

2.3. THE PHENOMENON OF INNOVATIVE DEVELOPMENT AND MODERNIZATION PROCESSES OF SINGAPORE

Singapore is one of the most developed countries in the Southeast Asian region. Despite its extremely small area of 725.7 km² and complete lack of natural resources, it has become the transport, economic, information and financial center of the region. Singapore differs from other countries in its significant technology in all spheres of state and population life, innovation and progressiveness. At the same time, a distinctive feature is strict control and censorship. The question of the history of the formation of information and analytical activity and the development of information technologies in Singapore, the formation of its innovation model was studied by such scientists as A.Yu. Bykov, E.V.Horyan, M.G. Osypova, L.V. Chebukhanova.

The Republic of Singapore is a country that took only 50 years to modernize. For half a century, the first Prime Minister of Singapore, Lee Kuan Yew, managed to raise the country's economic level to the first places in the world rankings. That is why the founder of Singapore is considered to be Lee Kuan Yew, who noted that Singapore was not going to exist as a separate state, because from the beginning there were no national and state-building components: a homogeneous national-homogeneous population, a single language, a common culture and even history. Thus, the founder of the "Singapore miracle" pointed out the importance of the social component of the state, because the residents of Singapore, under the leadership and constant social engineering of their leader, built the "social state of the 22-nd century".

Before modernization began, Singapore was a poor third world country with no obvious economic advantages and significant reserves of natural resources. Even fresh water had to be imported from Malaysia. Most of the population was illiterate, corruption, drug trafficking and sea piracy flourished in the country.

Modernization and development in the Republic of Singapore took place thanks to measures to ensure strict public discipline, order in the country and active suppression of crime (*Ivanov2022*). The modernization of the state began with the coming to power in 1959 of the founder of the Social Democratic People's Action Party, 36-year-old Lee Kuan Yew. Lee Kuan Yew's reforms allowed the country to make an economic breakthrough. Today, Singapore is one of the world leaders in high-tech industries such as electronics and pharmaceuticals, the largest financial and oil refining center.

Singapore's new vision was digital-centric, with e-government, a digital economy and a digital society encompassing healthcare, transport, urban life, public services and business. The result is a new digitized Singapore – a place to foster a new social culture of innovation and experimentation called the Smart Nation. The city-state is becoming not only a center of trade, but also a leading technology center in the Asia-Pacific region and provides exceptional business opportunities. More than 37,000 foreign companies are registered in Singapore.

Singapore's modernization was ensured by efforts in four key directions: economic reforms that set the vector for investment and innovative development, social modernization, effective fight against corruption, and political stability.

Today, Singapore is one of the largest trade, industrial, financial and transport centers in Southeast Asia. It receives up to 36 million passengers a year, has more than 100 shops, 60 restaurants, a large swimming pool and free cinemas, more than 200 Internet zones with free access to the World Wide Web and the largest art gallery in Asia. The Singapore currency exchange is the fourth in the world after London, New York and Tokyo. Metalworking, electrical engineering, shipbuilding and ship

repair enterprises work in the city; about 135 large banks and one of the largest rubber exchanges in the world. The chemical, food, textile, and light industries are developed (*History of internet in Singapore – from niche toy to must-have essential*).

In 2021, Singapore was the 35-th largest economy in the world by GDP, 19-th by total exports, 16-th by total imports, 6-th by GDP per capita, and the 6th most complex economy by economic development index.

Industrial enterprises of the country work on imported raw materials. Metalworking, electrotechnical, radio-electronic, optical-mechanical, aviation, steel-smelting, shipbuilding and ship-repairing, oil refining, chemical, food, textile, and light industry enterprises operate in the country. Singapore ranks second in the world, after the United States, in the production of mobile well equipment for the development of offshore oil fields; second place, after Xiangnan, in handling sea containers; third place, after Houston and Rotterdam, for oil refining. The country has a highly developed military industry. Enterprises for the primary processing of tea, coffee, and natural rubber work here.

Agriculture occupies an insignificant place in the total volume of production. Coconut palm, rubber, spices, tobacco, pineapples, vegetables, fruits are cultivated. Pig farming, poultry farming, fishing and sea fishing are developing. The country exports office equipment, petroleum products, television and radio equipment. The country's economy receives significant funds from the sale of exotic fish and orchids. The main foreign trade partners are the USA, Japan, and Malaysia.

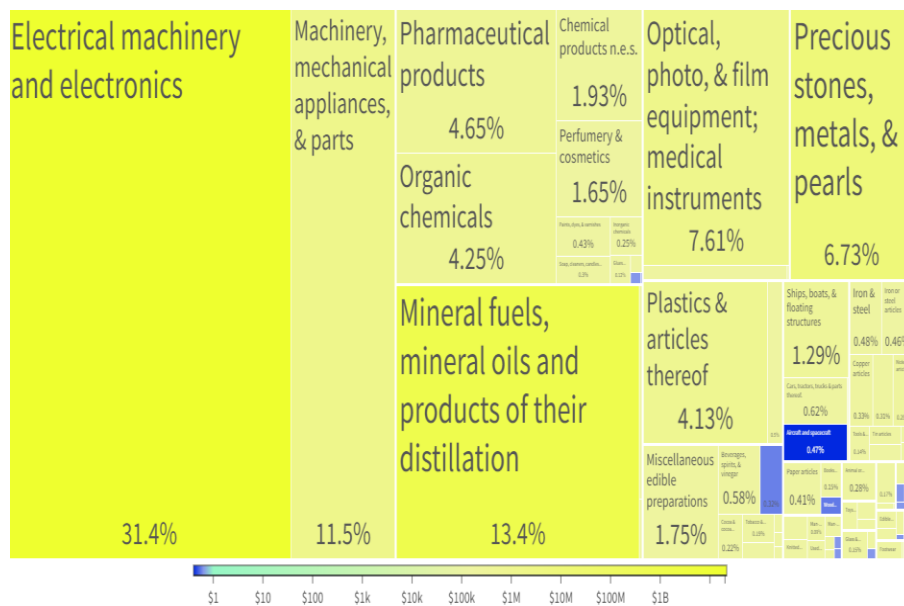


Figure 1. Structure of Singapore's exports for 2021, %%
Source: OEC World

Imports consist of food necessary for the country (up to 90% of the country's needs). A backup water pipeline from Indonesia was built. Every year, the country is visited by 6 to 8 million tourists, which brings significant income to the country. However, the coronavirus pandemic disrupted traditional supply chains and became a rehearsal for the global economic crisis, as a result of Russia's war against Ukraine. Business is forced to look for islands of stability. As a result, the migration of factories and offices under the name "people and companies are talking of reshoring, onshoring, near-shoring" is being formed. Economic development and a stable political situation enabled Singapore to

become an important financial center of the entire Asian region and the world. At the same time, Singapore is the largest regional investor in the economies of developing countries (*OECD World*).

In 2020, Singapore exported \$260 billion worth of services. The most exported services by Singapore in 2020 were business, professional and technical services (\$89.8 billion), maritime transport (\$80 billion), financial services (\$36.4 billion), other royalties and license fees (10.7 billion US dollars), as well as insurance services (8.26 billion US dollars).

In 2021, Singapore exported a total of US\$351 billion, making it the 19-th largest exporter in the world. Over the past five years, Singapore's exports have grown by US\$93.4 billion, from US\$257 billion in 2016 to US\$351 billion in 2021. In 2021, Singapore was the world's largest exporter of glass processing machinery (\$1.6 billion).

In terms of exports, integrated circuits (\$77 billion), petroleum products (\$40.8 billion), gold (\$18.6 billion), packaged medicine (\$10.4 billion), and equipment with individual functions (8.33 billion USD). The most common destinations for exports from Singapore are China (\$56.8 billion), Hong Kong (\$54.5 billion), the United States (\$28.1 billion), Malaysia (\$27.7 billion) and Indonesia (18.4 billion US dollars).

In March 2023, Singapore exported S\$45.2 billion and imported S\$38.1 billion, resulting in a trade balance of S\$7.04 billion. Between March 2022 and March 2023, Singapore's exports fell by S\$4.81 billion (-9.62%) from S\$50 billion to S\$45.2 billion, while imports fell by S\$8.01 billion (-17.4%) from S\$46.1 billion to S\$38.1 billion. In March 2023, Singapore's top exports were electrical machinery, apparatus and instruments, petroleum, products and related materials, organic chemicals, oil bunkers, and professional scientific and control instruments (*OECD World*).

Singapore's major export commodity groups are integrated circuits (\$77 billion), petroleum products (\$40.8 billion), gold (\$18.6 billion), packaged medicine (\$10.4 billion) and custom function equipment (\$8.33 billion). Exports are mainly to China (\$56.8 billion), Hong Kong (\$54.5 billion), the United States (\$28.1 billion), Malaysia (\$27.7 billion), and Indonesia (\$18.4 billion USA) (Fig. 1 and Fig. 2).

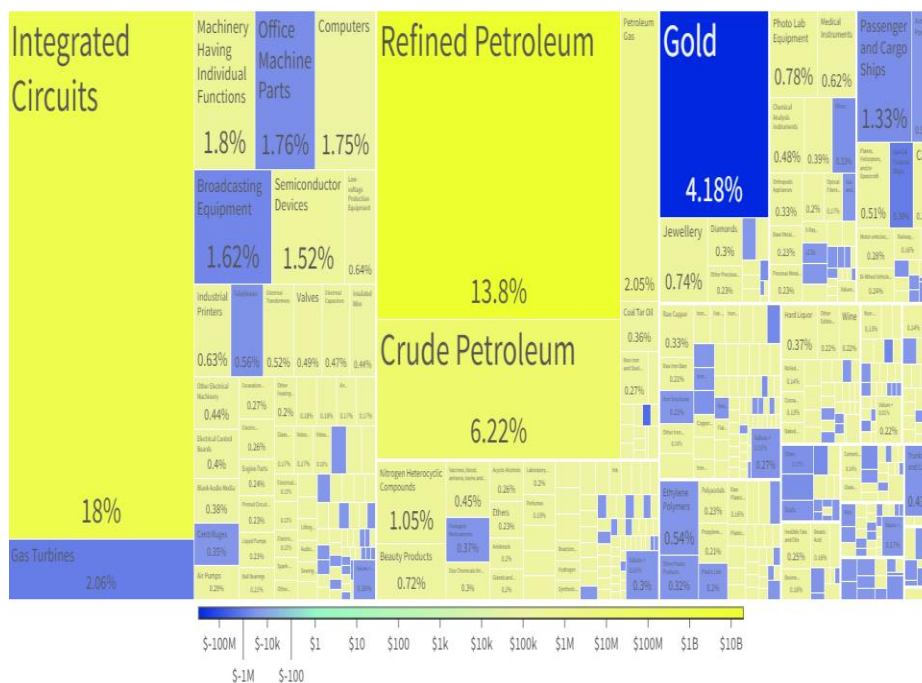


Figure 2. Singapore's import structure for 2021, %
Source: OECD World

In March 2023, the top imports from Singapore were electrical machinery, apparatus and appliances, petroleum and products, related materials, telecommunications and sound recording and reproducing equipment, office machinery and automatic data processing machinery, and various industrial products (*The World Bank*).

The most services imported by Singapore in 2020 were business, professional and technical services (\$71.5 billion), maritime transportation (\$68.9 billion), air transportation (\$19.5 billion), trade and others trade-related services (\$15.7 billion), royalties and license fees (\$15.2 billion).

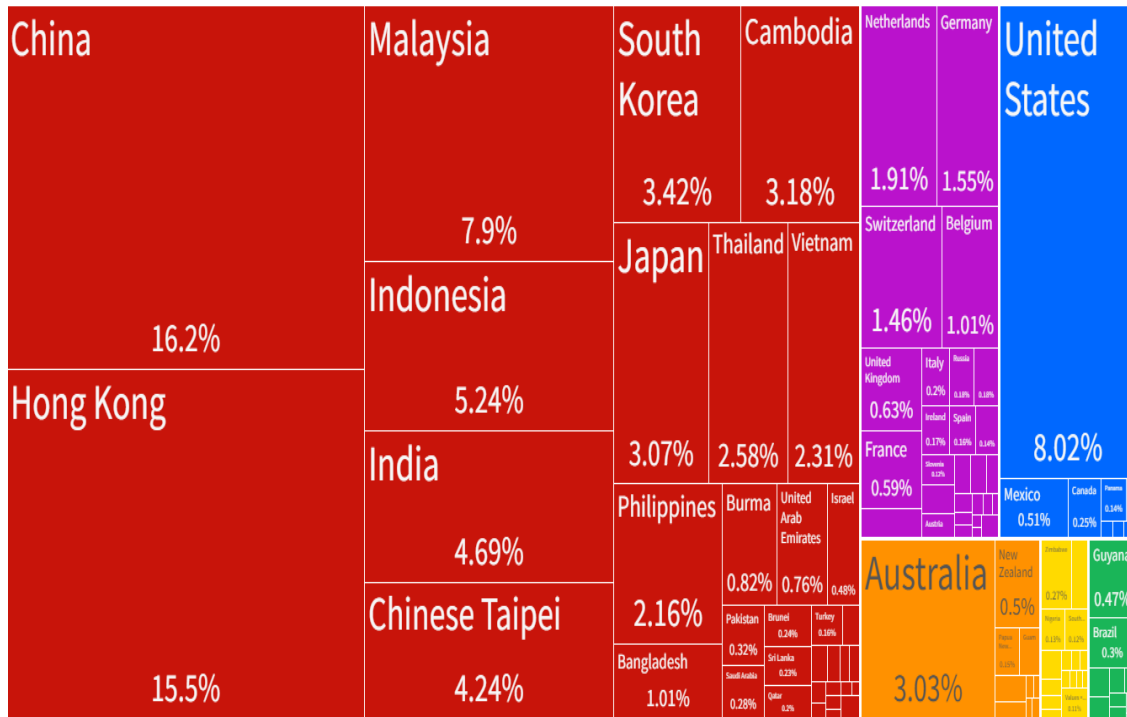


Figure 3. Exporting countries of Singapore in 2021

Source: OEC World

Singapore imports the most integrated circuits (USD 65.2 billion), petroleum products (USD 50 billion), crude oil (USD 22.5 billion), gold (USD 15.1 billion), gas turbines (USD 7.43 billion USD). Imported mainly from China (\$53.9 billion), Malaysia (\$49.6 billion), Chinese Taipei (\$34.1 billion), the United States (\$32.5 billion), and Japan (\$18.2 billion USD) (Fig. 3).

In 2021, Singapore was the world's largest importer of beef, sheep and goat fat (\$635 million), as well as pork and tallow (\$289 million).

In March 2023, Singapore exported to China (SGD 7.48 billion), USA (SGD 6.68 billion), Hong Kong (SGD 6.08 billion), Malaysia (SGD 5.77 billion) and Indonesia (SGD 4.05 billion). At the same time, imported mainly from China (SGD 6.61 billion), USA (SGD 6.13 billion), Malaysia (SGD 5.67 billion), Chinese Taipei (SGD 5.41 billion) and Japan (SGD 3.08 billion).

In March 2023, the year-on-year decline in Singapore's exports was driven by lower exports to China (-1.43 billion SGD or -16%), Chinese Taipei (774 billion SGD or -24.9%) and Hong Kong (-10.6%). The export of products decreased in electrical machines, devices and appliances, plastics, oil, products and related materials (-7.33%).

In March 2023, the year-on-year decline in Singapore's imports was driven by lower imports from Malaysia (SGD 2.22 billion or -28.1%), Chinese Taipei (SGD 2.05 billion or -27.5%) and South

Korea (-29.8%). Imports of products decreased in electrical machines, devices and devices (-23%), petroleum products, products and related materials (-24.5%) and professional scientific and control devices (-23.9%) (Fig. 4) (OECD World).

It can be concluded that Singapore's main trading partners are currently China, USA, Malaysia, Taiwan, Indonesia and Japan. In general, the state is focused on foreign trade, but its high integration into the world economy system is both an advantage and a risk. On the one hand, established contacts with developed countries allow Singapore to "collect the cream", providing foreign companies with ample opportunities for cooperation. On the other hand, the global world recession puts Singapore at increased risk, as the decline in world trade leads to a crisis in the country, with little to compensate for it.

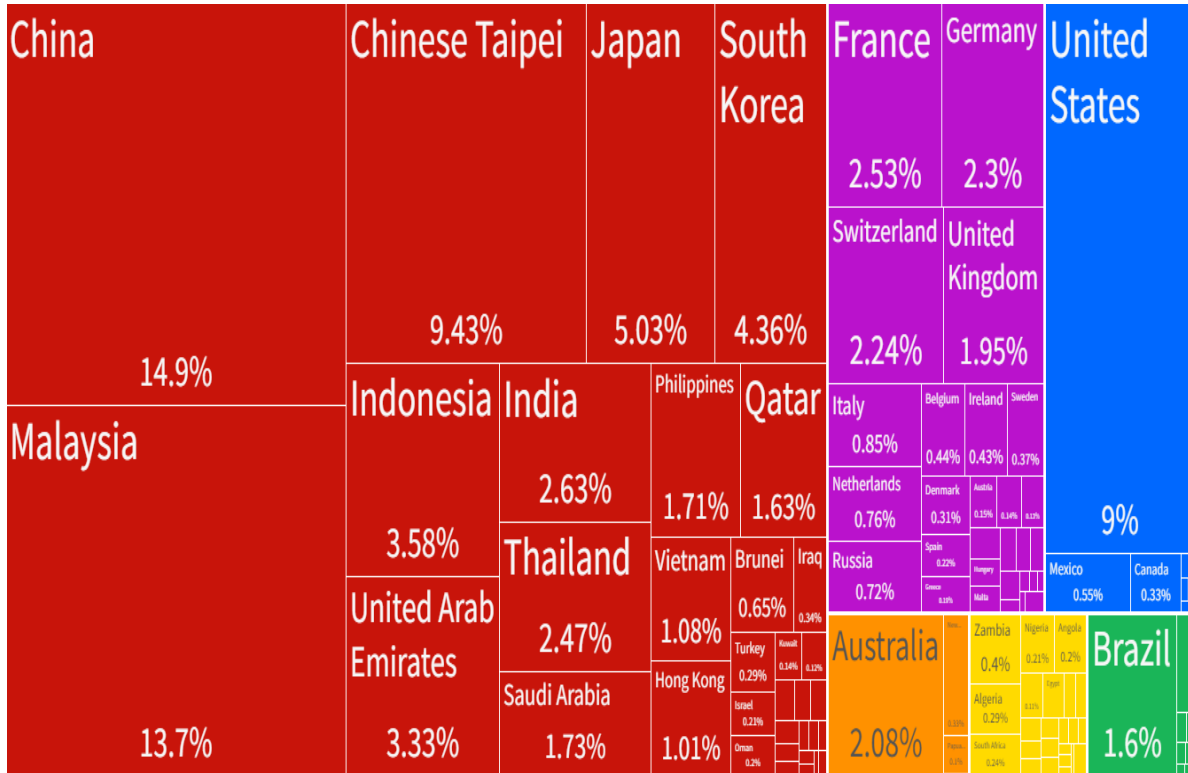


Figure 4. Countries importing Singapore in 2021

Source: OECD World

The country's government's understanding of the primary role of information technologies in the modern world led to the creation of strategic programs that began the intensive development of the country's information and communication technologies. Such programs were (*Digital 2021 – We Are Social UK*):

1. The program of computerization of the state civil service (1981).
2. National plan for information technologies (1986).
3. Information Technology Plan-2000 (Intelligent Island) (1991).

In these programs, information technology is defined as a key direction of economic, political and social development of Singapore. Thus, according to the program of computerization of the state civil service, all administrative services were equipped with computers, and officials were trained in high-tech work methods. This made it possible to speed up the decision-making process and free officials from a huge amount of paperwork, which increased the efficiency of public services.

The "information technologies-2000" program, an important component of which was the development of advanced high-speed communication infrastructure. In 1996, work began on a project to create a nationwide broadband network for the provision of multimedia interactive services called Singapore ONE, which meant "Singapore One – One Network for All". The project was launched in July 1998 (*Digital 2021 – We Are Social UK*).

The opening of the telecommunications market to free competition led to a rapid increase in Singapore's informatization indicators, with the country taking first positions in a number of indicators. The number of broadband users increased more than 4 times, and almost every third Singaporean used high-speed Internet access (*InfoComm and Media*), (*InfoComm Usage by Households and Individuals*).

The Information and Communication Technologies Development Index (IDI) is an index published by the United Nations International Telecommunication Union (ITU) based on internationally agreed indicators of information and communication technologies (*Information & Communications Technology*). The ICT Development Index is based on 11 ICT indicators grouped into three clusters: access, use and skills. In the ITU ranking for 2019, the top 5 are occupied by Iceland, South Korea, Switzerland, Denmark and Great Britain (Table 1). Singapore ranks 18th with an index of 8.05 (*Measuring digital development, 2019*).

The following World Digital Competitiveness Ranking, produced by the IMD World Competitiveness Center, assesses the capacity and readiness of 63 economies to adopt and explore digital technologies as a key driver of economic transformation for business, government and society as a whole.

Table 1. Ranking of countries by information and communication development technologies for 2019

1	Iceland	8.98
2	South Korea	8.85
3	Switzerland	8.74
4	Denmark	8.71
5	Great Britain	8.65
6	Hong Kong	8.61
7	Netherlands	8.49
8	Norway	8.47
9	Luxembourg	8.47
10	Japan	8.43
11	Sweden	8.41
12	Germany	8.39
13	New Zealand	8.33
14	Australia	8.24
15	France	8.24
16	USA	8.18
17	Estonia	8.14
18	Singapore	8.05
19	Monaco	8.05
20	Ireland	8.02

Source: built by the authors on the basis of (*Measuring digital development, 2019*)

Based on a combination of data and responses to surveys of business and government leaders, the digital rankings help governments and companies understand where to focus their resources and what best practices can be in their digital transformation.

Table 2. Ranking of countries according to the digital competitiveness index for 2021 and 2022

<i>2022 year</i>	<i>Country</i>	<i>2021 year</i>	<i>Rating change</i>	
1	Denmark	4	+3	↑
2	USA	1	-1	↓
3	Sweden	3	-	-
4	Singapore	5	+1	↑
5	Switzerland	6	+1	↑
6	Netherlands	7	+1	↑
7	Finland	11	+4	↑
8	Republic of Korea	12	+4	↓
9	Hong Kong	2	-7	↓
10	Canada	13	+3	↑

Source: built by the authors on the basis of (World Digital Competitiveness Rankings – IMD)

Analyzing the table 2, it can be seen that Denmark, USA, Sweden, Singapore and Switzerland lead the ranking of digital competitiveness. As for Singapore, the country's digital competitiveness score has improved, allowing Singapore to move up from 5-th to 4-th place.

The Network Readiness Index in 2021 (Table 3) assesses a total of 130 economies, which collectively account for almost 95% of global gross domestic product. The Netherlands is in 1st place. The USA advanced the most – 4-th place, which rose from the eighth position to the fourth place, displacing Singapore – 7-th place and Switzerland – 6-th place from the top 5 (*Countries-Network Readiness Index*).

Table 3. Ranking of countries according to the network readiness index, according to the data of the World Economic Forum for 2021

<i>Rank</i>	<i>Country</i>	<i>Rating</i>
1	Netherlands	82.06
2	Sweden	81,57
3	Denmark	81.24
4	United States	81.09
5	Finland	80,47
6	Switzerland	80.20
7	Singapore	80.01
8	Germany	78,95
9	Norway	78,49
10	UK	76,60

Source: built by the authors on the basis of (Countries-Network Readiness Index)

Currently, Singapore is mastering a new "wave" – this is cloud computing, industrial automation, artificial intelligence, cyber security, quantum computing, data analysis, 5G, intelligent solutions in the field of mobility and other technologies covering the fields of health care, security, finance, energy, aviation and defense. To advance this technological vision, Singapore is actively positioning itself as a testing ground for the testing and development of new products, as envisaged under the implementation of the Smart Nation programme. It seems that this "wave" will be the next point of growth that will allow Singapore to maintain its leading position in economic growth in the world.

Thus, the formation of Singapore's information society had its own active history. The beginning of building an information society dates back to the 1980s, and the main mechanism was the implementation of plans and programs aimed at creating information technologies. Maximum attention was paid to the digitization programs of education and government. Already in the 2000s, Singapore became one of the leaders in the use of information technologies throughout the world. Confirmation of the development of Singapore is the level of trust of citizens in the authorities "Public trust in politicians", which is noted in the annual report of the World Economic Forum. Singapore ranks first in the ranking out of 137 countries.

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