“Middle-income Trap” and China's Way Forward: Experiences and Insights from Singapore

Yingxu Zhu *

School of Economics and Management, Guangxi Normal University, Guilin 541006, China

* Corresponding author Email: z2681145309@126.com

Abstract: Singapore relied on its effective government administration, social governance, human capital development, industrial transformations and technological innovation to achieve rapid economic development in the decades after independence, and became a typical country that successfully crossed the "middle-income trap". China is at a critical stage in its progress towards becoming a high-income country. Active industrial transformation to support the development of new industries, creating a higher level of openness to the outside world to enhance international competitiveness, cultivating multi-level and high-quality talents, and promoting technological innovation and progress are the paths that China should take to cross the middle-income trap.

Keywords: Middle-income Trap; Industrial Transformation; Technological Progress; Human Capital.

1. Introduction

The "middle-income trap" refers to countries and economies that have escaped the "poverty trap" and entered the middle-income stage, but due to changes in the internal and external environment, the economic growth mechanisms on which they were based have failed, resulting in prolonged stagnation of economic growth and difficulties in further growth of national income per capita, and have been unable to break out of the middle-income stage for a long time [1]. As a typical case of successfully crossing the 'middle-income trap', Singapore, with its lack of natural resources and traditional industrial strengths, leapt from a low-income country to a high-income country in just two decades after its independence in 1965 to 1989, and its GDP per capita exceeded US$80,000 in 2022. It took less than 50 years for Singapore to complete the path from pre-industrialisation, industrialisation and then modernisation (post-industrialisation), the mystery of which deserves to be explored in depth by China. "China is only one step away from the World Bank's standard for high-income countries, and China will be able to cross the middle-income trap no later than 2025," said Justin Yifu Lin [2], director of the Institute of New Structural Economics at Peking University. Based on such a realistic background, how China can cross the middle-income trap and maintain a better development trend, combining the successful experience of Singapore and China's actual situation to take effective measures is a good response.

2. How can Singapore Leapfrog the "Middle Income Trap"?

Neoclassical growth theory suggests that trade openness contributes to economic growth mainly through economies of scale, capital formation and resource allocation efficiency. Singapore is a foreign trade-driven economy, dominated by electronics, petrochemicals, finance, shipping and services, highly dependent on China, the US, Japan, Europe and neighbouring markets, with total foreign trade three times its GDP. With its important international location advantage and its rather forward-looking development philosophy, it has carried out effective government governance, talent accumulation, industrial transformation and technological advancement, and successfully crossed the "middle-income trap".

2.1. Good Social Governance

Government Governance and Social Security. Singapore's People's Action Party (PAP), which has been in power since 1959, is firmly established, politically democratic and administratively efficient. They have tackled official corruption with strong and repeated determination and have the lowest level of corruption in Asia. In addition, with an international homicide rate (per 100,000 people) averaging 8.5 at the world level from 1990-1997, compared to 1.4 in Singapore, the good social security environment and clean government governance give added peace of mind to foreign investment and the country's economic development.

Population and Employment. In the 1960s and 1970s, with high immigration, high population density and housing constraints, it became imperative to curb rapid population growth. As a result, the Singapore Housing Development Board was established, the Home Ownership Scheme was introduced and the "two children per family" policy was implemented to address the population problem. However, in 1980, the fertility rate had already dropped to 1.7, and the predictable result was a shortage of labour, inadequate defence forces and an ageing population. In response, Singapore actively developed labour-intensive industries, enacted various acts to optimise the employment and investment environment, promoted the foreign economy to attract investment, and set up a public job market to provide employment services for people, including the disabled. The unemployment rate remained stable at less than 8% for two decades from 1965 to 1989.

Singapore is known for its stable political situation and clean and efficient government. Creating a fair and good social environment is the guarantee of success. In the decades since its independence, political authority has gradually shifted to democratic moderation, creating a clean and efficient government, a stable social order, a harmonious
pluralistic race, full employment and effective inflation control, creating a good and reassuring development environment for the transformation and upgrading of domestic industries and the entry of foreign investment.

2.2. Focus on Human Capital Accumulation and Optimisation

In the early years of the nation, despite the country's economic woes, Lee Kuan Yew (Singapore's first Prime Minister) invested heavily in education, with equal education for all and an emphasis on the relationship between education and employment. Singapore government expenditure on education increased from S$63.39 million in 1959 to S$88.25 billion in 2008 (a 130-fold increase), with public expenditure on education accounting for 3.1% of GDP in 1971 (education expenditure accounted for 13.3% of total government expenditure), and gradually expanded after the development of technology-intensive industries in the late 1970s; the overall youth literacy rate reached 96% and the overall adult literacy rate reached 83% in 1980, which compares favourably with the world averages of 79% and 68% for the same period. With US$493 million spent on education in 2020, primary school enrolment and secondary school enrolment rates were as high as 99.97% and 99.78% respectively in 2017 alone, and 91% in 2019 for tertiary education. This confirms why Singapore today has a wealth of talent.

In fact, in the 40 years since its founding, Singapore has promoted four education reform measures based on the concept of "education development for the economy": from 1965 to 1978, it vigorously popularized basic education, emphasized vocational and technical education, and launched bilingual education to train a large number of labour force in line with the development of industrialization; from 1979 to 1984, the second industrial revolution led to the development of a capital and technology-intensive economy, and the focus of education was on training the skilled workforce needed for industrial upgrading; from 1995 to 1997, in order to integrate with the global economic trends, the training of a highly skilled and high-quality workforce continued, with an emphasis on all-round talent training; after 1997, the "competency-based education " further established Singapore's orientation towards education in the knowledge economy, further fostering students' creativity and inquisitiveness[3]. In addition, Singapore has implemented four triage reforms to train different types of talents at different levels according to their abilities, which has provided talent for several economic transformation constructions. The country has also been able to attract foreign talent through a very open population policy, which has helped to address the shortage of high-end human capital and ensure the stability of the country's long-term talent pool [4].

2.3. Good Industrial Strategy

The history of Singapore's industrial transformation can be broadly divided into three phases: labour-intensive industries (1959-1979), capital- and technology-intensive industries (1979-1997), and knowledge-intensive industries (1997-).

During the colonial period, Singapore relied on re-export trade to develop its economy; however, after its autonomy, the British disinvested and the country's economy struggled, so Singapore, like other developing countries, pursued an industrialisation policy of import substitution in the hope of integrating the domestic market through trade protection. Singapore embarked on industrialisation after 1960, with the government investing heavily in supporting infrastructure and public utilities to create a sizeable industrial economy. But this also led to monopolistic, inefficient state enterprises and a domestic market that was too narrowly for import substitution to allow Singapore to grow more.

After independence in 1965, Singapore took advantage of the 'golden age' of development in Western capitalist countries to abolish all import tariffs, pursue a liberal and open economic policy, develop export-oriented industrialisation, and absorb large amounts of foreign capital and introduce multinational companies and advanced technology. At the same time, the country took advantage of its advantageous geographical location to develop shipbuilding and ship repair industries, and to build new oil-drilling equipment and refineries.

After the two oil crises in the 1970s, developed countries moved their capital out of the country to reduce costs. Singapore seized this opportunity and launched Singapore's "Second Industrial Revolution" in 1979 to encourage investment in capital-intensive and technology-intensive industries with high added value, such as electronics, chemicals, machinery and transport equipment manufacturing industries, to eliminate labour-intensive industries, improve labour productivity and product quality, and enhance the international competitiveness of products. After the Asian financial crisis in 1997, many multinational companies closed down and relocated their local factories, and Singapore accelerated its economic transformation to develop new industries and high-end manufacturing and to promote knowledge-intensive industries.

The process of Singapore's industrial transformation has been a process of rationalising its industrial structure towards a high degree of sophistication. Today, Singapore is already one of the world's third largest refining centres and oil trading hubs, the pricing centre for petroleum products in Asia, the second largest wealth management centre in the world, the centre of the Asian dollar market and the third largest offshore RMB centre in the world, occupying an extremely important strategic position in international economic exchanges.

2.4. Technological Innovation and Technological Progress

Technological progress has been a key factor in sustaining economic growth after the economy has reached a steady state level, and technological transformation and upgrading has been key to Singapore's ability to leapfrog the middle-income trap and avoid falling back into it.

Technological innovation and advancement were key drivers of Singapore's ability to cross the middle-income trap, and its industrialisation through the First Industrial Revolution in the 1960s and 1980s, which saw the introduction and learning of advanced technologies from developed countries through openness to the outside world, became a key factor in rapidly changing its technological backwardness. In 1979, Singapore embarked on a "second industrial revolution" by fostering technological talent, implementing a development strategy of "automation, mechanisation and computerisation", vigorously promoting capital and technology-intensive industries, and promoting autonomous innovation to achieve technological progress, which has helped it gain an advantage in industries or production chains with high added value [5]. Later on, Singapore also committed to technology-intensive industries.
and promoted a move towards knowledge-intensive construction, with a strong focus on new industries. Technological innovation and progress were key to Singapore avoiding falling back into the 'middle-income trap'. Solow saw total factor productivity growth as technological progress, and for a country entering a high-income phase, the contribution of technological progress to economic growth is even more critical. Singapore became a developed country in 1996. According to the World Bank, the number of patent applications in Singapore grew from 145 in 1995 to 1,778 in 2020, which is showing a better upward trend, although much inferior to Japan and the US. Singapore's R&D expenditure as a percentage of GDP increased from 1.32% to 2.597% between 1996 and 2008, gradually surpassing the EU expenditure ratio within the same period, and gradually narrowing and catching up with the difference of 2.1%-2.3% with high-income countries, already higher than middle-income countries by almost 1%. The number of R&D personnel also increased continuously to 6,803 (per 1 million people) in 2017. Singapore has gradually made the leap from technology importation to technological innovation, and its ability to innovate in science and technology has successfully led to the upgrading of their industrial structure and rapid economic growth [6].

<table>
<thead>
<tr>
<th>Country /Region</th>
<th>Year 1996</th>
<th>Year 2000</th>
<th>Year 2004</th>
<th>Year 2008</th>
</tr>
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<tr>
<td>Singapore</td>
<td>1.320</td>
<td>1.817</td>
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<td>2.597</td>
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<tr>
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<td>0.802</td>
<td>0.961</td>
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</tr>
</tbody>
</table>

Data source: World Bank

3. Lessons for China from Singapore's Experience in Crossing the "Middle-Income Trap"

3.1. Timely Adjustment of Industrial Strategies is the Key to Transforming Economic Dynamism

Singapore's strategy of shifting its reliance on re-export trade for development after autonomy and adopting a labour-intensive shift from import substitution to export orientation led to its initial growth. Then in the 1980s it phased out labour-intensive industries and introduced capital and technology-intensive industries. In the late 1990s it strengthened its own innovation to advance towards knowledge-intensive industries. This was its continuous drive to highly industrialise, allowing Singapore to rise to a new level of economic dynamism at each stage.

While China enjoyed a demographic dividend in the past decades and relied on its huge labour market to become a world manufacturing power, it has now become the country with all the industrial categories in the UN Industrial Classification, the world's largest producer of more than 200 industrial products, the world's largest manufacturing value added since 2010, and the rapid development of modern and emerging service industries. As we enter a new era, China has to transform from "Made in China" to "Intelligent Manufacturing in China". The global technological revolution is currently underway, and the core of the fourth industrial revolution is the digital revolution, the life science revolution and the physical product revolution, all going hand in hand, from information technology to intelligence [7]. As global environmental governance has become a global consensus, such as "carbon neutrality" and "carbon peaking", China should focus on the world's development trend, focus on strategic emerging industries, accelerate the application of key core technology innovations, cultivate and grow new momentum for industrial development, and promote high-end, intelligent and green manufacturing. We should plan ahead for frontier technologies and industrial changes, pragmatically promote the implementation of the 14th Five-Year Plan, stand at the front end of industrial changes, and promote timely adjustment and upgrading of industries.

3.2. A Higher Level of Openness is a Key Way to Enhance Our Strength and International Standing

Singapore is a foreign trade driven economy, having developed re-export trade during its colonial days and an export-led economic strategy after independence. During the decades of its economic development, Singapore has adopted a liberal and friendly foreign policy to bring in technology, capital and talent, and many multinational companies and talented people have come to Singapore. Singapore now occupies a strategically important position in the international economic landscape.

While China has achieved economic take-off over the past 40 years, the current international situation is complex and complicated, with major power conflicts emerging from time to time. In the face of the complex international development environment, it is all the more important for China to steadily improve the level of its opening up to the outside world while co-ordinating the construction of a large domestic market, so as to enhance China's international competitiveness and international discourse. We should co-ordinate the construction of various open platforms, create new highlands of openness with higher levels of openness, better business environments and stronger radiation effects, and build more open, efficient and convenient regions for international exchanges at a higher level by relying on free trade pilot zones such as RCEP. At the same time, we will consolidate the leading position of the eastern coastal region and mega megalopolises in opening up, and rely on Guangdong, Hong Kong, Macao, the Yangtze River Delta, Beijing, Tianjin and Hebei and other optimized development zones and frontier positions in opening up to the outside world to take the lead in promoting high-level opening up on all fronts. It is also
necessary to strengthen the inter-regional opening linkage, build an opening pattern of linkage between land and sea, and mutual assistance between east and west, and play to the advantages of each region to participate in the trend of opening up and development. What's more, we should build a strong regulatory and risk prevention system, push for the promotion of laws, regulations and institutional support, so that domestic products can go out with confidence and foreign factors can flow in with confidence, promote mutual benefit and win-win, and participate in the construction of the global economy in a proactive and autonomous manner.

3.3. Talent Accumulation and Technological Innovation are the Key Drivers of New Economic Development

Singapore has carried out several education reforms to reserve domestic talent, while importing the world's best talent to provide a multi-layered, multi-faceted and highly qualified workforce. In addition, along with the timely shift in industrial strategy, technology has continued to innovate and develop, achieving a shift from low-end manufacturing to high value-added and highly sophisticated technology, providing a constant driving force for Singapore's economic development.

China attaches great importance to education and has developed a unique education system that has produced many outstanding talents. However, there is still a shortage of very top talent compared to developed countries around the world, and the development of general and vocational education is still unbalanced. We need to build a highland of scientific research and innovation that gathers outstanding talents from home and abroad, cultivate more world-class strategic scientific and technological talents, leading scientific and technological talents and innovation teams, and cultivate a high-level talent team. In addition to vigorously cultivating scientific research talents, we should also nurture technically skilled talents in professional fields, create a more equitable environment for the cultivation of talents, guide the synergistic development of general and vocational education, strengthen the cultivation of innovative, applied and skilled talents, and create development opportunities for talents of different types, levels and fields.

The competition for comprehensive national power in today's world is a competition for science and technology, and technological progress is the key to a country's continuous acquisition of new growth power. There is an urgency to maintain total factor productivity growth [8], and the key to improving total factor productivity is to change from a factor input-based economic growth mode to an innovation-driven one. Adhering to innovative development and promoting the economy to maintain medium-to-high-speed growth and move towards the medium-to-high-end level requires cultivating new impetus for development, expanding new space for development, thoroughly implementing the innovation-driven development strategy, vigorously promoting agricultural modernization, building a new industrial system, constructing a new system for development, and innovating and improving the macro-control system. In this way, we will continue to promote technological innovation, play the key role of technological progress for high-quality economic development, and maintain the efficient development of China's economy [9].

4. Conclusion

The Singapore government has been forward-looking in its philosophy of governance, actively promoting timely institutional transformation in various areas, and taking appropriate and effective measures to promote effective government and social governance, all-round talent training, active promotion of industrial upgrading, and vigorous promotion of technological innovation and progress, thus creating a good fair and friendly social environment and successfully crossing the "middle-income trap". China should learn from this experience and be more forward-looking and strategic in promoting China's economic development to remain at the forefront of the times and technology. It should make a good institutional shift to adapt to productivity and the progress of the times, integrate into the world development trend with a more open mind, and ride on the momentum to start a new journey of building a comprehensive socialist modern state.

References