classify and integrate data sources from various channels and ensure the authenticity and reliability of secondary data. All reports and qualitative data sources used in this study are in English, so the authenticity and reliability of qualitative data and government industrial policies can be improved through cross-referencing between journals and reports to avoid any author's bias affecting the credibility of research results.



## 6. Analysis

This section aims to answer the research questions proposed in section 1, including the main question and the four sub questions, which concern the authoritarian state's role and government intervention during Singapore's economic development. Under the guidance of the developmental state theory, this section will make a detailed analysis of state power in the Singapore model from four perspectives: how government is stimulating economic dynamism, the integration of state role in the economy, Singapore's industrial policy, and changes of state power with economic development. It will then demonstrate the economic achievements of Singapore since 1965 through charts.

### 6.1 Invigorating the economy

The historical context of Singapore before 1965 was characterized by problems similar to those existing in today's Third World countries (Rastin, 2003). In the absence of a response to PAP government's requests for international assistance, the government realized that Singapore will have to survive on its own (Mahizhnan, 1994). Lee Kuan Yew and his team had to get directly involved in the economy to maximize the use of limited resources by coordinating the development of various economic sectors.

#### 6.1.1 Public Sector

In the early days of Singapore's independence in 1960-70, the PAP government put industrialisation at the centre of its economic development (Huff, 1995). Export-oriented industrialization, deregulation and trade liberalization quickly replaced import-substitution industries to achieve national economic development goals. At that time, the private sector of Singapore had not yet been established, and the government used the introduction of foreign capital and reliance on the state capitalist sector to achieve economic development. The government monopolized key industries such as infrastructure construction, social services, industry and communications by controlling state-owned enterprises and setting up statutory committees (Huff, 1995).

The government created two statutory boards, the EDB and the Housing and Development Board (HDB), to address the country's urgent problems of unemployment and housing shortage (Völgyi, 2019). EDB promoted national economic transformation and sustainable development by developing new industries, helping businesses attract financing and coordinating labor distribution. Facing the overseas market, EDB successfully developed the service industry into a secondary industry besides manufacturing, continuously attracted MNEs to enter and helped domestic enterprises expand into the overseas markets (Völgyi, 2019). The HDB gave most of Singapore's citizens access to public housing for 25 years. Moreover, the MAS pursued monetary and foreign exchange policies that strengthened and stabilized economic growth. The Port Authority of Singapore, the Public Services Committee and the Civil Aviation Authority of Singapore all acted as statutory committees to implement the necessary infrastructure development and construction projects of the country (Völgyi, 2019). The statutory boards and state-owned

enterprises mentioned above constitute the state capitalist sector, which fundamentally promotes Singapore's industrialization and national economic development.

Due to the increasing number of state-owned enterprises, the Singapore government established Temasek Holdings in 1974 to control and coordinate the economic activities that state-owned enterprises were involved in (Hussein, 2019). Temasek Holdings is 100% owned by Singapore's Ministry of Finance, and its function shifted from merely overseeing the economic activities of state-owned enterprises at the initial stage to providing direct advice on the business strategy of its companies regarding co-operation, investment and mergers (Hussein, 2019). Temasek and other state-owned enterprises have greatly contributed to the diversification of national development goals and economic interests.

### 6.1.2 Private sector

In 1970, under the influence of developed capitalist countries, the Singapore government carried out market reform and introduced privatization in the public sector by means of property privatization, trade and investment liberalization and reform of the public sector (Völgyi, 2019). Statutory boards transferred ownership to the private sector in the form of assets or shares and introduced privatization tools such as liberalization and deregulation into nationalized production. The government would open some industries monopolized by statutory boards to private enterprises to varying degrees and gradually withdrew unnecessary business activities to reduce competition with the private sector and promote the vitality of the domestic market (Huff, 1995). From another perspective, Singapore's privatisation represents a restructuring of state capitalism and its ownership. In addition to internationalization, PAP governments implemented domestic market policies such as labor market interventions, forced savings as well as tax and fiscal incentives to achieve a stable domestic macroeconomic environment (Völgyi, 2019).

### 6.1.3 Foreign Direct Investment

Singapore's economic development is largely dependent on foreign capital - foreign enterprises being another significant feature of its development model. By amending laws and curbing corruption and labor unrest, the government has proved to foreign investors that state policies will remain stable, protecting their assets (Völgyi, 2019). Since 1967, the contribution of FDI to Singapore's domestic capital has gradually increased, resulting in an accumulation of a large amount of foreign exchange reserves (Mahizhnan, 1994). In the period of 1980-1990, Singapore was the largest recipient of FDI in the world in absolute terms among underdeveloped countries. MNEs achieved almost complete dominance in the total output and direct export volume of Singapore's manufacturing industry (Mahizhnan, 1994). Hence, Singapore's economy still failed to reach the level of developed countries around 1990 despite its rapid economic growth over the past three decades, and one of the most important reasons for this lies in its excessive dependence on the contribution of

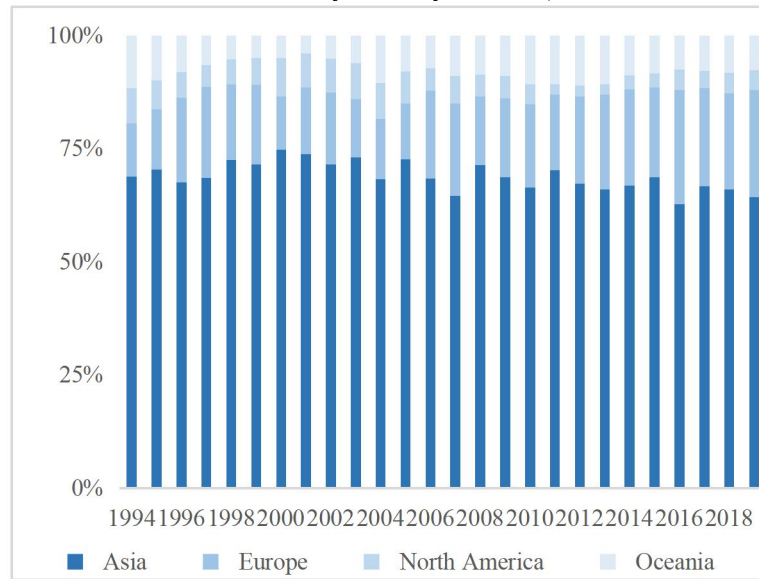
foreign capital to GDP.

#### 6.1.4 Second Wing

By developing state-owned enterprises and attracting foreign investment, the government enabled Singapore's economy to grow rapidly, but was still a long way from the developed nations it hoped to join. Thus, from the late 1980s, Singapore gradually shifted the focus of national investment and development from the relatively saturated domestic market to the overseas market, in order to promote the maturation of Singapore's "second wing". In Singapore's 1991 Government Economic Strategy report, economic planners clearly pointed out that Singapore, as an island country, should see the entire world as its hinterland for economic development, that is, Singapore needed to move towards the global market.

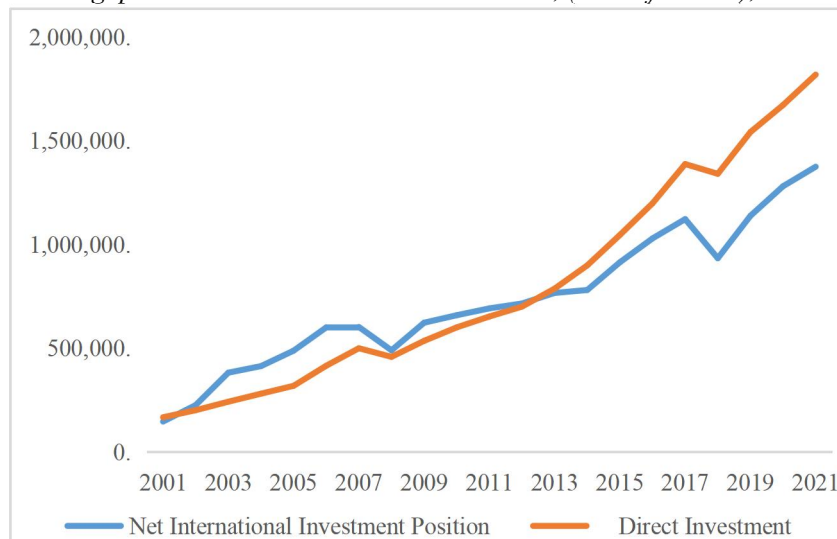
Therefore, due to the scarce land and labor resources at home, the demand for market expansion and the high potential of the overseas markets, the Singapore government was eager to develop an external economy (Mahizhnan, 1994). The Singapore government adopted regionalization as their focus when going overseas. It did not mean that Singapore did not go global, but channeling its resources into the regional market was a more practical approach. In fact, as early as the 1960s, Singapore established connections with the global enterprise network by relying on MNEs, but it always remained in a subordinate position to provide services in the network, and did not lead the construction of the whole global industrial chain (Mahizhnan, 1994). The Singapore-Malaysia-Indonesia growth triangle was the first state-led initiative and encouraged division of labour and cooperation between these countries which had different comparative advantages. In the ten years from 1981 to 1991, Singapore's investment overseas increased by more than 400% (Mahizhnan, 1994). The increase in the amount of OFDI did, to a large extent, increase the influence of Singapore investors' strategic management of overseas enterprises, thus increasing the influence on the external economy (Mahizhnan, 1994). Globalization has also largely promoted transformation of the national economic structure to high value-added and knowledge-intensive industries, while domestic enterprises continue to expand investment in the Asia-Pacific region to promote the diversification of national economic growth sources (*Figure 4*).

Figure 4: Singapore's Direct Investment Abroad (DIA) and Direct Equity Investment Abroad Singapore's Direct Investment Abroad By Industry Abroad (Stock As At Year-End), Annual



Sources: Singapore, DOS & EDB. Annual series 1994-2019

Figure 5: Singapore International Investment Position, (End Of Period), Annual



Sources: Singapore, DOS & EDB. Annual series 2001-2021

It is worth noting that although enterprises are the main force exploring and investing in overseas markets, the government still plays an important role in guiding enterprises in order to ease their entrance into the overseas markets (Mahizhnan, 1994). Singapore's main sovereign investors are Temasek and Government of Singapore Investment Corporation (GIC), the former being an investment company and the latter a traditional sovereign wealth fund. GIC has always been investing in the global market, while Temasek initially invested domestically, then expanded to the rest of the Asian market in 2002, and has been investing in the global market since 2011 (Hussein, 2019). The government also expanded overseas investment through state-owned enterprises and established new economic sectors to create Singapore's 'second wing' (Figure 5). This increased the country's economic resilience and

diversification and gradually made financial services one of the country's key industries (Mahizhnan, 1994). In 1993, the Report submitted by the "Committee for Promoting Overseas Entrepreneurship" (CPEO) appointed by the Prime minister of Singapore showed that the government not only helped enterprises to solve the financial problems faced by firms in overseas markets through financial support programs, but also used preferential tax policies to encourage firms to expand overseas. Under the guidance of the government, Singapore's external economic expansion gradually matured, which also provided new impetus for the development of the "second wing".

In accordance with the developmental state model, Singapore prioritises economic development when coordinating its different sectors. Through substantial economic intervention, the state allows public bureaucrats to play a strategic role in national development, and uses the development of the public sector to expand industries and gradually bring them into the private sector (Mahizhnan, 1994). The government adopted a positive macroeconomic policy to introduce FDI along with the inflow of new technologies. After completing the initial accumulation of capital, the country broke through the restrictions of its limited domestic market and enhanced its economic strength in the world by controlling foreign commercial and financial accounts.

## 6.2 The integration of authoritarian government in the economy

The Lee Kuan Yew government let the state play the role of an entrepreneur, and the PAP government has promoted Singapore's economic development both through direct intervention and supervision. The core of the Singapore model is the social contract between the ruling People's Action Party (PAP) and Singaporeans (Rastin, 2003). Singaporeans are essentially willing to accept more state control and give up individual rights to create economic prosperity and improve the quality of life of their citizens. At the same time, Singapore has a highly efficient executive bureaucracy. Since 1959, Singapore's electoral politics have been dominated by one party. The authoritarian rule by the ruling PAP has provided confidence for economic development both at home and abroad. Internally, the government has had a high sense of discipline in managing national economic affairs. Apart from cautiously nationalizing some key industries, it makes effective industrial policies to guide the development of the private sector. As Haggard (2018) demonstrates, a key factor in developing countries' success is their ability to "bind" the private sector which is made possible by their capacity to control capture as well as access and elicit information. Externally, Singapore is a state-led, export-oriented economy. The government ensures the country's macroeconomic stability in the short term and guides its long-term growth. PAP guarantees Singapore's financial credibility in the name of the state to attract foreign investment to promote the development of domestic industries. In these aspects, the Singapore government has demonstrated "complex bureaucratic capabilities in policy implementation and monitoring", in accordance with Haggard's observations (2018). This is also consistent with Johnson's

(1982, 1999) proposal of a small but efficient bureaucracy in the developmental state model.

### 6.3 Singapore's industrial policy - "picking winners"

The transformation of national economic structure and the development of specific industries need to be guided by the government to a large extent and cannot be completed independently by market forces and enterprises. As a result, the effectiveness of government's industrial policy in promoting industry development has been widely investigated in the academic literature. Singapore has been implementing directive intervention since 1965, which implies the use of industrial policy to guide the industry to foster its growth. Industrial policy mainly provides policy support for industrial development from the following three aspects. The first is 'functional policies' that promote industry development through exchange rate policies and protection policies for global trade competition. Secondly, multi-sector 'horizontal policies' include incentives for enterprise R&D and construction of infrastructure around the industry. Finally, 'sectoral policy' promotes the development of specific departments and companies. This section will explain the industrial policies introduced by Singapore government to stimulate domestic economic dynamism in the manufacturing industry (especially export-oriented) and technology industry (innovation).

#### 6.3.1 Establishment of export-oriented manufacturing industry

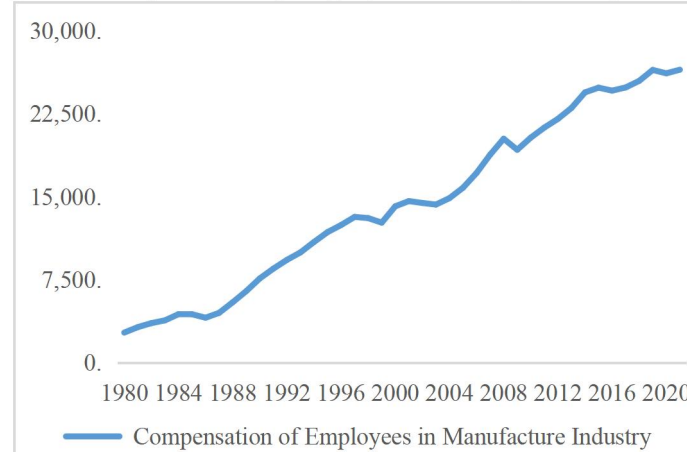
Singapore's approach to manufacturing stands in stark contrast to the protectionist and 'picking winners' attitudes of South Korea and Taiwan. Singapore supports free trade in manufacturing with directive intervention and attracts foreign investment through supply-oriented policies.

With the support of the EDB, Singapore's ambitious planners pay close attention to changes in the international market and select industries that can bring long-term benefits for economic development (Huff, 1995). The potential of the electronics industry was noted by Singapore ministers during their visit to Taiwan in 1966 (Wee, 1966; Goh, 1992). Its characteristics of high value-added, high technology content and high capital intensity were considered by planners to be in line with Singapore's economic development path. Subsequently, EDB adopted a series of policies such as labor market intervention, tax reduction and fiscal incentives to attract foreign investment and promote the development of Singapore's manufacturing industry (*Figure 6*).

For example, as a high-cost manufacturing producer, Singapore's wages were initially too high for international markets looking to invest, hence the PAP government gradually introduced labour laws starting from 1967, establishing effective government control over trade unions and giving employers the power to negotiate workers' wages (Völgyi, 2019). The effect of the act was so striking that in 1969 Singaporean workers in the electronics and electrical assembly industry, which had

the highest share, earned less than one-tenth the hourly wage of American workers while being as productive as those in other newly industrialized countries. Thus, over the course of the 1970s Singapore became the largest overseas supplier to the US and European semiconductor assembly industries (Völgyi, 2019).

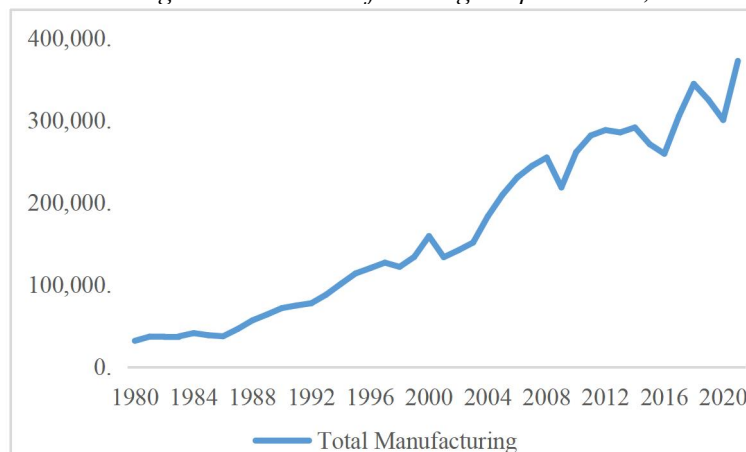
Figure 6: Compensation of Employees in Manufacturing Industry



Sources: Singapore, DOS & EDB. Annual series 1980-2008

Moreover, the government attached great importance to the development of human capital and investment in education in the manufacturing sector. It merged all the independent trade unions in the country into the National Congress of Trade Unions (NTUC) and established a direct and effective control over the group. Under NTUC's leadership, technical schools for high-paying industries such as electronics, ship repair and petrochemicals were set up to boost human capital. In addition, in order to better control the domestic wage level and continue to attract foreign investment, the Singaporean government set up the National Wage Committee composed of the government, NTUC and employers (Völgyi, 2019). The PAP government continued to attract foreign capital by keeping domestic labour costs stable and internationally competitive.

Figure 7: Total Manufacturing Output Annual, 1980-2020



Sources: Singapore, DOS & EDB. Annual series 1980-2020

With strong government guidance of manufacturing exports, Singapore's manufacturing exports have made an enormous contribution to driving the economy. Manufacturing's contribution to GDP has been rising since 1967 (Huff, 1995). In fact,

the proportion of direct manufactured goods in GDP increased from 12.7% in 1966 to 60% in 1992 (Völgyi, 2019).

### 6.3.2 Incentives for the innovation sector

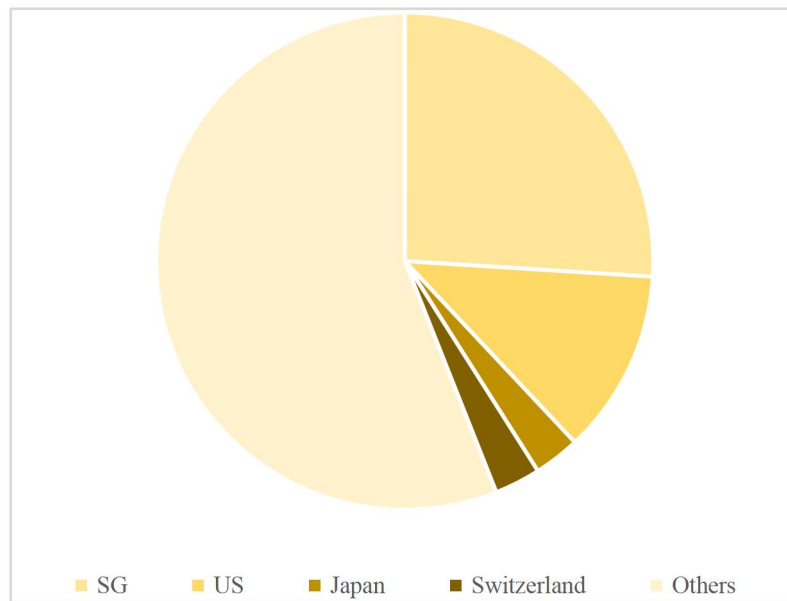
One of the determinants for innovation capacity is the government. Since the market itself could not provide sufficient stimulation for knowledge production, government intervention plays a crucial role in supporting R&D and innovation (Wang, 2018).

After the 1980s, the development of export-oriented manufacturing industry in Singapore was basically mature, and the government made the goal of attracting foreign investment as the primary task of economic construction (Wang, 2018). PAP government hoped to attract MNEs and drive the transfer of R&D centers to Singapore, thus promoting the spillover of advanced technologies to local enterprises (Wong, 2001). Then, in the late 1990s, Singapore decided to address its high-tech industry's excessive dependence on foreign capital and lack of local innovation (Yeung, 2000). In order to solve Singapore's dependence on foreign countries in the innovation sector, the government launched the Five-Year National Plan on Science and Technology, establishing Technopreneurship Innovation Fund and made joint investments with venture capitalists in the local emerging technology enterprises to promote the localized development of high-tech industry (NFR, 2015). After 2000, the Singapore government established various agencies and support schemes at the national level such as Research, Innovation and Enterprise Council (RIEC)-2006, The National Research Foundation (NRF)-2008, The Science and Technology 2010 Plan etc., which provided strategic advice and financial support to encourage the commercialization of technologies for indigenous R&D innovation. The chart shows the investment of Singapore government in technological innovation since 1980.

The promotion of specific industries by the government's industrial policy makes Singapore's technological innovation highly concentrated in specific fields. Since the 1980s, Singapore has sought to promote local innovation in electronics as well as information and communication technology (ICT), accounting respectively for 57 percent and 32 percent of the country's patents (Wang, 2018). This patent application follows a similar trend with the United States Patent and Trademark Office (USPTO) in recent years. According to USPTO filings, the vast majority of patent applications (84 percent) come from industry. With the exception of two public research institutions, all the top patent applicants came from enterprises in the semiconductor and electronics industries. The dependence of high-tech industry on foreign investment is also reflected in the list, with MNCs contributing 69% of the industry share and holding six of the top 10 patent holders. Chartered Semiconductor and STATS ChipPAC are the only two companies to be featured in the Top Patent Assignees List, and they both have strong links with the Singapore government (either being a state-owned enterprise or a Government-Linked Company (GLCs)).



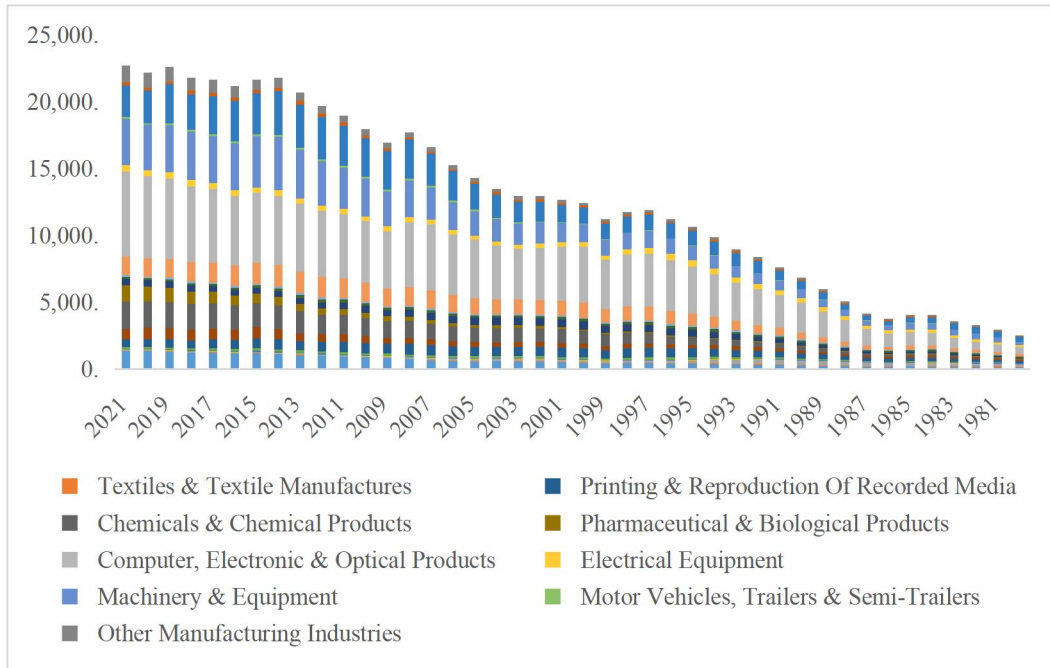
Figure 8: Top ten Patent Assignees in Singapore



Sources: DOS, 2015.

Since the 1990s, Singapore has gradually shifted its growth and development focus from MNCs to local enterprises by introducing more policy instruments to promote the development of local enterprises (Wang, 2018). The government has been playing a directive role in the development of Singapore's innovation sector, and has actively implemented a series of industrial policies to ensure that relevant departments have adequate budget and clear strategic guidance in innovation. All these industrial policies have contributed to Singapore's transformation of its economic structure towards high value-added industries (Völgyi, 2019). Although MNEs accounted for the majority of the R&D achievements of Singapore's industrial sector in the early years, the government gradually attached importance to the cultivation of the innovation ability of local enterprises in the development of the industry. This led local enterprises to become more involved in the R&D activities of the industrial sector, which was reflected in the growth of the number of local patents (*Figure 8*).

Figure 9: Remuneration In Manufacturing By Industry, Annual



Sources: Sources: Singapore, DOS & EDB. Annual series 1980-2021

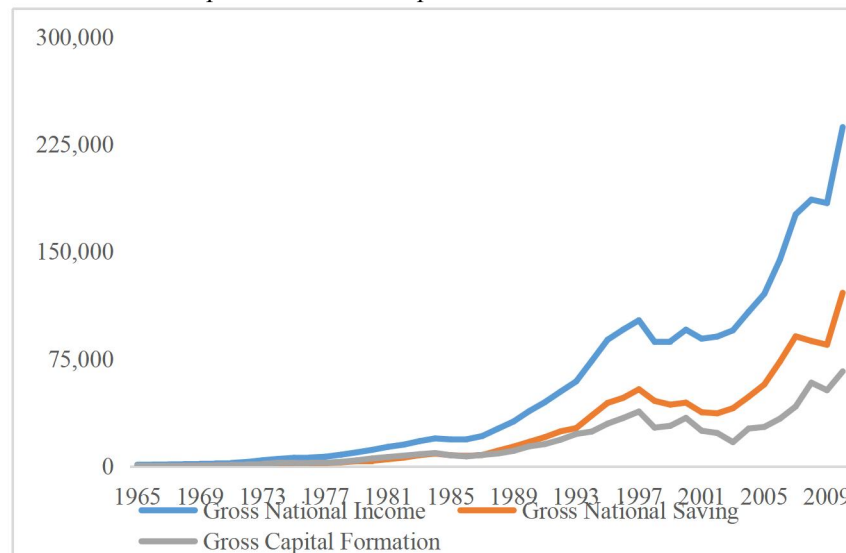
It is worth noting that the implementation of the government's industrial policy has resulted in a high concentration of R&D and innovation in specific industries, while industries that the government does not focus on have few patent applications (*Figure 8*). It can be seen that Singapore's industrial innovation is indeed affected by policy intervention to a large extent. Likewise, the development of technological innovation and industrial transformation within the country is promoted from top to bottom, rather than initiated and dominated by the market. Moreover, despite the fact that Singapore's domestic industry had a disadvantaged start, it has grown tremendously in recent decades (Völgyi, 2019). The effect of government industrial policy on enterprise independent innovation performance index can prove the effectiveness of government intervention from another aspect.

### 6.3.3 Forced Savings

As early as 1963, Singapore's Finance Minister said that investment and capital formation are the core of economic growth, and a high savings rate is the most direct and effective way to meet this demand. The advantages of government intervention in the early stage of economic development are thus reflected. It is precisely because of Singapore's high domestic savings rate that the government can carry out secondary allocation of resources and invest the rest of the national economy in the development of high value-added and capital-intensive industries (Völgyi, 2019). However, the high savings rate of Singapore was realized by way of government intervention rather than the voluntary decisions of the citizens themselves. The government controls prices through seven statutory boards with monopoly powers, and uses consumer surplus to subsidise public housing, thereby covertly diverting spending into savings (Huff, 1995). PAP government aggressively promoted provident funds to force the

private sector to save to achieve high savings rates. Apart from the social security scheme (the Central Provident Fund), the government manipulates the market to control surplus private voluntary savings. Within 30 years, Singapore's national savings grew from S\$-46 in 1960 to S\$30,828 in 1990. Thus, it can be seen that PAP's forced savings policy has greatly improved the savings rate of the public sector and the private sector, laying a foundation for the country's capital accumulation (*Figure 10*).

*Figure 10: Gross National Income, Gross National Saving and Gross Capital Formation expressed in current prices (Million US\$)*



*Notes: Gross national savings equal public sector savings plus private sector savings (Huff, 1995). Public sector savings are the current surplus in the consolidated accounts of the public sector, which consists of government plus seven major statutory boards, including the HDB, Jurong Town Corporation, Public Utilities Board, Port of Singapore Authority, Telecommunication Authority of Singapore, Urban Redevelopment Authority and Sentosa Development Corporation (Huff, 1995).*

The government's forced savings policy promoted the rapid accumulation of physical capital in Singapore's private sector, and the resulting high investment was mostly from domestic financing. As demonstrated in the chart, Singapore's gross national savings had exceeded gross capital formation by the end of the 1980s. The huge savings not only ensured the stability of the domestic macroeconomic environment, but also opened up a cheap and stable financing channel for the country's infrastructure construction (Huff, 1995). The domestic private sector used the massive savings accumulated by its citizens as start-up capital to invest in overseas markets in return for the inflow of foreign private capital. At the same time, domestic savings also provided subsidies for MNEs, which earned high profits in the world market while learning the management knowledge and technology of MNEs (Völgyi, 2019). Overall, the Singapore government created a stable economic environment for the domestic market through FDI and forced savings.

#### 6.3.4 Building financial credibility

Singapore has successfully built up the financial credibility of its own economy to secure international co-operation. Unlike Hong Kong, which can rely on effective

support from the Bank of England, Singapore cannot apply for international borrowing on behalf of a developed country's central bank (Rastin, 2003). The PAP government had to prioritise economic planning to avoid the economic risks of inflation, currency devaluation and balance-of-payments problems (Huff,1987). By gradually implementing fiscal programmes, the government has enabled the economy to have substantial officially held fiscal reserves, enabling it to meet emergency public spending needs. During the Asian financial crisis of 1997, for example, Singapore was able to insulate itself from the economic collapse of many of its neighbors (Rastin, 2003).

### 6.3.5 Human capital development

Furthermore, the success of Singapore is also reflected in the government's investment in human resources development and people's education. Through a series of measures such as controlling trade unions and establishing schools, the government cultivates human resources and establishes order in labor-management relations (Rastin, 2003). In this business environment, labor market and labor-management relations are stabilized. The Singaporean government also attracts high-quality talents from overseas through skilled immigration. In the long run, only skilled and productive high-quality labor force can improve economic efficiency and achieve economic growth. Iran, a fellow developing economy, focuses on stemming the capital outflow rather than the brain drain that results in a loss of 60 percent of the country's college graduates each year (Rastin, 2003). Singapore's government has attracted a large number of high-quality workers from around the world by providing a decent standard of living and low tax rates for highly qualified people. Compared with Iran, which is rich in oil and gas resources, Singapore's PER capita GDP is 18 times greater. (World Bank, 2018)

Such rapid economic and social development makes Singapore a rare example of a developing country that has succeeded through state capitalism (Rodan 2004; Sim 2011; Hayashi 2010). According to the state-centric concept of the developmental state, achieving successful economic and social progress requires interventionist government leadership (Bel-Low 2006, 231). Although Singapore never carried out nationalization plans as aggressively as the Soviet Union and China, it did play an active role in national economic and social construction to promote national well-being since it came into power (Völgyi, 2019).

The Singapore government has reallocated domestic resources through interventionary guiding policies, allowing capital and labor to flow to the industrial and innovation sector. The government picks winners in various industries, and then supports them in various ways including by providing human, material and institutional resources (Wade, 2005). Its strong state has helped Singapore achieve rapid industrialization development in several decades. Strong national power is reflected in national autonomy, which enables the effective implementation of

industrial policy in Singapore (Rueschemeyer & Evans, 1985). As a comprehensive developmental state, Singapore's industrial policy formulation follows the rational plan-oriented development and gives priority to industrial policy in national development.

#### 6.4 Changes in state power with economic development

In his research on authoritarian governments in East Asia, Ohno (2007) pointed out that Singapore was the only economy in East Asia that had reached a high wage level (after the 1990s), but still did not give up the authoritarian developmentalist system. That is because of Singapore's own endowments and its vulnerability to external shocks.

As an economy lacking natural resource endowment, the government of Singapore attracts and cultivates FDI to promote the development of domestic enterprises through intervention policies, especially in the development of manufacturing industry (Khuong, 2011). The high proportion of foreign capital in economic development makes Singapore highly dependent on foreign capital and vulnerable to the impact of international market fluctuations. In addition, Singapore has developed an export-oriented manufacturing industry through policy interventions, which is a pillar of national economic development, and consists of electronics, petroleum, chemical industry, shipbuilding and other industries (Khuong, 2011). As these industries are characterized by a large scale and strong periodicity, their production is easily affected by the international market, which necessitates the Singapore government to protect the industry through necessary economic means to reduce the external impact brought by international fluctuations.

Singapore built its financial credibility to gain the trust of its international partners. To avoid inflation, currency devaluation and other balance-of-payments problems, the Singapore government prioritized and implemented economic planning in stages, as well as maintained sufficient official currency reserves (Khuong, 2011). When the Asian financial crisis erupted in 1997, several East Asian countries collapsed due to heavy exposure to short-term debt in foreign currencies, but Singapore benefited from a smooth transition in which the government kept control of the economy throughout the crisis. The continued interventionist policies of Singapore's authoritarian government have made the economy remarkably resilient, enabling it to recover strongly from five major financial crises: the oil shock of 1973-1975; the slowdown in global trade in 1985; the Asian financial crisis of 1997-1998; the recession that followed the Sept. 11, 2001, terrorist attacks; and the global financial crisis of 2008-2009 (Khuong, 2011).

#### 6.5 Discussion - The Singapore model

From the above analysis, it can be seen that the PAP of Singapore has played an important role in the process of national construction and the development of the

national economy since it came to power in 1959. To achieve its economic goals, the PAP has created a public system that is transparent, efficient and free of corruption. Especially since 1965, the PAP has been characterized by a highly interventionist approach to economic activity, with a purposeful, determined meritocracy that maximizes economic growth (Huff, 1987, 1995; Khuong, 2011). Although the government never pursued the aggressive nationalization policies of socialist countries such as China, it still created a broad public sector to guide the development and direction of the economy (Völgyi, 2019). Singapore has always been committed to a market economy, but the government's attitude towards privatization is still cautious. It is significant that it has not undergone an extreme swing between nationalization and privatization as the economy has developed. Unlike Asian Miracles countries such as South Korea and Japan, Singapore does not rely on the local capitalist class (chaebol) in its economic development, but on the guidance of the state capitalist sector and the capital and technology provided by MNEs, which enables the state to play the role of an entrepreneur and respond to international market risks whenever they arise. As a rare case of successful state capitalism, Singapore did not conform in its economic development to Johnson's (1982, 1999) envisaged diminishment of national autonomy due to a fusion of the private sector and the capitalist elite as the economy developed to a certain level. The Singapore government's dependence on the state capitalist sector and foreign investment has largely limited the development vitality of the private sector, but it has provided highly significant benefits for the national economic development in other important ways (Sim 2011, 59-60).

## 7. Conclusion

This research focuses on Singapore's economic development since 1965 from the perspective of institutions and government intervention. The focus was on coordination among different sectors in the development of Singapore's economy and the government intervention in the economy through industrial policy. The analytic narrative approach of a single case is adopted in this study. In addition to the in-depth analysis of the government's coordination of various economic departments and the development of various industries, the secondary qualitative data are graphically displayed to intuitively explain and analyze the changes in development.

There are some gaps and areas to be further studied in the existing literature, which served as the basis for the formulation of this study's research questions. First, existing literature focuses more on the promotion of economic development by intervention policies than on the coordination of sectoral relations. Secondly, the existing literature does not pay comprehensive attention to the embeddedness of state power in economic development and whether it changes with economic development. Finally, the existing studies only briefly describe the way in which the Singapore government promotes economic development, and do not carefully examine the relationship between the government and the market in economic development. The contribution of this study lies in that the paper attempts to describe the coordinated operation among various economic sectors in Singapore and the reasons why the state power of Singapore does not weaken with economic development. The research takes the influence of the political system on intervention policies as the starting point, which is a more fundamental force driving economic development and explains it more comprehensively, instead of focusing the analysis on the policy level as the existing literature does.

This research found that the PAP was not willing to confine the government role to providing infrastructure for economic development, but actively participated in the facilitation of national industrial, commercial and financial activities (Lee, 1974). Statutory committees of Singapore's public sector actively shaped the domestic market and made adjustments in relation to foreign markets to create an attractive business environment. State-owned enterprises in the public sector assumed a leading position economically and took an active part in the development of new industries (especially the high-tech industry) to drive the entry of domestic private enterprises. The state capitalist sector composed of statutory committees and state-owned enterprises played a fundamental role in promoting the industrialization of Singapore and the development of its national economy. Singapore's state enterprises, established through a kind of political entrepreneurship, have been able to operate effectively and profitably for decades, with the government monopolizing quite a few entrepreneurs. The government gradually privatised after 1985, but remained cautious, assigning business elites to firms to develop the private sector. The high savings of the public sector led to the high financing of the private sector, and the government

accumulated a large amount of foreign exchange reserves through foreign public savings for overseas investment. The Singapore government transformed the outflow of national savings in the public sector into the inflow of foreign private capital and promoted FDI to promote the cultivation of domestic enterprises and the development of the economy. Moreover, the Singapore government has promoted the development of export-oriented manufacturing and innovation sector through industrial policies to promote the structural transformation and diversification of the domestic economy. It is worth noting that the government's interference in economy does not decrease with the country stepping into the ranks of developed countries, which is mainly due to its own factor endowments and vulnerability to external shocks.



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## Appendix

| Data Series | GDP       | Annual Growth | 10-YMA Growth |
|-------------|-----------|---------------|---------------|
| 1960        | 8,175.7   |               |               |
| 1961        | 8,841     | 8%            |               |
| 1962        | 9,508.8   | 8%            |               |
| 1963        | 10,463.5  | 10%           |               |
| 1964        | 10,138.8  | -3%           |               |
| 1965        | 10,933.1  | 8%            |               |
| 1966        | 12,046.1  | 10%           |               |
| 1967        | 13,552.9  | 13%           |               |
| 1968        | 15,386.2  | 14%           |               |
| 1969        | 17,514.7  | 14%           |               |
| 1970        | 19,956.6  | 14%           |               |
| 1971        | 22,433.9  | 12%           |               |
| 1972        | 25,421.1  | 13%           |               |
| 1973        | 28,116.5  | 11%           |               |
| 1974        | 29,836.5  | 6%            | 0.0920        |
| 1975        | 31,026.6  | 4%            | 0.0882        |
| 1976        | 33,334.1  | 7%            | 0.0866        |
| 1977        | 35,618.3  | 7%            | 0.0804        |
| 1978        | 38,388.4  | 8%            | 0.0783        |
| 1979        | 42,056.2  | 10%           | 0.0810        |
| 1980        | 46,309.5  | 10%           | 0.0764        |
| 1981        | 51,318.3  | 11%           | 0.0703        |
| 1982        | 54,963    | 7%            | 0.0742        |
| 1983        | 59,664.8  | 9%            | 0.0777        |
| 1984        | 64,910.7  | 9%            | 0.0783        |
| 1985        | 64,506.5  | -1%           | 0.0780        |
| 1986        | 65,372.7  | 1%            | 0.0739        |
| 1987        | 72,431.6  | 11%           | 0.0734        |
| 1988        | 80,590    | 11%           | 0.0763        |
| 1989        | 88,777    | 10%           | 0.0786        |
| 1990        | 97,495.7  | 10%           | 0.0864        |
| 1991        | 104,016.6 | 7%            | 0.0926        |
| 1992        | 110,923.1 | 7%            | 0.0901        |
| 1993        | 123,634.5 | 11%           | 0.0766        |
| 1994        | 137,352.6 | 11%           | 0.0722        |
| 1995        | 147,208.2 | 7%            | 0.0714        |
| 1996        | 158,206.7 | 7%            | 0.0637        |
| 1997        | 171,363.5 | 8%            | 0.0609        |
| 1998        | 167,608.9 | -2%           | 0.0540        |
| 1999        | 177,193.4 | 6%            | 0.0529        |
| 2000        | 193,208.7 | 9%            | 0.0531        |
| 2001        | 191,139.7 | -1%           | 0.0546        |
| 2002        | 198,638.8 | 4%            | 0.0553        |
| 2003        | 207,673.4 | 5%            | 0.0594        |
| 2004        | 228,316.1 | 10%           | 0.0538        |
| 2005        | 245,134.6 | 7%            | 0.0592        |
| 2006        | 267,213.3 | 9%            | 0.0670        |
| 2007        | 291,320   | 9%            | 0.0705        |
| 2008        | 296,748.7 | 2%            | 0.0741        |
| 2009        | 297,128.4 | 0%            | 0.0698        |
| 2010        | 340,270.7 | 15%           | 0.0691        |

| Data Series | Data Series |
|-------------|-------------|
| 1965        | 2,983.6     |
| 1966        | 3,356.4     |
| 1967        | 3,789.9     |
| 1968        | 4,364.4     |
| 1969        | 5,081.3     |
| 1970        | 5,879.3     |
| 1971        | 6,929.9     |
| 1972        | 8,302.3     |
| 1973        | 10,395.6    |
| 1974        | 12,831.4    |
| 1975        | 13,728.7    |
| 1976        | 15,003.4    |
| 1977        | 16,353.2    |
| 1978        | 18,337.4    |
| 1979        | 21,141.2    |
| 1980        | 25,869.6    |
| 1981        | 30,352      |
| 1982        | 33,981.2    |
| 1983        | 38,058      |
| 1984        | 41,730.4    |
| 1985        | 40,862.8    |
| 1986        | 40,892.7    |
| 1987        | 45,549.5    |
| 1988        | 53,432.3    |
| 1989        | 61,308.5    |
| 1990        | 70,492.3    |
| 1991        | 78,542.8    |
| 1992        | 84,920.2    |
| 1993        | 97,923.1    |
| 1994        | 112,555.4   |
| 1995        | 124,463.3   |
| 1996        | 135,777.2   |
| 1997        | 148,664.4   |
| 1998        | 143,474.9   |
| 1999        | 146,252.5   |
| 2000        | 165,632.4   |
| 2001        | 160,885.6   |
| 2002        | 165,698.1   |
| 2003        | 170,117.9   |
| 2004        | 194,433     |
| 2005        | 212,723     |
| 2006        | 236,158.8   |
| 2007        | 272,697.6   |
| 2008        | 273,941.6   |
| 2009        | 282,394.5   |
| 2010        | 326,980.1   |
| 2011        | 351,367.9   |
| 2012        | 368,770.5   |
| 2013        | 384,870.3   |
| 2014        | 398,947.9   |
| 2015        | 423,444.1   |
| 2016        | 440,467     |
| 2017        | 473,915.7   |
| 2018        | 508,495.1   |
| 2019        | 512,219.9   |
| 2020        | 476,404.8   |

Figure 3: GDP (current US\$) - Singapore

| <b>Data Series</b> | Asia      | Europe    | North America | Oceania  |
|--------------------|-----------|-----------|---------------|----------|
| <b>1994</b>        | 22,231.7  | 3,831.1   | 2,502.9       | 3,759.2  |
| <b>1995</b>        | 29,596.3  | 5,570.7   | 2,723.3       | 4,146.6  |
| <b>1996</b>        | 31,724.6  | 8,743.5   | 2,693.8       | 3,764.3  |
| <b>1997</b>        | 41,480.8  | 12,143.8  | 2,972.2       | 3,920.9  |
| <b>1998</b>        | 42,364.6  | 9,721.4   | 3,242         | 3,085    |
| <b>1999</b>        | 53,058.4  | 13,060.5  | 4,452.3       | 3,699.8  |
| <b>2000</b>        | 56,756.7  | 8,976.4   | 6,472.5       | 3,763.2  |
| <b>2001</b>        | 63,458.5  | 12,668.4  | 6,372.6       | 3,471.1  |
| <b>2002</b>        | 69,547.7  | 15,425.7  | 7,273.9       | 4,928.3  |
| <b>2003</b>        | 75,968.2  | 13,536.3  | 8,165.3       | 6,397    |
| <b>2004</b>        | 84,938.7  | 16,577.7  | 9,790.7       | 13,069.7 |
| <b>2005</b>        | 102,494.1 | 17,472.5  | 10,064        | 11,127.1 |
| <b>2006</b>        | 119,350.6 | 33,803.3  | 8,773.9       | 12,574.3 |
| <b>2007</b>        | 146,960.6 | 46,496.3  | 14,005.8      | 20,214.2 |
| <b>2008</b>        | 174,941.2 | 37,218.6  | 11,988        | 21,174.4 |
| <b>2009</b>        | 201,123.6 | 51,087.4  | 14,264.7      | 26,370.9 |
| <b>2010</b>        | 226,436   | 63,138.2  | 14,680.9      | 36,916.5 |
| <b>2011</b>        | 259,231.1 | 62,073.8  | 8,125.5       | 40,038.8 |
| <b>2012</b>        | 277,116.8 | 79,949.4  | 9,691.8       | 45,659.4 |
| <b>2013</b>        | 294,556.4 | 93,402.8  | 10,256.1      | 48,041.9 |
| <b>2014</b>        | 336,149.8 | 106,553.9 | 15,622.7      | 44,574.5 |
| <b>2015</b>        | 386,857.4 | 111,249.4 | 17,415.4      | 47,344.7 |
| <b>2016</b>        | 443,512.7 | 178,558.7 | 32,080.5      | 52,783.9 |
| <b>2017</b>        | 472,788.1 | 154,100.7 | 26,974.2      | 55,816.6 |
| <b>2018</b>        | 477,304   | 153,635.9 | 33,399.2      | 59,508.4 |
| <b>2019</b>        | 501,339.6 | 184,438.4 | 34,588.2      | 59,978.3 |

*Figure 4: Singapore's Direct Investment Abroad (DIA) and Direct Equity Investment Abroad  
Singapore's Direct Investment Abroad By Industry Abroad (Stock As At Year-End), Annual*



| Data Series | Net International Investment Position | Direct Investment |
|-------------|---------------------------------------|-------------------|
| 2001        | 146,633.5                             | 167,424.3         |
| 2002        | 226,156.5                             | 201,405.7         |
| 2003        | 382,398.2                             | 242,402           |
| 2004        | 413,965.2                             | 281,026.2         |
| 2005        | 488,450.7                             | 319,041.3         |
| 2006        | 600,684.8                             | 415,830.7         |
| 2007        | 602,935.2                             | 500,215.8         |
| 2008        | 490,239.7                             | 458,760.9         |
| 2009        | 623,431.1                             | 535,861           |
| 2010        | 659,570.6                             | 600,906.1         |
| 2011        | 692,534.3                             | 653,291.5         |
| 2012        | 716,030.6                             | 701,038.3         |
| 2013        | 767,047.1                             | 787,907.2         |
| 2014        | 781,174.7                             | 899,906.6         |
| 2015        | 914,909.5                             | 1,046,666.9       |
| 2016        | 1,030,046.8                           | 1,199,423.3       |
| 2017        | 1,123,054.9                           | 1,388,562.8       |
| 2018        | 934,406.7                             | 1,341,655.2       |
| 2019        | 1,138,934.1                           | 1,542,881.2       |
| 2020        | 1,281,664.6                           | 1,673,389.5       |
| 2021        | 1,375,768.7                           | 1,819,922.7       |

*Figure5:Singapore International Investment Position, (End Of Period), Annual*

| Data Series | Compensation of Employees in Manufacture Industry |
|-------------|---|
| 1980        | 2,740.3   |
| 1981        | 3,232.8   |
| 1982        | 3,594.2   |
| 1983        | 3,843.7   |
| 1984        | 4,401   |
| 1985        | 4,394.5   |
| 1986        | 4,082.2   |
| 1987        | 4,521.2   |
| 1988        | 5,475.9   |
| 1989        | 6,483.1   |
| 1990        | 7,627.3   |
| 1991        | 8,512.2   |
| 1992        | 9,302.6   |
| 1993        | 9,978.5   |
| 1994        | 10,919.6  |
| 1995        | 11,808.7  |
| 1996        | 12,451.6  |
| 1997        | 13,183.8  |
| 1998        | 13,077.3  |
| 1999        | 12,667.1  |
| 2000        | 14,141.5  |
| 2001        | 14,614.6  |
| 2002        | 14,444.2  |
| 2003        | 14,299.3  |
| 2004        | 14,880.2  |
| 2005        | 15,820  |
| 2006        | 17,156.1  |
| 2007        | 18,804.5  |
| 2008        | 20,244.3  |
| 2009        | 19,245.5  |
| 2010        | 20,345.4  |
| 2011        | 21,250.9  |
| 2012        | 22,034.6  |
| 2013        | 23,020.4  |
| 2014        | 24,427.4  |
| 2015        | 24,856.6  |
| 2016        | 24,588.5  |
| 2017        | 24,873.8  |
| 2018        | 25,467.7  |
| 2019        | 26,457.4  |
| 2020        | 26,149.9  |
| 2021        | 26,475.7  |

*Figure 6: Compensation of Employees in Manufacturing Industry*

| Data Series | Total Manufacturing |
|-------------|---------------------|
| 1980        | 32,119.1            |
| 1981        | 37,184              |
| 1982        | 36,853.9            |
| 1983        | 37,593.6            |
| 1984        | 41,477.4            |
| 1985        | 38,894.3            |
| 1986        | 37,650.2            |
| 1987        | 46,562.2            |
| 1988        | 57,020.7            |
| 1989        | 64,216.6            |
| 1990        | 71,922.8            |
| 1991        | 75,113.5            |
| 1992        | 77,795.3            |
| 1993        | 88,163.3            |
| 1994        | 101,236.9           |
| 1995        | 113,973.5           |
| 1996        | 120,445.2           |
| 1997        | 127,115.8           |
| 1998        | 122,002.6           |
| 1999        | 134,182.8           |
| 2000        | 159,403.7           |
| 2001        | 133,767.5           |
| 2002        | 142,211.8           |
| 2003        | 151,574.8           |
| 2004        | 183,466.7           |
| 2005        | 209,714.3           |
| 2006        | 230,766.3           |
| 2007        | 244,733             |
| 2008        | 254,884.7           |
| 2009        | 218,566.9           |
| 2010        | 261,364.3           |
| 2011        | 281,703.3           |
| 2012        | 288,279.2           |
| 2013        | 285,431.3           |
| 2014        | 291,423.6           |
| 2015        | 271,120.1           |
| 2016        | 259,495.9           |
| 2017        | 305,741.7           |
| 2018        | 344,416.7           |
| 2019        | 324,947.7           |
| 2020        | 300,540.8           |
| 2021        | 372,352.4           |

*Figure 7: Total Manufacturing Output Annual, 1980-2020*

|   |  |  |  |       |      |     |             |      |
|---|--|--|--|-------|------|-----|-------------|------|
| SG Assignee                                     |  |  |  |       |      |     |             |      |
| Chartered Semiconductor Manufacturing (SG)      |  |  |  | 968   | 9%   |     | SG          | 26%  |
| STATS ChipPAC (SG)                              |  |  |  | 796   | 7%   |     | US          | 12%  |
| Agency for Science Technology and Research (SG) |  |  |  | 729   | 7%   |     | Japan       | 3%   |
| Micron Technology (US)                          |  |  |  | 377   | 4%   |     | Switzerland | 3%   |
| Seagate Technology (US)                         |  |  |  | 358   | 3%   |     | Others      | 56%  |
| National University of Singapore (SG)           |  |  |  | 355   | 3%   |     | SUM         | 100% |
| Hewlett-Packard (US)                            |  |  |  | 301   | 3%   |     |             |      |
| STMicroelectronics (Switzerland)                |  |  |  | 294   | 3%   |     |             |      |
| Panasonic Corporation (Japan)                   |  |  |  | 287   | 3%   |     |             |      |
| Globalfoundries (US)                            |  |  |  | 240   | 2%   |     |             |      |
| Sum of top ten                                  |  |  |  | 4619  | 43%  | 44% |             |      |
| Total patent counts                             |  |  |  | 10685 | 100% |     |             |      |

*Figure 8: Top ten Patent Assignees in Singapore*

| Year | Gross National Income | Gross National Saving | Gross Capital Formation |
|------|-----------------------|-----------------------|-------------------------|
| 1965 | 1,006                 | 119.9                 | 211.6                   |
| 1966 | 1,131.1               | 186.6                 | 238.3                   |
| 1967 | 1,270                 | 211.9                 | 271.5                   |
| 1968 | 1,454.2               | 297.2                 | 351.2                   |
| 1969 | 1,687.6               | 334.9                 | 469.6                   |
| 1970 | 1,938.9               | 389.2                 | 733.2                   |
| 1971 | 2,268.3               | 445.6                 | 910.6                   |
| 1972 | 2,944.6               | 741.5                 | 1,206.3                 |
| 1973 | 4,139.2               | 1,167.8               | 1,646.1                 |
| 1974 | 5,121.6               | 1,369.2               | 2,343.1                 |
| 1975 | 5,841.6               | 1,719.9               | 2,246.8                 |
| 1976 | 6,039.4               | 1,901.2               | 2,404.4                 |
| 1977 | 6,627                 | 2,143.1               | 2,362.5                 |
| 1978 | 8,045                 | 2,694.9               | 3,053                   |
| 1979 | 9,685.6               | 3,473.4               | 4,094.5                 |
| 1980 | 11,462.1              | 3,827.3               | 5,440.2                 |
| 1981 | 13,540.1              | 4,891.8               | 6,433.8                 |
| 1982 | 15,078.9              | 5,999.3               | 7,347.3                 |
| 1983 | 17,509.7              | 7,713.2               | 8,366                   |
| 1984 | 19,439.2              | 8,777.9               | 9,180.6                 |
| 1985 | 18,725.9              | 7,653.4               | 7,633.1                 |
| 1986 | 18,786.6              | 7,202.4               | 6,865.8                 |
| 1987 | 21,062.2              | 7,795.5               | 7,898.6                 |
| 1988 | 26,189.6              | 10,817.3              | 8,870.4                 |
| 1989 | 31,244.3              | 13,685.3              | 10,707.1                |
| 1990 | 38,501.3              | 17,008.8              | 13,866.3                |
| 1991 | 44,776.7              | 20,322.1              | 15,448.5                |
| 1992 | 52,161.4              | 24,368                | 18,514.4                |
| 1993 | 59,323.9              | 26,652.9              | 22,545.7                |
| 1994 | 73,786.6              | 35,517.5              | 24,253.2                |
| 1995 | 88,446                | 44,237.5              | 29,751.5                |
| 1996 | 95,597.3              | 47,824.3              | 33,739.8                |
| 1997 | 102,085.9             | 53,806.4              | 38,217.2                |
| 1998 | 86,992.9              | 45,677.4              | 26,995.9                |
| 1999 | 87,267.2              | 43,054.6              | 28,209.4                |
| 2000 | 95,492.7              | 44,432.7              | 33,795.2                |
| 2001 | 89,194.5              | 37,751.9              | 24,791.9                |
| 2002 | 90,696.2              | 36,969.5              | 23,202.6                |
| 2003 | 95,050.2              | 40,548.8              | 16,819                  |
| 2004 | 108,070.9             | 48,546.2              | 26,332.9                |
| 2005 | 120,561.8             | 57,209.3              | 27,484.2                |
| 2006 | 144,599.2             | 73,234.1              | 33,262.4                |
| 2007 | 176,182.2             | 90,849.6              | 41,736                  |
| 2008 | 186,503.2             | 87,602.3              | 58,396.9                |
| 2009 | 184,081.7             | 84,967.2              | 53,139.7                |
| 2010 | 237,218.3             | 121,323.4             | 66,327                  |

Figure 10: Gross National Income, Gross National Saving and Gross Capital Formation expressed in current prices (MillionUS\$)