

บทที่ 2

วิทยาศาสตร์และเทคโนโลยี

1. นิยามและความหมายของวิทยาศาสตร์ และ เทคโนโลยี
2. ประวัติศาสตร์และวิวัฒนาการของวิทยาศาสตร์และเทคโนโลยี
3. สถานภาพของวิทยาศาสตร์ และ เทคโนโลยีของประเทศไทย
4. อนาคตของวิทยาศาสตร์ และ เทคโนโลยีของประเทศไทยกับ
ความเจริญก้าวหน้าของชาติ

อันดับความสามารถในการแข่งขันของประเทศไทย

สถาบันนานาชาติที่ทำหน้าที่ในการจัด
อันดับความสามารถในการแข่งขันของประเทศต่าง ๆ

International Institute for
Management Development (IMD)

(64 ประเทศ : ปี2564)

World Economic Forum (WEF)

(139 ประเทศ : ปี2553)

World bank (183 ประเทศ : ปี2553)



International Institute for Management Development (IMD)

สำนักงานใหญ่ อยู่ที่เมืองโลซานน์ ประเทศสวิตเซอร์แลนด์

จัดทำ **The World Competitiveness Yearbook (WCY)**

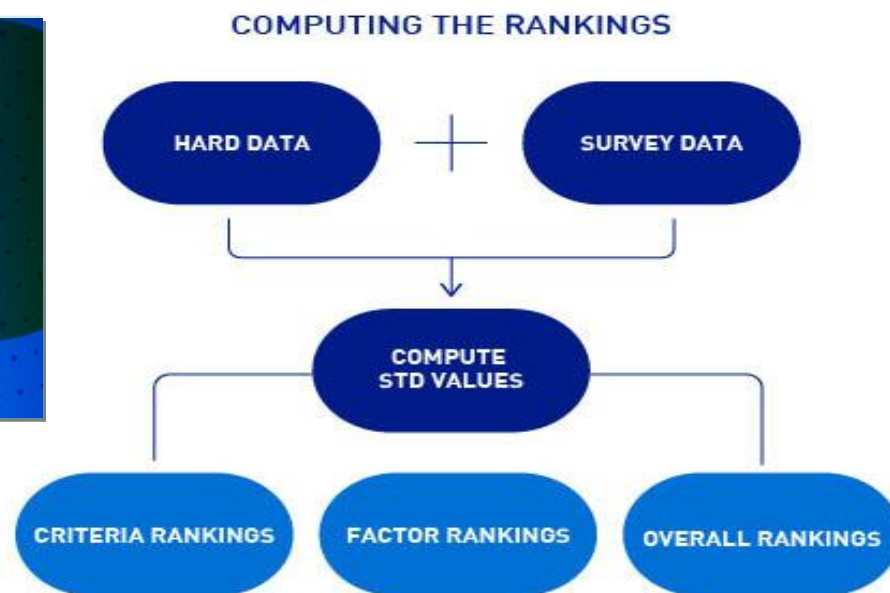

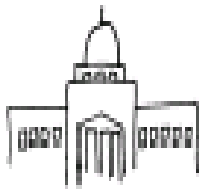

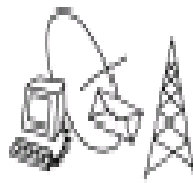
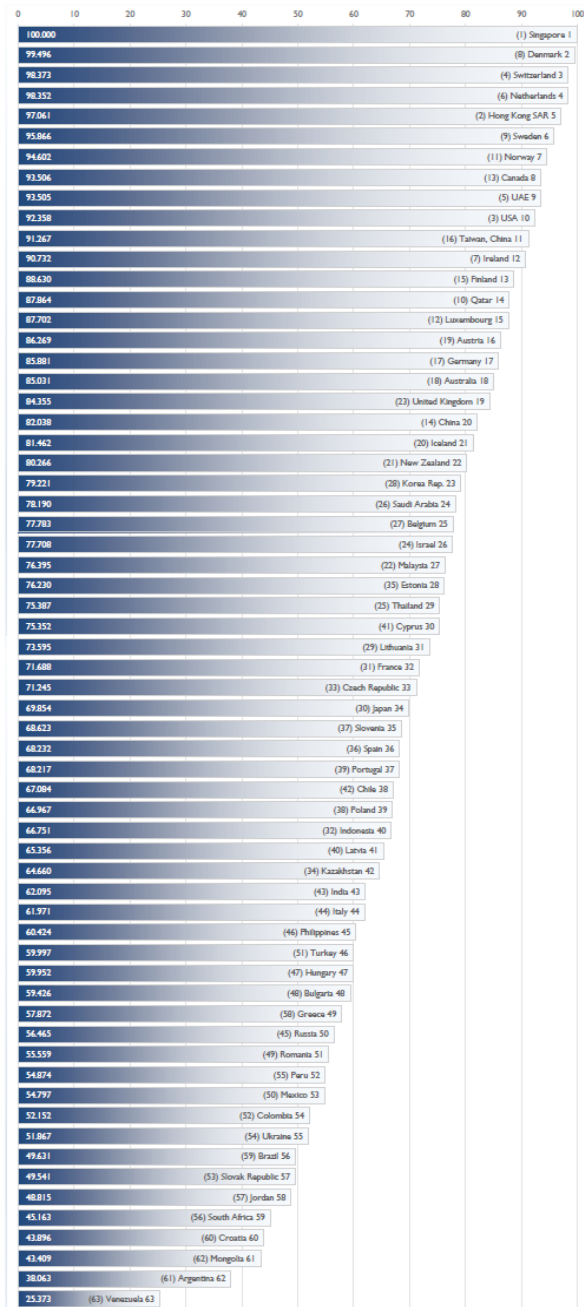


TABLE 2 • The Breakdown of Competitiveness Factors

|  |  |  |  |
|---|---|---|---|
| Economic Performance | Government Efficiency | Business Efficiency | Infrastructure |
| Domestic Economy | Public Finance | Productivity | Basic Infrastructure |
| International Trade | Fiscal Policy | Labor Market | Technological Infrastructure |
| International Investment | Institutional Framework | Finance | Scientific Infrastructure |
| Employment | Business Legislation | Management Practices | Health and Environment |
| Prices | Societal Framework | Attitudes and Values | Education |



| 2020 | Country | 2019 | Change |
|------|-----------------|------|--------|
| 1 | Singapore | 1 | 0 — |
| 2 | Denmark | 8 | 6 + |
| 3 | Switzerland | 4 | 1 + |
| 4 | Netherlands | 6 | 2 + |
| 5 | Hong Kong SAR | 2 | -3 - |
| 6 | Sweden | 9 | 3 + |
| 7 | Norway | 11 | 4 + |
| 8 | Canada | 13 | 5 + |
| 9 | UAE | 5 | -4 - |
| 10 | USA | 3 | -7 - |
| 11 | Taiwan, China | 16 | 5 + |
| 12 | Ireland | 7 | -5 - |
| 13 | Finland | 15 | 2 + |
| 14 | Qatar | 10 | -4 - |
| 15 | Luxembourg | 12 | -3 - |
| 16 | Austria | 19 | 3 + |
| 17 | Germany | 17 | 0 — |
| 18 | Australia | 18 | 0 — |
| 19 | United Kingdom | 23 | 4 + |
| 20 | China | 14 | -6 - |
| 21 | Iceland | 20 | -1 - |
| 22 | New Zealand | 21 | -1 - |
| 23 | Korea Rep. | 28 | 5 + |
| 24 | Saudi Arabia | 26 | 2 + |
| 25 | Belgium | 27 | 2 + |
| 26 | Israel | 24 | -2 - |
| 27 | Malaysia | 22 | -5 - |
| 28 | Estonia | 35 | 7 + |
| 29 | Thailand | 25 | -4 - |
| 30 | Cyprus | 41 | 11 + |
| 31 | Lithuania | 29 | -2 - |
| 32 | France | 31 | -1 - |
| 33 | Czech Republic | 33 | 0 — |
| 34 | Japan | 30 | -4 - |
| 35 | Slovenia | 37 | 2 + |
| 36 | Spain | 36 | 0 — |
| 37 | Portugal | 39 | 2 + |
| 38 | Chile | 42 | 4 + |
| 39 | Poland | 38 | -1 - |
| 40 | Indonesia | 32 | -8 - |
| 41 | Latvia | 40 | -1 - |
| 42 | Kazakhstan | 34 | -8 - |
| 43 | India | 43 | 0 — |
| 44 | Italy | 44 | 0 — |
| 45 | Philippines | 46 | 1 + |
| 46 | Turkey | 51 | 5 + |
| 47 | Hungary | 47 | 0 — |
| 48 | Bulgaria | 48 | 0 — |
| 49 | Greece | 58 | 9 + |
| 50 | Russia | 45 | -5 - |
| 51 | Romania | 49 | -2 - |
| 52 | Peru | 55 | 3 + |
| 53 | Mexico | 50 | -3 - |
| 54 | Colombia | 52 | -2 - |
| 55 | Ukraine | 54 | -1 - |
| 56 | Brazil | 59 | 3 + |
| 57 | Slovak Republic | 53 | -4 - |
| 58 | Jordan | 57 | -1 - |
| 59 | South Africa | 56 | -3 - |
| 60 | Croatia | 60 | 0 — |
| 61 | Mongolia | 62 | 1 + |
| 62 | Argentina | 61 | -1 - |
| 63 | Venezuela | 63 | 0 + |

อันดับ ความสามารถใน การแข่งขันของ ประเทศต่าง ๆ ที่จัดโดย IMD ประจำปี 2563

ที่มา : IMD 2020

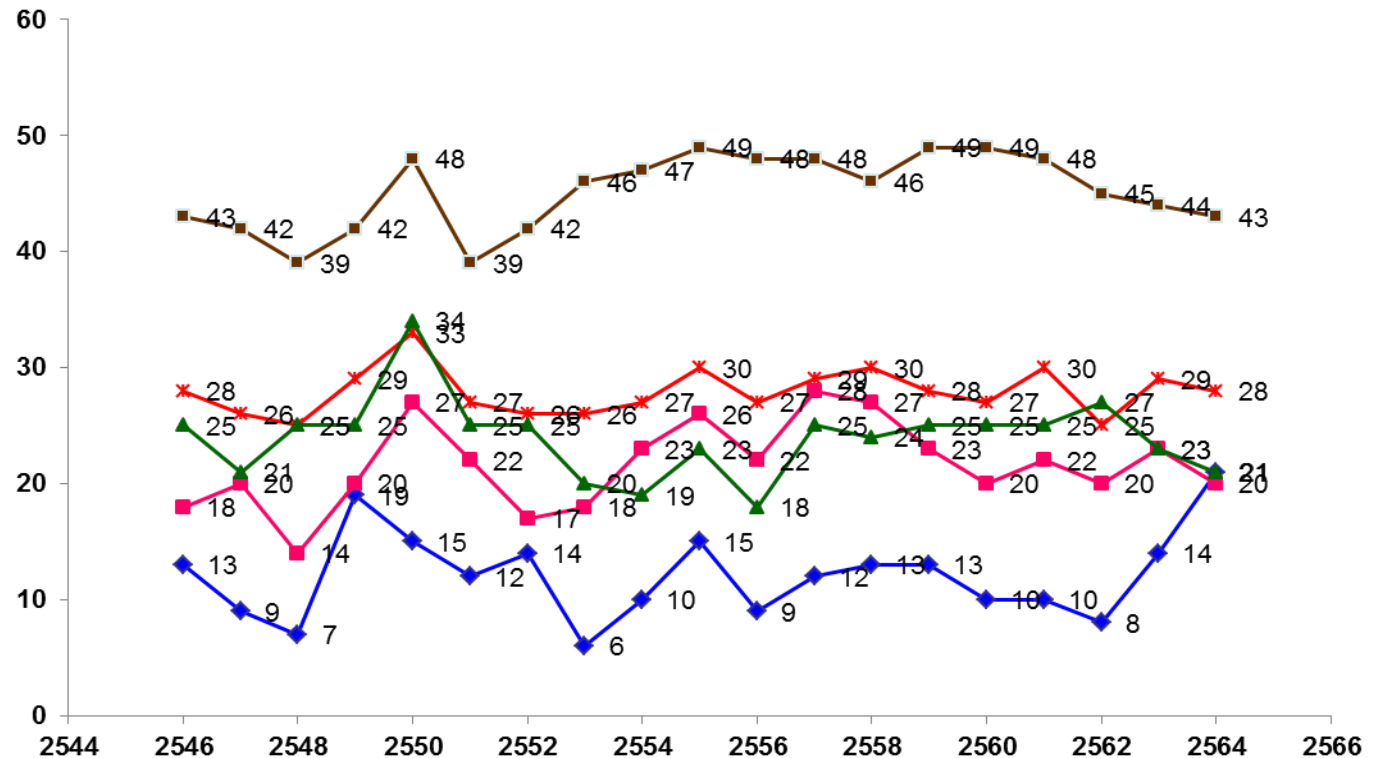
อันดับความสามารถในการแข่งขันของ ประเทศต่าง ๆ ที่จัดโดย IMD ประจำปี 2564

| | | | | | | | | | |
|---|--|---|---|---|---|---|--|---|--|
|  Switzerland 1 st of 64 |  Sweden 2 nd of 64 |  Luxembourg 12 th of 64 |  Ireland 13 th of 64 |  Korea Rep. 23 rd of 64 |  Belgium 24 th of 64 |  Kazakhstan 35 th of 64 |  Portugal 36 th of 64 |  Bulgaria 53 rd of 64 |  Ukraine 54 th of 64 |
|  Denmark 3 rd of 64 |  Netherlands 4 th of 64 |  Canada 14 th of 64 |  Germany 15 th of 64 |  Malaysia 25 th of 64 |  Estonia 26 th of 64 |  Indonesia 37 th of 64 |  Latvia 38 th of 64 |  Mexico 55 th of 64 |  Colombia 56 th of 64 |
|  Singapore 5 th of 64 |  Norway 6 th of 64 |  China 16 th of 64 |  Qatar 17 th of 64 |  Israel 27 th of 64 |  Thailand 28 th of 64 |  Spain 39 th of 64 |  Slovenia 40 th of 64 |  Brazil 57 th of 64 |  Peru 58 th of 64 |
|  Hong Kong SAR 7 th of 64 |  Taiwan, China 8 th of 64 |  United Kingdom 18 th of 64 |  Austria 19 th of 64 |  France 29 th of 64 |  Lithuania 30 th of 64 |  Italy 41 st of 64 |  Hungary 42 nd of 64 |  Croatia 59 th of 64 » View Profile |  Mongolia 60 th of 64 » View Profile |
|  UAE 9 th of 64 |  New Zealand 20 th of 64 |  Japan 31 st of 64 |  Saudi Arabia 32 nd of 64 |  Russia 45 th of 64 |  Greece 46 th of 64 |  India 43 rd of 64 |  Chile 44 th of 64 |  Botswana 61 st of 64 » View Profile |  Argentina 63 rd of 64 » View Profile |
|  USA 10 th of 64 |  Finland 11 th of 64 |  Iceland 21 st of 64 |  Australia 22 nd of 64 |  Cyprus 33 rd of 64 |  Czech Republic 34 th of 64 |  Poland 47 th of 64 » View Profile |  Romania 48 th of 64 » View Profile |  South Africa 62 nd of 64 |  Venezuela 64 th of 64 |
| | | | | | |  Jordan 49 th of 64 » View Profile |  Slovak Republic 50 th of 64 » View Profile | | |
| | | | | | |  Turkey 51 st of 64 |  Philippines 52 nd of 64 | | |

ที่มา : IMD 2020

อันดับความสามารถในการแข่งขันของประเทศไทย

ปี 2546 - 2564



2546-48 : 51 ประเทศ 2549-50 : 53 ประเทศ 2551 : 55 ประเทศ, 2552 : 57 ประเทศ
 2553-54 : 58 ประเทศ 2555 : 59 ประเทศ 2556-57 : 60 ประเทศ
 2558-59 : 61 ประเทศ 2560-63 : 63 ประเทศ 2564 : 64 ประเทศ

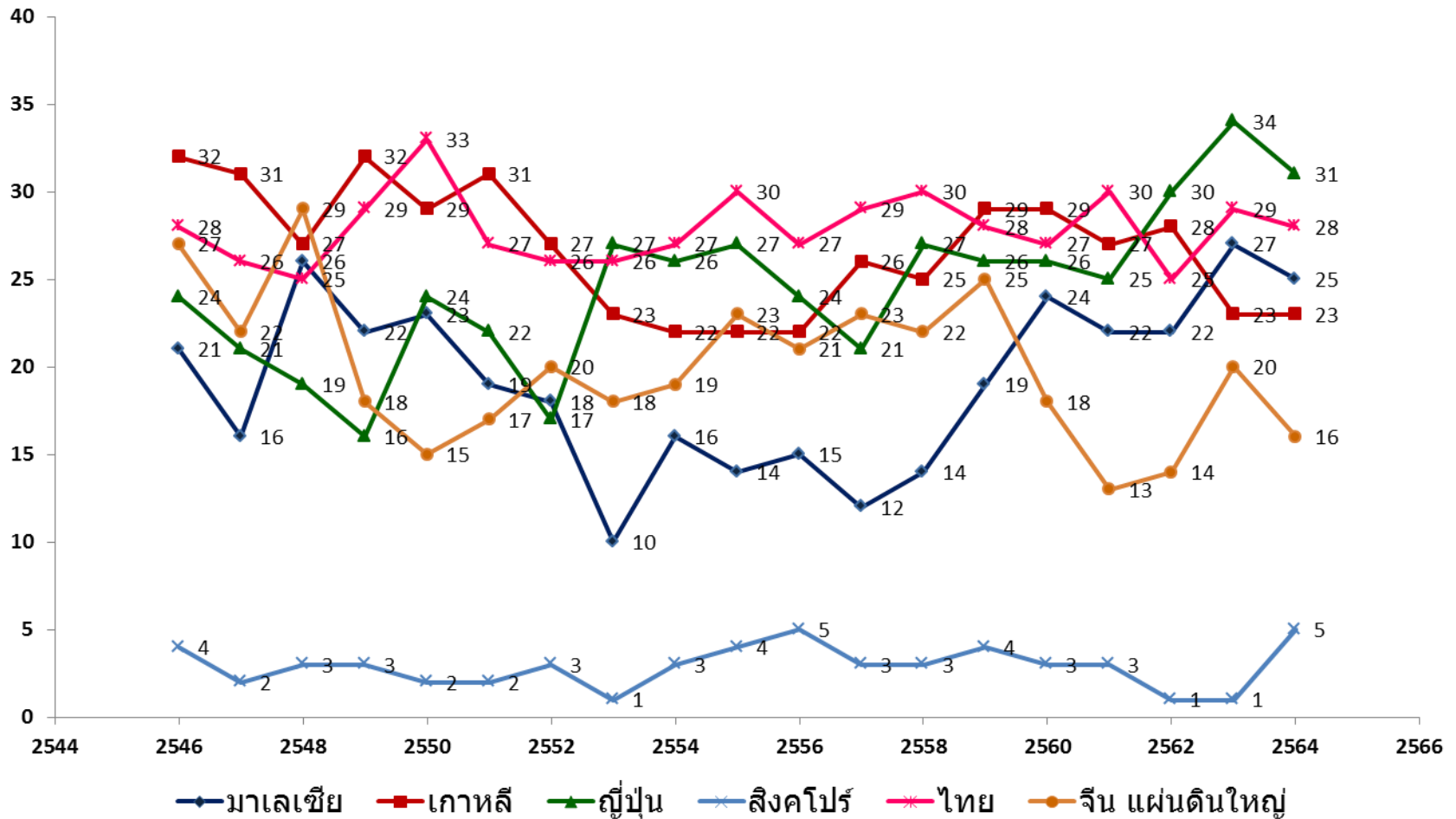
ที่มา : IMD

อันดับความสามารถในการแข่งขันของประเทศไทย

จำแนกตามปัจจัยหลัก โดย IMD ปี 2546 - 2564

| | ปัจจัยหลัก | | | | อันดับโดยรวม | จำนวนประเทศ |
|------|--------------------|----------------------|-------------------------|------------------|--------------|-------------|
| | สมรรถนะทางเศรษฐกิจ | ประสิทธิภาพของภาครัฐ | ประสิทธิภาพของภาคธุรกิจ | โครงสร้างพื้นฐาน | | |
| 2546 | 13 | 18 | 25 | 43 | 28 | 51 |
| 2547 | 9 | 20 | 21 | 42 | 26 | 51 |
| 2548 | 7 | 14 | 25 | 39 | 25 | 51 |
| 2549 | 19 | 20 | 25 | 42 | 29 | 53 |
| 2550 | 15 | 27 | 34 | 48 | 33 | 55 |
| 2551 | 12 | 22 | 25 | 39 | 27 | 55 |
| 2552 | 14 | 17 | 25 | 42 | 26 | 57 |
| 2553 | 6 | 18 | 20 | 46 | 26 | 58 |
| 2554 | 10 | 23 | 19 | 47 | 27 | 59 |
| 2555 | 15 | 26 | 23 | 49 | 30 | 59 |
| 2556 | 9 | 22 | 18 | 48 | 27 | 60 |
| 2557 | 12 | 28 | 25 | 48 | 29 | 60 |
| 2558 | 13 | 27 | 24 | 46 | 30 | 61 |
| 2559 | 13 | 23 | 25 | 49 | 28 | 61 |
| 2560 | 10 | 20 | 25 | 49 | 27 | 63 |
| 2561 | 10 | 22 | 25 | 48 | 30 | 63 |
| 2562 | 8 | 20 | 27 | 45 | 25 | 63 |
| 2563 | 14 | 23 | 23 | 44 | 29 | 63 |
| 2564 | 21 | 20 | 21 | 43 | 28 | 64 |

อันดับความสามารถในการแข่งขันของประเทศต่าง ๆ โดยรวม ปี 2546 - 2564



ที่มา : IMD

THAILAND

CHALLENGES IN 2021

- Short-term measures for economic recovery and social supports.
- Digital transformation and digitalization of the public sector.
- Handling conflict driven by divisive opinion and generation gap.
- Public-private partnership in handling the crisis.
- National crisis capacity improvement especially crisis communication.

SINGAPORE

CHALLENGES IN 2021

- Help businesses transform and capture growth opportunities amidst shifts in the global economic landscape.
- Spur job creation, and equip workers with the capabilities to secure jobs in growth sectors.
- Preserve core capabilities of firms in sectors severely affected by the COVID-19 pandemic.

MALAYSIA

CHALLENGES IN 2021

- Minimize the impact of COVID-19 on economic, social and environment through agile policies and regulations.
- Upskilling and reskilling are crucial to keep up with new and emerging job challenges and nurture a future-ready workforce.
- To inculcate digital-first mindset and increase the adoption of digital technology across the public sector.
- To increase productivity through measures enabling business environment e.g. to boost innovation, skills and institutional quality.
- Creating an ecosystem conducive to attracting investment.

CHINA - MAINLAND

CHALLENGES IN 2021

- Stimulate domestic consumption to promote high-quality socio-economic development.
- Strengthen anti-monopoly and prevent disorderly expansion of capital.
- Manage the economic and social uncertainty caused by COVID-19 pandemic.
- Promote international cooperation to meet the challenge of climate change.
- Address challenges posed by increasingly serious population ageing.

KOREA

CHALLENGES IN 2021

- Transformation of service industries: contact-free and digitalized.
- Return of inflation, interest rate hikes and increasing borrowing costs.
- Disparity between advanced economies and emerging markets due to unequal vaccination.
- Reshoring, near-shoring and supply chain disruption.
- Global corporate tax coordination.

JAPAN

CHALLENGES IN 2021

- Dealing with the pandemic and protecting the lives and livelihoods of the people.
- Developing human resources who will propel social reform and strengthening investment in intangible assets.
- Accelerating the investment and implementation of digitization to construct the 'New Normal Lifestyle'.
- Establishing a new global cooperation through stronger international cooperation and partnerships.
- Building a nation of multipolar partnerships and revitalizing local communities.

IMD WORLD DIGITAL COMPETITIVENESS RANKING 2020

What is the IMD World Digital Competitiveness ranking?

Digital Competitiveness Factors and Sub-factors

| FACTORS | Knowledge | Technology | Future Readiness |
|-------------|---|--|---|
| | <i>Know-how necessary to discover, understand and build new technologies.</i> | <i>Overall context that enables the development of digital technologies.</i> | <i>Level of country preparedness to exploit digital transformation.</i> |
| SUB-FACTORS | Talent | Regulatory Framework | Adaptive Attitudes |
| | Training and Education | Capital | Business Agility |
| | Scientific Concentration | Technological Framework | IT Integration |

DIGITAL COMPETITIVENESS FACTORS AND SUB-FACTORS

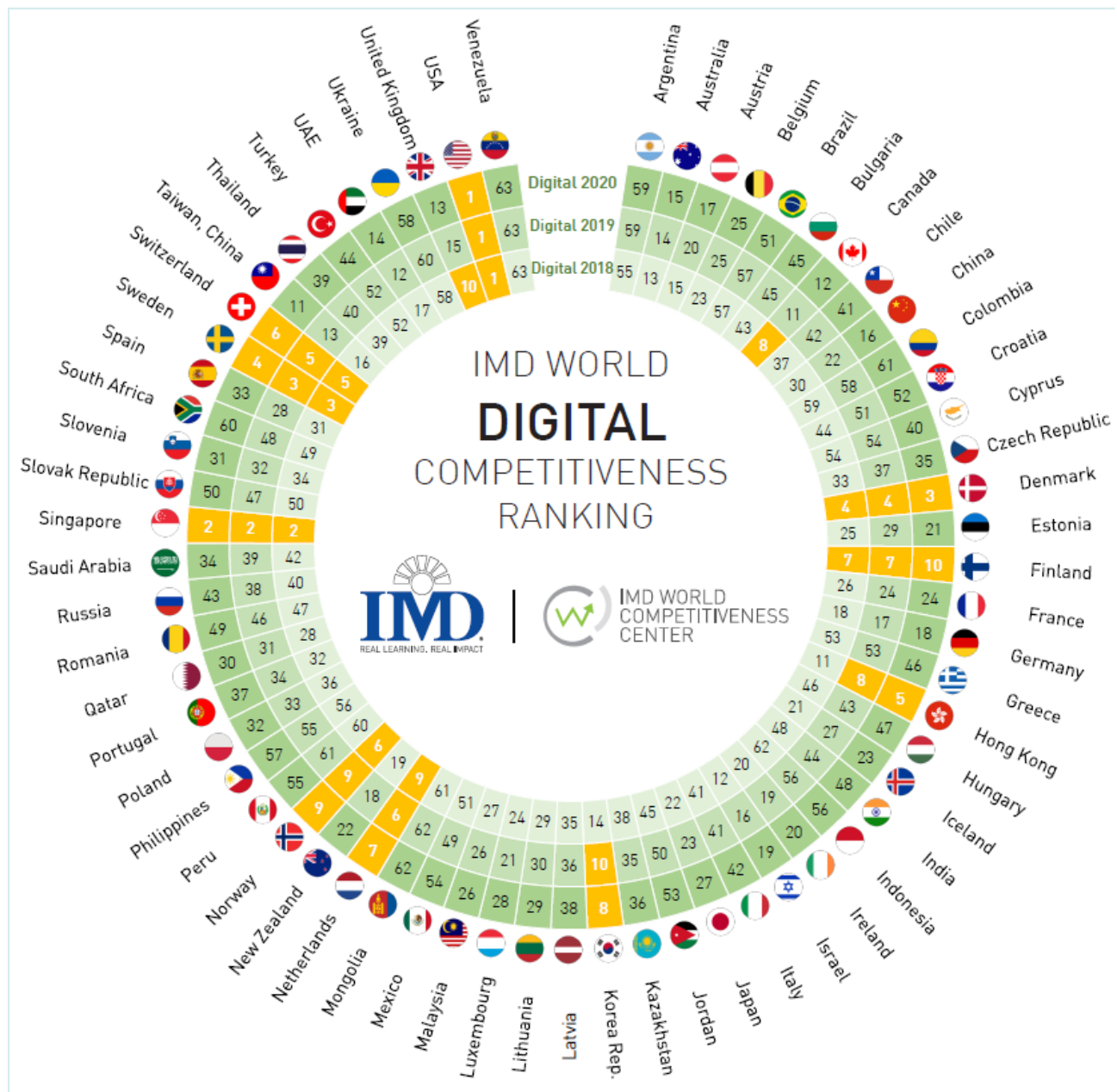


ที่มา : IMD

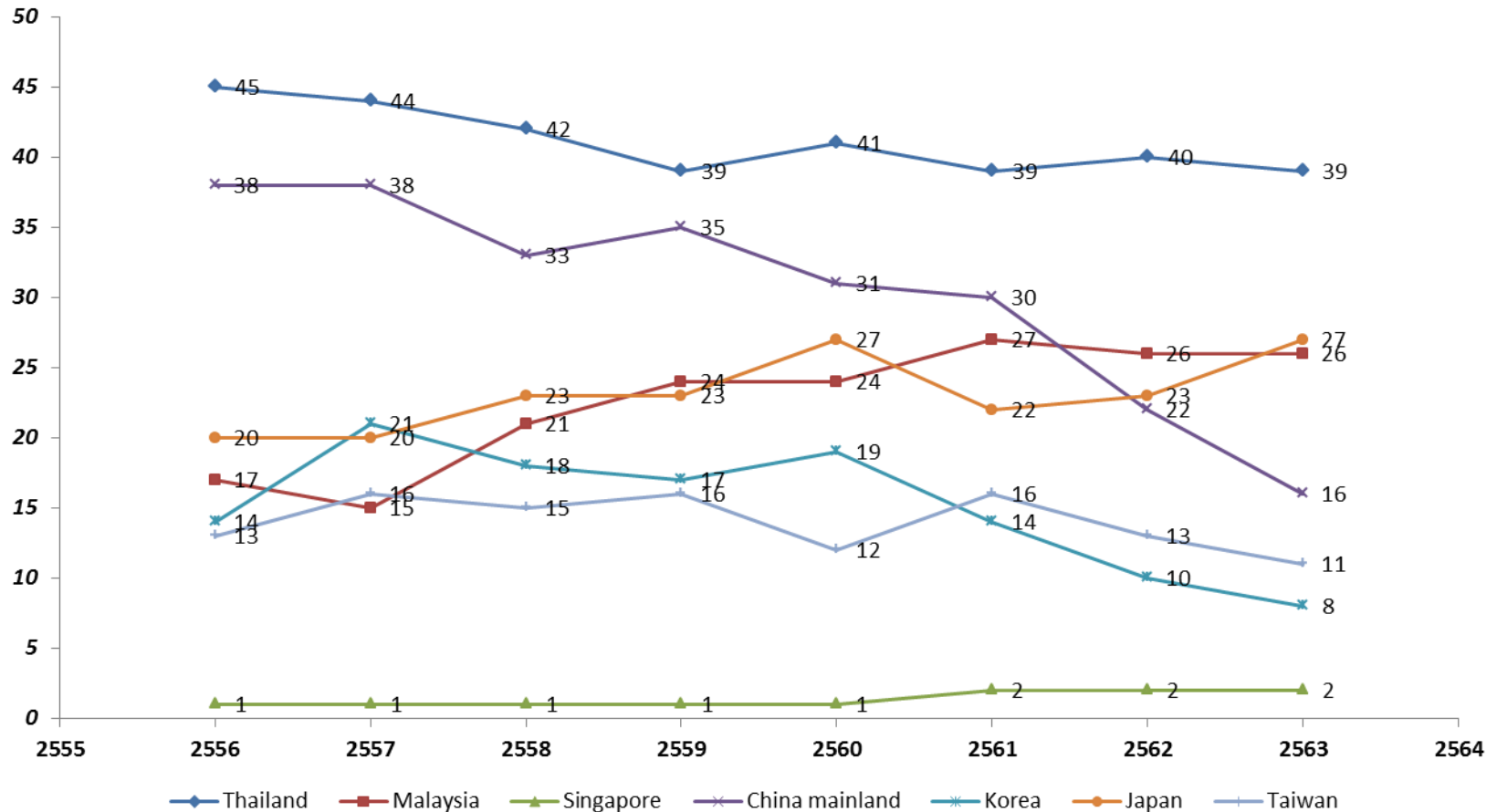
Table 1. Overall structure of Digital Competitiveness

| Knowledge | | |
|------------------------------------|--|-------------------------------------|
| <i>Talent</i> | <i>Training and education</i> | <i>Scientific concentration</i> |
| Educational assessment PISA - Math | Employee training | Total expenditure on R&D (%) |
| International experience | Total public expenditure on education | Total R&D personnel per capita |
| Foreign highly-skilled personnel | Higher education achievement | Female researchers |
| Management of cities | Pupil-teacher ratio (tertiary education) | R&D productivity by publication |
| Digital/Technological skills | Graduates in Sciences | Scientific and technical employment |
| Net flow of international students | Women with degrees | High-tech patent grants |
| Technology | | |
| <i>Regulatory framework</i> | <i>Capital</i> | <i>Technological</i> |
| Starting a business | IT & media stock market capitalization | Communications technology |
| Enforcing contracts | Funding for technological development | Mobile broadband subscribers |
| Immigration laws | Banking and financial services | Wireless broadband |
| Technological regulation | Investment risk | Internet users |
| Scientific research legislation | Venture capital | Internet bandwidth speed |
| Intellectual property rights | Investment in telecommunications | High-tech exports (%) |
| Future readiness | | |
| <i>Adaptive attitudes</i> | <i>Business agility</i> | <i>IT integration</i> |
| E-Participation | Opportunities and threats | E-Government |
| Internet retailing | Innovative firms | Public-private partnerships |
| Tablet possession | Agility of companies | Cyber security |
| Smartphone possession | Use of big data and analytics | Software piracy |
| Attitudes toward globalization | Knowledge transfer | |

Digital Competitiveness Ranking 2018, 2019, 2020

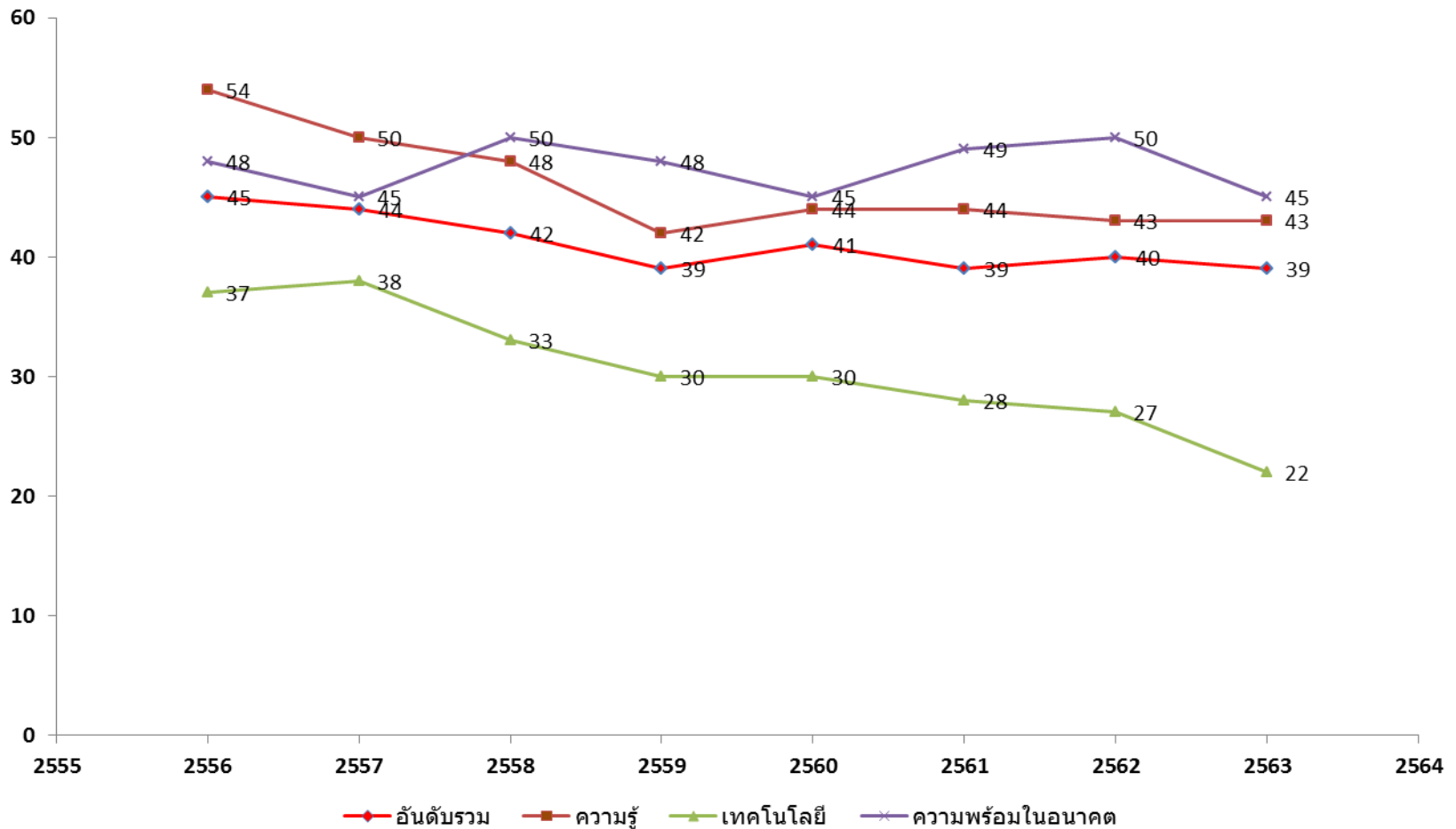


อันดับความสามารถในการแข่งขันทางดิจิทัล ของประเทศต่าง ๆ โดยรวมปี 2556-2563



ที่มา : IMD

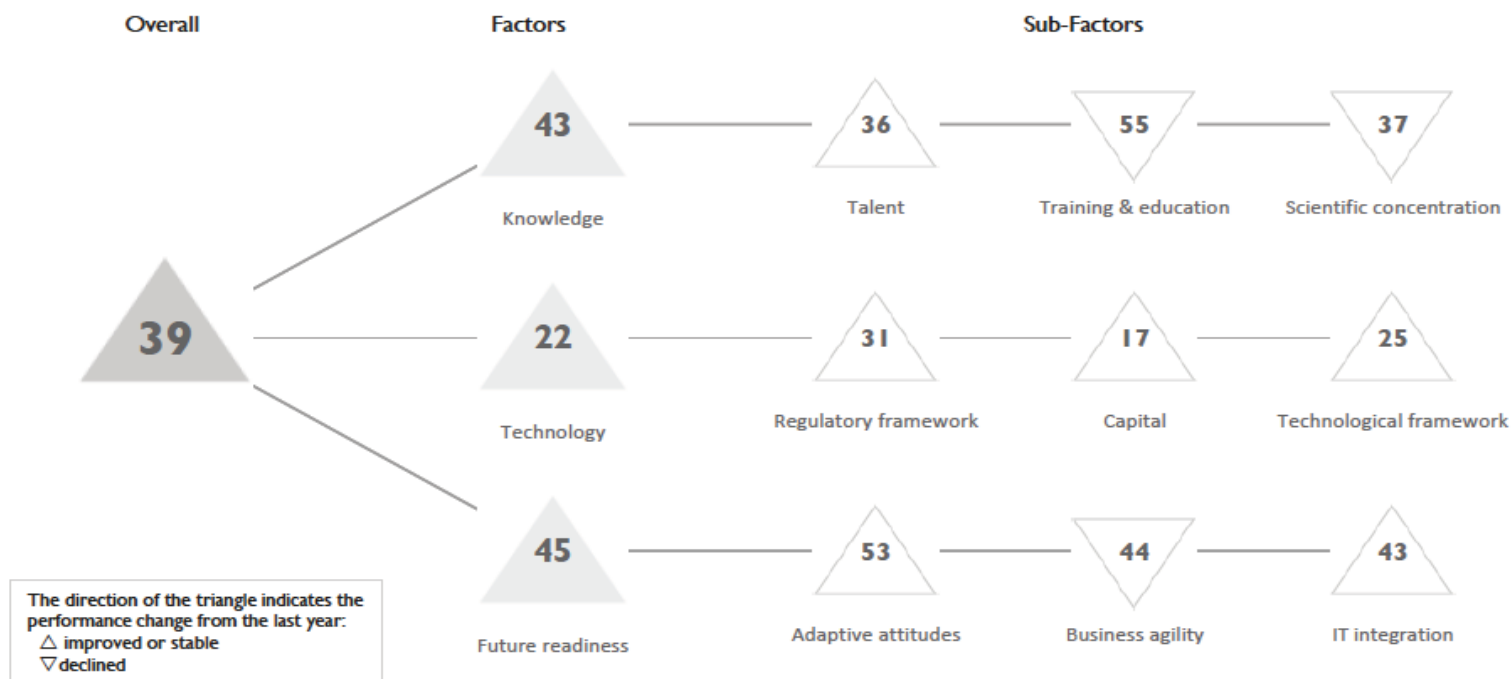
อันดับความสามารถในการแข่งขันทางดิจิทัล ของประเทศไทย ปี 2556-2563



ที่มา : IMD

THAILAND

OVERALL PERFORMANCE (63 countries)



| OVERALL & FACTORS - 5 years | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------|------|------|------|------|------|
| OVERALL | 39 | 41 | 39 | 40 | 39 |
| Knowledge | 42 | 44 | 44 | 43 | 43 |
| Technology | 30 | 30 | 28 | 27 | 22 |
| Future readiness | 48 | 45 | 49 | 50 | 45 |

THAILAND

2019

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 42 | 42 | 42 | 42 | 40 |
| Training & education | 54 | 44 | 47 | 44 | 50 |
| Scientific concentration | 44 | 41 | 43 | 45 | 35 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 48 |
| International experience | 20 |
| Foreign highly-skilled personnel | 29 |
| Management of cities | 35 |
| Digital/Technological skills | 49 |
| Net flow of international students | 34 |

| Training & education | Rank |
|--|------|
| Employee training | 25 |
| Total public expenditure on education | 51 |
| Higher education achievement | 41 |
| ▷ Pupil-teacher ratio (tertiary education) | 57 |
| Graduates in Sciences | 15 |
| Women with degrees | 45 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 37 |
| Total R&D personnel per capita | 39 |
| ► Female researchers | 3 |
| R&D productivity by publication | 28 |
| Scientific and technical employment | 47 |
| High-tech patent grants | 49 |
| Robots in Education and R&D | 26 |

TECHNOLOGY

THAILAND

2019

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 42 | 43 | 38 | 34 | 33 |
| Capital | 17 | 21 | 21 | 28 | 21 |
| Technological framework | 38 | 32 | 30 | 23 | 29 |

| Regulatory framework | Rank |
|---|------|
| Starting a business | 23 |
| Enforcing contracts | 29 |
| Immigration laws | 27 |
| Development and application of technology | 34 |
| Scientific research legislation | 37 |
| Intellectual property rights | 47 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 23 |
| Funding for technological development | 29 |
| Banking and financial services | 7 |
| Country credit rating | 41 |
| Venture capital | 22 |
| Investment in Telecommunications | 19 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 23 |
| Mobile Broadband subscribers | 4 |
| Wireless broadband | 22 |
| Internet users | 54 |
| Internet bandwidth speed | 32 |
| High-tech exports (%) | 9 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 47 | 47 | 51 | 55 | 58 |
| Business agility | 40 | 34 | 32 | 34 | 30 |
| IT integration | 57 | 55 | 53 | 55 | 51 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 56 |
| Internet retailing | 54 |
| Tablet possession | 59 |
| Smartphone possession | 49 |
| Attitudes toward globalization | 18 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 33 |
| World robots distribution | 10 |
| Agility of companies | 41 |
| Use of big data and analytics | 37 |
| Knowledge transfer | 32 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 53 |
| Public-private partnerships | 20 |
| Cyber security | 30 |
| Software piracy | 56 |

THAILAND

2020

► Overall top strengths

▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 42 | 42 | 42 | 40 | 36 |
| Training & education | 44 | 47 | 44 | 50 | 55 |
| Scientific concentration | 41 | 43 | 45 | 35 | 37 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 48 |
| International experience | 15 |
| Foreign highly-skilled personnel | 16 |
| Management of cities | 27 |
| Digital/Technological skills | 45 |
| Net flow of international students | 35 |

| Training & education | Rank |
|--|------|
| Employee training | 25 |
| ▷ Total public expenditure on education | 58 |
| Higher education achievement | 48 |
| ▷ Pupil-teacher ratio (tertiary education) | 54 |
| Graduates in Sciences | 16 |
| Women with degrees | 47 |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 37 |
| Total R&D personnel per capita | 40 |
| ► Female researchers | 6 |
| R&D productivity by publication | 31 |
| ▷ Scientific and technical employment | 54 |
| High-tech patent grants | 47 |
| Robots in Education and R&D | 21 |

TECHNOLOGY

THAILAND

2020

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 43 | 38 | 34 | 33 | 31 |
| Capital | 21 | 21 | 28 | 21 | 17 |
| Technological framework | 32 | 30 | 23 | 29 | 25 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 27 |
| Enforcing contracts | 29 |
| Immigration laws | 23 |
| Development & application of tech. | 32 |
| Scientific research legislation | 28 |
| Intellectual property rights | 44 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 20 |
| Funding for technological development | 27 |
| Banking and financial services | 9 |
| Country credit rating | 40 |
| Venture capital | 24 |
| Investment in Telecommunications | 14 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 24 |
| Mobile Broadband subscribers | 10 |
| Wireless broadband | 23 |
| Internet users | 54 |
| Internet bandwidth speed | 20 |
| High-tech exports (%) | 11 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 47 | 51 | 55 | 58 | 53 |
| Business agility | 34 | 32 | 34 | 30 | 44 |
| IT integration | 55 | 53 | 55 | 51 | 43 |

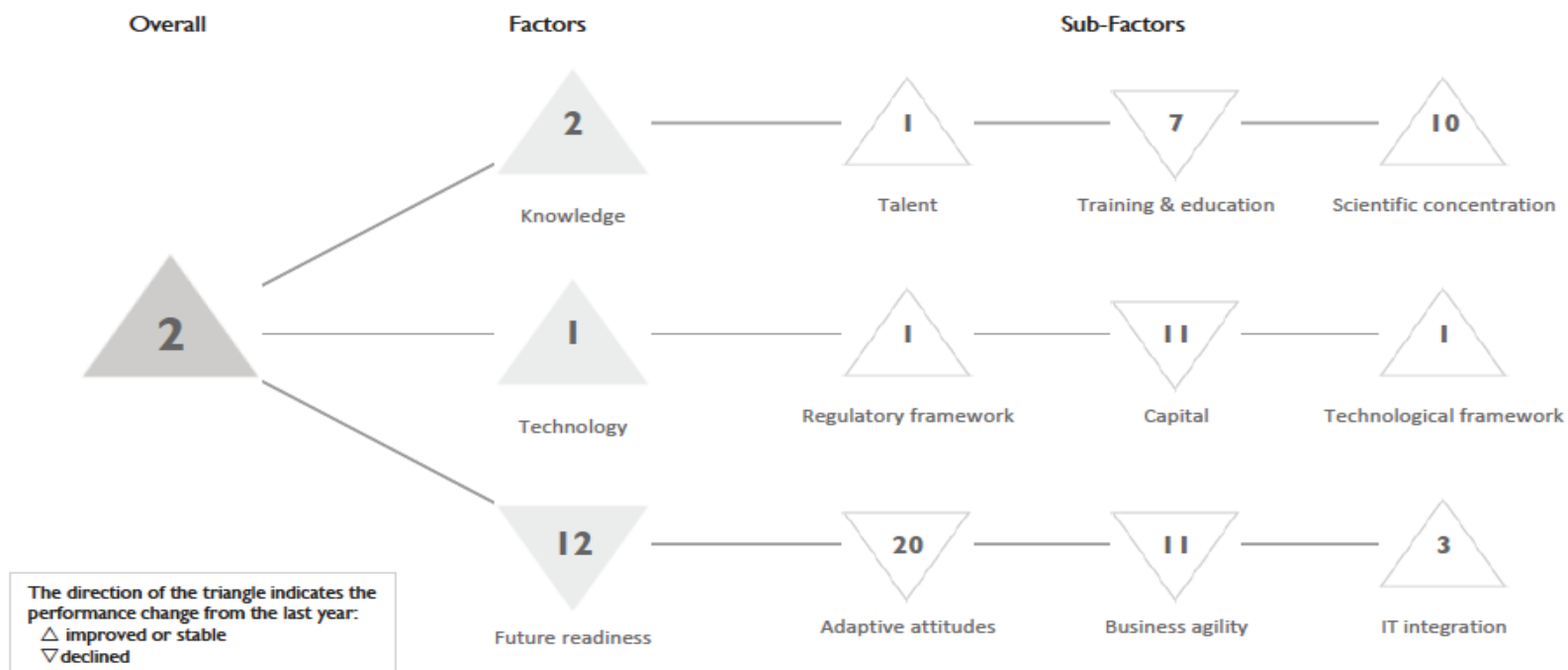
| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 42 |
| Internet retailing | 49 |
| Tablet possession | 58 |
| Smartphone possession | 47 |
| Attitudes toward globalization | 12 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 38 |
| World robots distribution | 11 |
| Agility of companies | 36 |
| Use of big data and analytics | 35 |
| Knowledge transfer | 29 |
| Entrepreneurial fear of failure | 53 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 49 |
| Public-private partnerships | 16 |
| Cyber security | 34 |
| Software piracy | 56 |

SINGAPORE

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|
| OVERALL | 1 | 1 | 2 | 2 | 2 |
| Knowledge | 1 | 1 | 1 | 3 | 2 |
| Technology | 1 | 1 | 1 | 1 | 1 |
| Future readiness | 4 | 6 | 15 | 11 | 12 |

- Overall top strengths
▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 1 | 1 | 1 | 1 | 1 |
| Training & education | 5 | 9 | 9 | 1 | 4 |
| Scientific concentration | 13 | 11 | 8 | 19 | 22 |

| Talent | Rank |
|--------------------------------------|------|
| ► Educational assessment PISA - Math | 1 |
| International experience | 9 |
| Foreign highly-skilled personnel | 2 |
| ► Management of cities | 1 |
| Digital/Technological skills | 8 |
| Net flow of international students | 7 |

| Training & education | Rank |
|--|------|
| Employee training | 28 |
| ▷ Total public expenditure on education | 60 |
| Higher education achievement | 2 |
| Pupil-teacher ratio (tertiary education) | 31 |
| Graduates in Sciences | 2 |
| Women with degrees | - |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 18 |
| Total R&D personnel per capita | 13 |
| ▷ Female researchers | 42 |
| ▷ R&D productivity by publication | 44 |
| ▷ Scientific and technical employment | 51 |
| ► High-tech patent grants | 1 |
| Robots in Education and R&D | 32 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 3 | 2 | 1 | 2 | 2 |
| Capital | 10 | 10 | 14 | 8 | 8 |
| Technological framework | 1 | 1 | 1 | 1 | 1 |

| Regulatory framework | Rank |
|---------------------------------------|------|
| Starting a business | 2 |
| ► Enforcing contracts | 1 |
| ▷ Immigration laws | 48 |
| Development and application of technc | 1 |
| Scientific research legislation | 1 |
| Intellectual property rights | 6 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 26 |
| Funding for technological development | 1 |
| Banking and financial services | 2 |
| Country credit rating | 1 |
| Venture capital | 5 |
| Investment in Telecommunications | 40 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 5 |
| Mobile Broadband subscribers | 1 |
| Wireless broadband | 5 |
| Internet users | 1 |
| ► Internet bandwidth speed | 1 |
| High-tech exports (%) | 2 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 12 | 11 | 11 | 20 | 19 |
| Business agility | 12 | 13 | 14 | 18 | 6 |
| IT integration | 1 | 1 | 1 | 3 | 4 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 13 |
| Internet retailing | 26 |
| Tablet possession | 15 |
| Smartphone possession | 32 |
| Attitudes toward globalization | 2 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 9 |
| World robots distribution | 15 |
| Agility of companies | 7 |
| Use of big data and analytics | 15 |
| Knowledge transfer | 5 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 7 |
| Public-private partnerships | 2 |
| Cyber security | 6 |
| Software piracy | 17 |

SINGAPORE

2020

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 1 | 1 | 1 | 1 | 1 |
| Training & education | 9 | 9 | 1 | 4 | 7 |
| Scientific concentration | 11 | 8 | 19 | 22 | 10 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 2 |
| International experience | 7 |
| Foreign highly-skilled personnel | 5 |
| Management of cities | 1 |
| Digital/Technological skills | 7 |
| Net flow of international students | 6 |

| Training & education | Rank |
|--|------|
| Employee training | 16 |
| ▷ Total public expenditure on education | 61 |
| Higher education achievement | 2 |
| Pupil-teacher ratio (tertiary education) | 27 |
| Graduates in Sciences | 4 |
| Women with degrees | - |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 20 |
| Total R&D personnel per capita | 13 |
| ▷ Female researchers | 45 |
| ▷ R&D productivity by publication | 41 |
| Scientific and technical employment | 11 |
| ► High-tech patent grants | 1 |
| Robots in Education and R&D | 32 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 2 | 1 | 2 | 2 | 1 |
| Capital | 10 | 14 | 8 | 8 | 11 |
| Technological framework | 1 | 1 | 1 | 1 | 1 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 3 |
| ► Enforcing contracts | 1 |
| ▷ Immigration laws | 48 |
| Development & application of tech. | 2 |
| Scientific research legislation | 2 |
| Intellectual property rights | 5 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 26 |
| Funding for technological development | 3 |
| Banking and financial services | 3 |
| ► Country credit rating | 1 |
| Venture capital | 7 |
| ▷ Investment in Telecommunications | 41 |

| Technological framework | Rank |
|--------------------------------|------|
| Communications technology | 8 |
| ► Mobile Broadband subscribers | 1 |
| Wireless broadband | 7 |
| Internet users | 1 |
| ► Internet bandwidth speed | 1 |
| High-tech exports (%) | 4 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 11 | 11 | 20 | 19 | 20 |
| Business agility | 13 | 14 | 18 | 6 | 11 |
| IT integration | 1 | 1 | 3 | 4 | 3 |

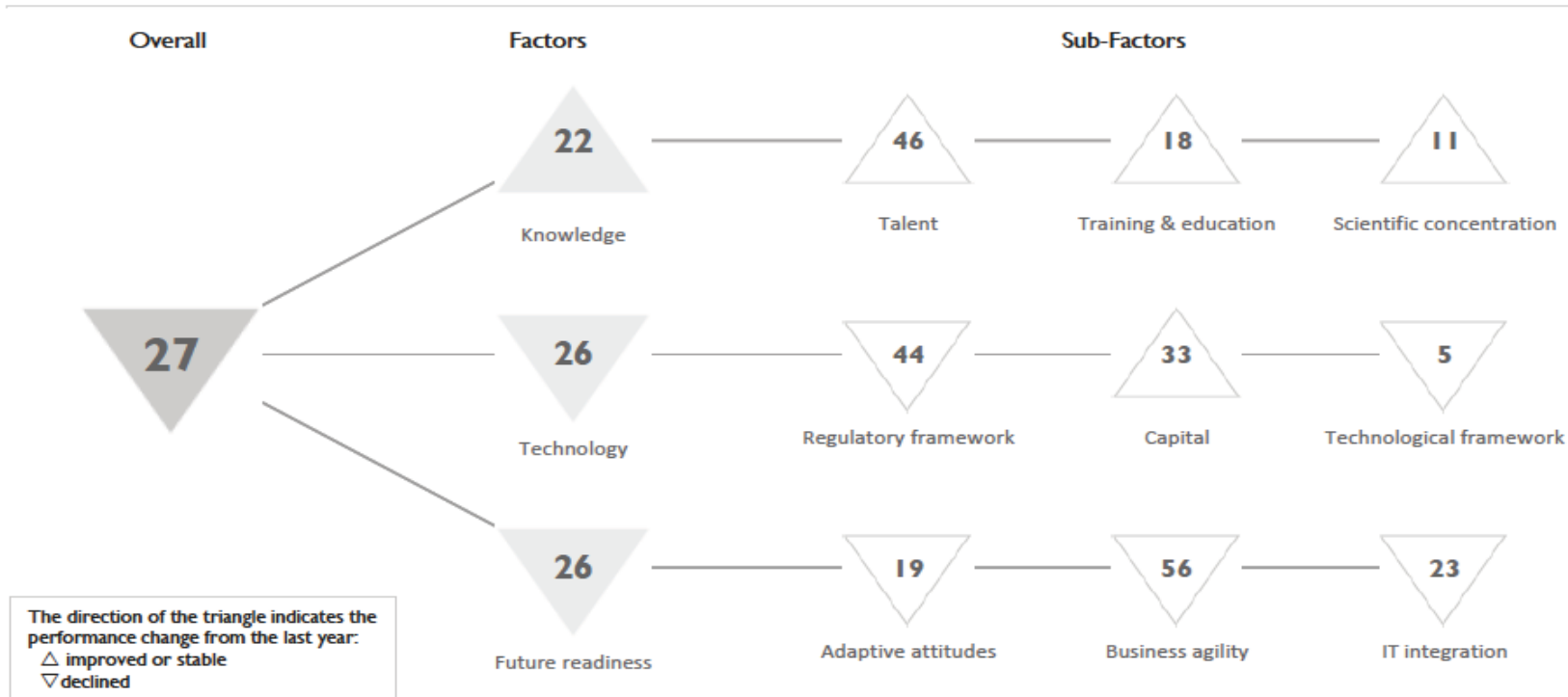
| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 6 |
| Internet retailing | 25 |
| Tablet possession | 23 |
| Smartphone possession | 31 |
| Attitudes toward globalization | 4 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 16 |
| World robots distribution | 15 |
| Agility of companies | 19 |
| Use of big data and analytics | 10 |
| Knowledge transfer | 4 |
| Entrepreneurial fear of failure | - |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 11 |
| Public-private partnerships | 2 |
| Cyber security | 6 |
| Software piracy | 17 |

JAPAN

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|
| OVERALL | 23 | 27 | 22 | 23 | 27 |
| Knowledge | 23 | 29 | 18 | 25 | 22 |
| Technology | 19 | 23 | 23 | 24 | 26 |
| Future readiness | 23 | 25 | 25 | 24 | 26 |

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 31 | 30 | 41 | 36 | 46 |
| Training & education | 27 | 28 | 31 | 14 | 19 |
| Scientific concentration | 14 | 14 | 16 | 12 | 11 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 4 |
| ▷ International experience | 63 |
| Foreign highly-skilled personnel | 51 |
| Management of cities | 11 |
| ▷ Digital/Technological skills | 60 |
| Net flow of international students | 25 |

| Training & education | Rank |
|--|------|
| Employee training | 15 |
| Total public expenditure on education | 55 |
| Higher education achievement | 6 |
| ► Pupil-teacher ratio (tertiary education) | 1 |
| Graduates in Sciences | 42 |
| Women with degrees | 8 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 6 |
| Total R&D personnel per capita | 16 |
| Female researchers | 54 |
| R&D productivity by publication | 15 |
| Scientific and technical employment | 36 |
| High-tech patent grants | 4 |
| Robots in Education and R&D | 4 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 39 | 37 | 37 | 40 | 42 |
| Capital | 26 | 29 | 33 | 33 | 37 |
| Technological framework | 3 | 3 | 6 | 4 | 2 |

| Regulatory framework | Rank |
|--------------------------------------|------|
| Starting a business | 42 |
| Enforcing contracts | 38 |
| Immigration laws | 56 |
| Development and application of techn | 37 |
| Scientific research legislation | 41 |
| Intellectual property rights | 31 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 17 |
| Funding for technological development | 32 |
| Banking and financial services | 45 |
| Country credit rating | 31 |
| Venture capital | 36 |
| Investment in Telecommunications | 57 |

| Technological framework | Rank |
|--------------------------------|------|
| Communications technology | 36 |
| ► Mobile Broadband subscribers | 1 |
| ► Wireless broadband | 2 |
| Internet users | 5 |
| Internet bandwidth speed | 14 |
| High-tech exports (%) | 21 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 13 | 15 | 14 | 13 | 15 |
| Business agility | 35 | 33 | 57 | 55 | 41 |
| IT integration | 10 | 15 | 18 | 15 | 18 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 5 |
| Internet retailing | 16 |
| Tablet possession | 24 |
| Smartphone possession | 19 |
| Attitudes toward globalization | 44 |

| Business agility | Rank |
|---------------------------------|------|
| ▷ Opportunities and threats | 63 |
| ► World robots distribution | 2 |
| ▷ Agility of companies | 63 |
| ▷ Use of big data and analytics | 63 |
| Knowledge transfer | 45 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 10 |
| Public-private partnerships | 37 |
| Cyber security | 41 |
| ► Software piracy | 2 |

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 30 | 41 | 36 | 46 | 46 |
| Training & education | 28 | 31 | 14 | 19 | 18 |
| Scientific concentration | 14 | 16 | 12 | 11 | 11 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 5 |
| ▷ International experience | 63 |
| Foreign highly-skilled personnel | 54 |
| Management of cities | 14 |
| ▷ Digital/Technological skills | 62 |
| Net flow of international students | 26 |

| Training & education | Rank |
|--|------|
| Employee training | 28 |
| Total public expenditure on education | 55 |
| Higher education achievement | 8 |
| ► Pupil-teacher ratio (tertiary education) | 1 |
| Graduates in Sciences | 44 |
| Women with degrees | 8 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 6 |
| Total R&D personnel per capita | 18 |
| Female researchers | 56 |
| R&D productivity by publication | 16 |
| Scientific and technical employment | 37 |
| High-tech patent grants | 4 |
| Robots in Education and R&D | 4 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 37 | 37 | 40 | 42 | 44 |
| Capital | 29 | 33 | 33 | 37 | 33 |
| Technological framework | 3 | 6 | 4 | 2 | 5 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 44 |
| Enforcing contracts | 36 |
| Immigration laws | 56 |
| Development & application of tech. | 45 |
| Scientific research legislation | 45 |
| Intellectual property rights | 33 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 9 |
| Funding for technological development | 39 |
| Banking and financial services | 40 |
| Country credit rating | 31 |
| Venture capital | 34 |
| Investment in Telecommunications | 52 |

| Technological framework | Rank |
|--------------------------------|------|
| Communications technology | 35 |
| ► Mobile Broadband subscribers | 1 |
| ► Wireless broadband | 2 |
| Internet users | 5 |
| Internet bandwidth speed | 19 |
| High-tech exports (%) | 22 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 15 | 14 | 13 | 15 | 19 |
| Business agility | 33 | 57 | 55 | 41 | 56 |
| IT integration | 15 | 18 | 15 | 18 | 23 |

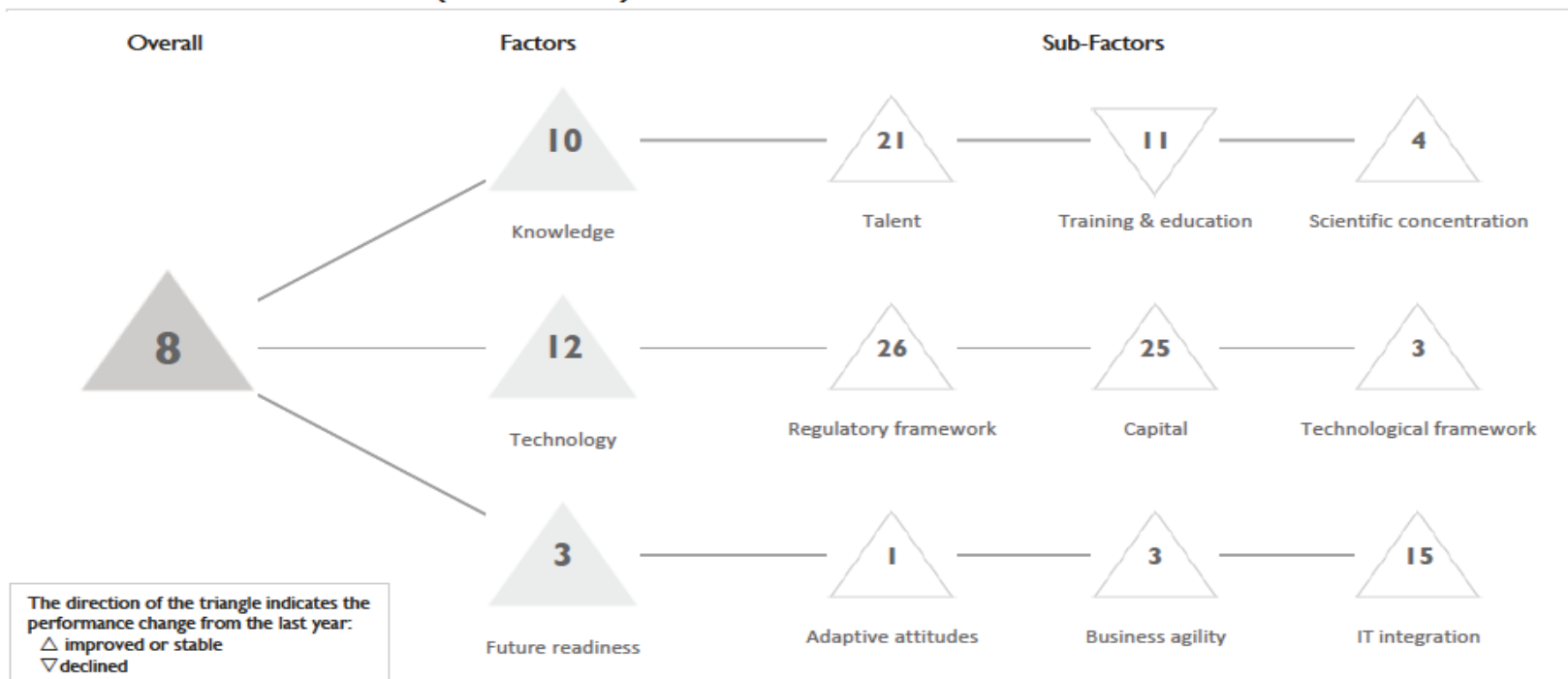
| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 4 |
| Internet retailing | 16 |
| Tablet possession | 21 |
| Smartphone possession | 21 |
| Attitudes toward globalization | 50 |

| Business agility | Rank |
|---------------------------------|------|
| ▷ Opportunities and threats | 63 |
| ► World robots distribution | 2 |
| ▷ Agility of companies | 63 |
| ▷ Use of big data and analytics | 63 |
| Knowledge transfer | 45 |
| Entrepreneurial fear of failure | 32 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 14 |
| Public-private partnerships | 46 |
| Cyber security | 45 |
| ► Software piracy | 2 |

KOREA REP.

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|
| OVERALL | 17 | 19 | 14 | 10 | 8 |
| Knowledge | 15 | 14 | 11 | 11 | 10 |
| Technology | 13 | 17 | 17 | 17 | 12 |
| Future readiness | 25 | 24 | 17 | 4 | 3 |

- Overall top strengths
- ▷ Overall top weaknesses

KOREA REP.

2019

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 23 | 27 | 25 | 26 | 30 |
| Training & education | 10 | 14 | 13 | 8 | 5 |
| Scientific concentration | 9 | 8 | 9 | 7 | 6 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 6 |
| ▷ International experience | 52 |
| Foreign highly-skilled personnel | 49 |
| Management of cities | 17 |
| Digital/Technological skills | 26 |
| Net flow of international students | 50 |

| Training & education | Rank |
|--|------|
| Employee training | 33 |
| Total public expenditure on education | 22 |
| Higher education achievement | 3 |
| Pupil-teacher ratio (tertiary education) | 34 |
| Graduates in Sciences | 9 |
| Women with degrees | 20 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| ► Total expenditure on R&D (%) | 1 |
| Total R&D personnel per capita | 5 |
| ▷ Female researchers | 53 |
| R&D productivity by publication | 25 |
| Scientific and technical employment | 30 |
| High-tech patent grants | 3 |
| Robots in Education and R&D | 13 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 23 | 28 | 28 | 27 | 26 |
| Capital | 32 | 35 | 41 | 44 | 29 |
| Technological framework | 2 | 2 | 2 | 2 | 7 |

| Regulatory framework | Rank |
|---|------|
| Starting a business | 7 |
| ► Enforcing contracts | 2 |
| ▷ Immigration laws | 61 |
| ▷ Development and application of technology | 50 |
| Scientific research legislation | 34 |
| Intellectual property rights | 37 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 3 |
| Funding for technological development | 42 |
| ▷ Banking and financial services | 54 |
| Country credit rating | 19 |
| Venture capital | 48 |
| Investment in Telecommunications | 46 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 12 |
| Mobile Broadband subscribers | 10 |
| Wireless broadband | 19 |
| Internet users | 16 |
| ► Internet bandwidth speed | 2 |
| High-tech exports (%) | 19 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 8 | 8 | 10 | 3 | 4 |
| Business agility | 38 | 43 | 48 | 47 | 5 |
| IT integration | 17 | 21 | 23 | 20 | 21 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| ► E-Participation | 1 |
| ► Internet retailing | 1 |
| Tablet possession | 13 |
| Smartphone possession | 17 |
| Attitudes toward globalization | 19 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 43 |
| World robots distribution | 3 |
| Agility of companies | 28 |
| Use of big data and analytics | 40 |
| Knowledge transfer | 35 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 3 |
| Public-private partnerships | 41 |
| Cyber security | 23 |
| Software piracy | 20 |

KOREA REP.

2020

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 27 | 25 | 26 | 30 | 21 |
| Training & education | 14 | 13 | 8 | 5 | 11 |
| Scientific concentration | 8 | 9 | 7 | 6 | 4 |

| Talent | Rank |
|--------------------------------------|------|
| Educational assessment PISA - Math | 6 |
| International experience | 39 |
| ▷ Foreign highly-skilled personnel | 43 |
| Management of cities | 12 |
| Digital/Technological skills | 18 |
| ▷ Net flow of international students | 49 |

| Training & education | Rank |
|--|------|
| Employee training | 15 |
| Total public expenditure on education | 36 |
| Higher education achievement | 4 |
| Pupil-teacher ratio (tertiary education) | 33 |
| Graduates in Sciences | 11 |
| Women with degrees | 20 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| ► Total expenditure on R&D (%) | 2 |
| Total R&D personnel per capita | 3 |
| ▷ Female researchers | 54 |
| R&D productivity by publication | 26 |
| Scientific and technical employment | 34 |
| High-tech patent grants | 3 |
| Robots in Education and R&D | 13 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 28 | 28 | 27 | 26 | 26 |
| Capital | 35 | 41 | 44 | 29 | 25 |
| Technological framework | 2 | 2 | 2 | 7 | 3 |

| Regulatory framework | Rank |
|--------------------------------------|------|
| Starting a business | 19 |
| Enforcing contracts | 2 |
| Immigration laws | 39 |
| ▷ Development & application of tech. | 44 |
| Scientific research legislation | 31 |
| Intellectual property rights | 38 |

| Capital | Rank |
|--|------|
| ► IT & media stock market capitalization | 2 |
| Funding for technological development | 38 |
| ▷ Banking and financial services | 49 |
| Country credit rating | 19 |
| Venture capital | 41 |
| Investment in Telecommunications | 42 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 10 |
| Mobile Broadband subscribers | 10 |
| Wireless broadband | 20 |
| Internet users | 16 |
| ► Internet bandwidth speed | 2 |
| High-tech exports (%) | 6 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 8 | 10 | 3 | 4 | 1 |
| Business agility | 43 | 48 | 47 | 5 | 3 |
| IT integration | 21 | 23 | 20 | 21 | 15 |

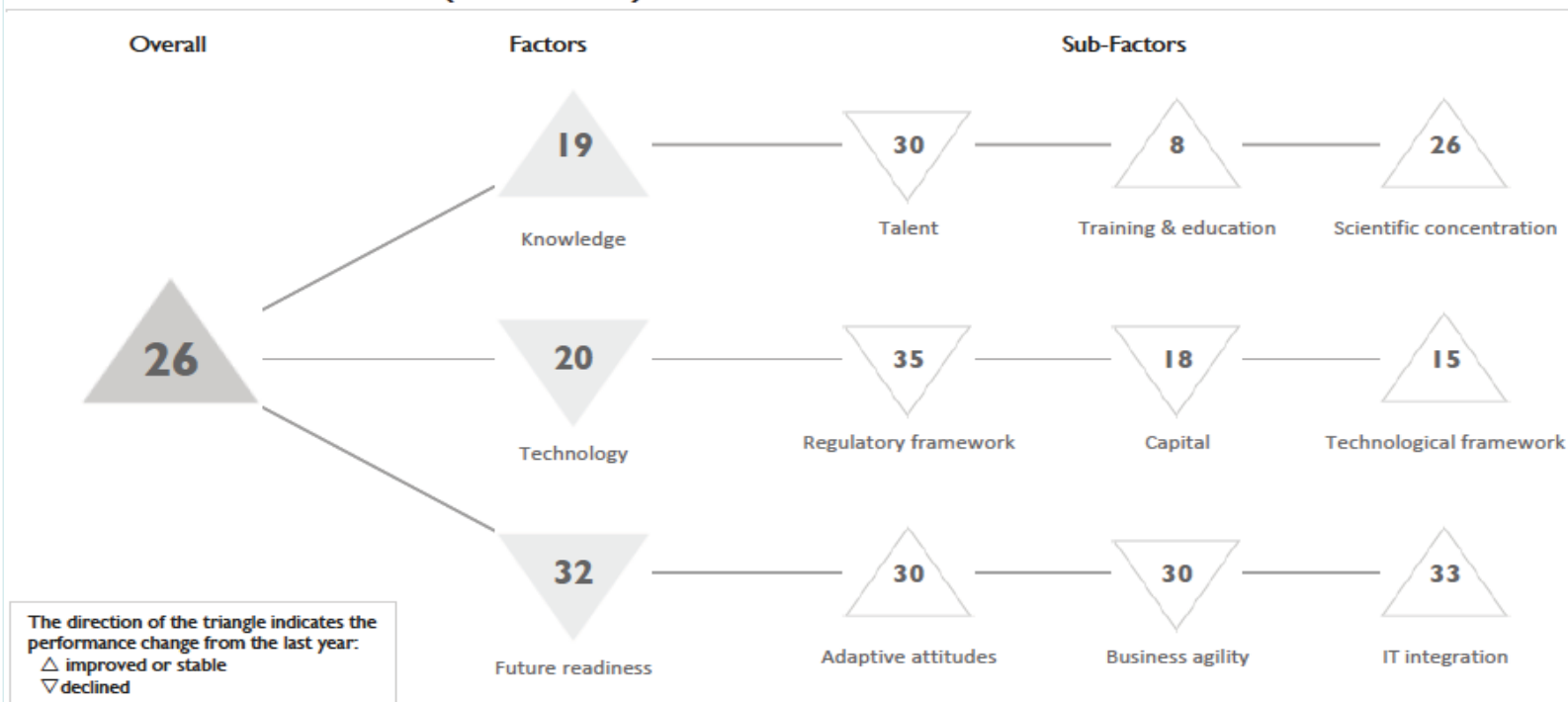
| Adaptive attitudes | Rank |
|--------------------------------|------|
| ► E-Participation | 1 |
| ► Internet retailing | 1 |
| Tablet possession | 20 |
| Smartphone possession | 16 |
| Attitudes toward globalization | 14 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 24 |
| World robots distribution | 3 |
| Agility of companies | 13 |
| Use of big data and analytics | 15 |
| Knowledge transfer | 30 |
| Entrepreneurial fear of failure | 15 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 2 |
| Public-private partnerships | 29 |
| Cyber security | 21 |
| Software piracy | 20 |

MALAYSIA

OVERALL PERFORMANCE (63 countries)



| OVERALL & FACTORS - 5 years | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------|------|------|------|------|------|
| OVERALL | 24 | 24 | 27 | 26 | 26 |
| Knowledge | 22 | 17 | 17 | 19 | 19 |
| Technology | 16 | 18 | 22 | 19 | 20 |
| Future readiness | 28 | 27 | 29 | 28 | 32 |

- Overall top strengths
- ▷ Overall top weaknesses

MALAYSIA

2019

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 26 | 26 | 27 | 24 | 22 |
| Training & education | 17 | 11 | 3 | 10 | 11 |
| Scientific concentration | 28 | 27 | 26 | 30 | 27 |

| Talent | Rank |
|--------------------------------------|------|
| ► Educational assessment PISA - Math | 41 |
| International experience | 12 |
| Foreign highly-skilled personnel | 16 |
| Management of cities | 20 |
| Digital/Technological skills | 21 |
| Net flow of international students | 23 |

| Training & education | Rank |
|--|------|
| Employee training | 18 |
| Total public expenditure on education | 33 |
| Higher education achievement | 37 |
| Pupil-teacher ratio (tertiary education) | 29 |
| ► Graduates in Sciences | 6 |
| ► Women with degrees | 4 |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 24 |
| Total R&D personnel per capita | 36 |
| Female researchers | 10 |
| R&D productivity by publication | 27 |
| ► Scientific and technical employment | 41 |
| High-tech patent grants | 18 |
| Robots in Education and R&D | 19 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 21 | 21 | 30 | 29 | 29 |
| Capital | 7 | 7 | 9 | 12 | 14 |
| Technological framework | 17 | 21 | 19 | 32 | 20 |

| Regulatory framework | Rank |
|---|------|
| ► Starting a business | 52 |
| Enforcing contracts | 28 |
| Immigration laws | 19 |
| Development and application of technology | 20 |
| Scientific research legislation | 25 |
| Intellectual property rights | 28 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 22 |
| Funding for technological development | 18 |
| Banking and financial services | 19 |
| Country credit rating | 36 |
| Venture capital | 20 |
| ► Investment in Telecommunications | 6 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 38 |
| Mobile Broadband subscribers | 29 |
| Wireless broadband | 15 |
| Internet users | 41 |
| Internet bandwidth speed | 36 |
| ► High-tech exports (%) | 4 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 27 | 29 | 28 | 30 | 30 |
| Business agility | 15 | 17 | 12 | 15 | 17 |
| IT integration | 29 | 30 | 34 | 35 | 33 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 31 |
| ► Internet retailing | 48 |
| Tablet possession | 26 |
| Smartphone possession | 27 |
| Attitudes toward globalization | 16 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 14 |
| World robots distribution | 22 |
| Agility of companies | 19 |
| Use of big data and analytics | 9 |
| Knowledge transfer | 20 |

| IT integration | Rank |
|-------------------------------|------|
| E-Government | 40 |
| ► Public-private partnerships | 9 |
| Cyber security | 20 |
| ► Software piracy | 45 |

MALAYSIA

2020

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 26 | 27 | 24 | 22 | 30 |
| Training & education | 11 | 3 | 10 | 11 | 8 |
| Scientific concentration | 27 | 26 | 30 | 27 | 26 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 43 |
| International experience | 32 |
| Foreign highly-skilled personnel | 25 |
| Management of cities | 22 |
| Digital/Technological skills | 30 |
| Net flow of international students | 24 |

| Training & education | Rank |
|--|------|
| Employee training | 31 |
| Total public expenditure on education | 33 |
| Higher education achievement | 40 |
| Pupil-teacher ratio (tertiary education) | 28 |
| Graduates in Sciences | 1 |
| Women with degrees | 4 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 25 |
| Total R&D personnel per capita | 39 |
| Female researchers | 11 |
| R&D productivity by publication | 28 |
| Scientific and technical employment | 50 |
| High-tech patent grants | 19 |
| Robots in Education and R&D | 21 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 21 | 30 | 29 | 29 | 35 |
| Capital | 7 | 9 | 12 | 14 | 18 |
| Technological framework | 21 | 19 | 32 | 20 | 15 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 52 |
| Enforcing contracts | 28 |
| Immigration laws | 44 |
| Development & application of tech. | 20 |
| Scientific research legislation | 26 |
| Intellectual property rights | 34 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 23 |
| Funding for technological development | 23 |
| Banking and financial services | 21 |
| Country credit rating | 36 |
| Venture capital | 30 |
| Investment in Telecommunications | 8 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 42 |
| Mobile Broadband subscribers | 29 |
| Wireless broadband | 19 |
| Internet users | 41 |
| Internet bandwidth speed | 36 |
| High-tech exports (%) | 3 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 29 | 28 | 30 | 30 | 30 |
| Business agility | 17 | 12 | 15 | 17 | 30 |
| IT integration | 30 | 34 | 35 | 33 | 33 |

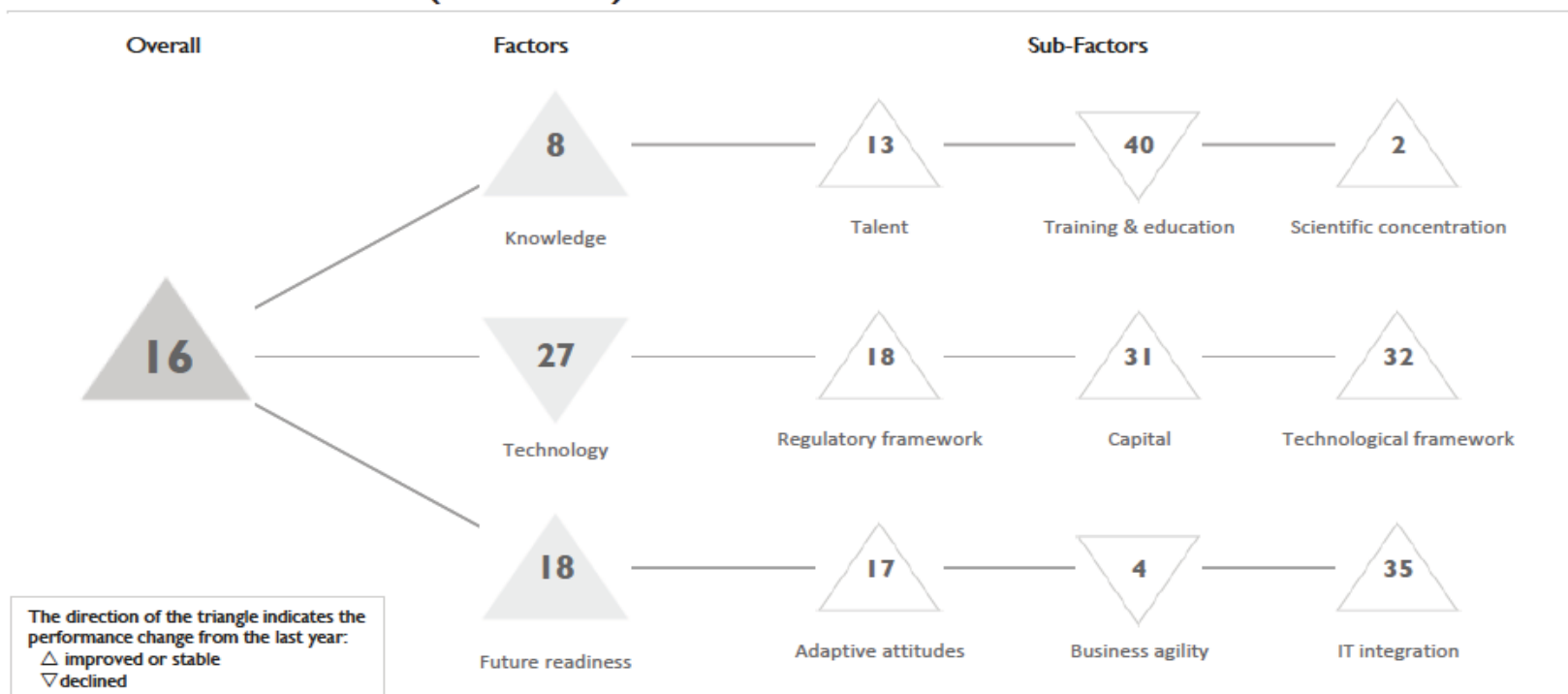
| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 28 |
| Internet retailing | 45 |
| Tablet possession | 27 |
| Smartphone possession | 26 |
| Attitudes toward globalization | 27 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 35 |
| World robots distribution | 22 |
| Agility of companies | 34 |
| Use of big data and analytics | 26 |
| Knowledge transfer | 25 |
| Entrepreneurial fear of failure | 36 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 41 |
| Public-private partnerships | 17 |
| Cyber security | 29 |
| Software piracy | 45 |

CHINA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|
| OVERALL | 35 | 31 | 30 | 22 | 16 |
| Knowledge | 24 | 23 | 30 | 18 | 8 |
| Technology | 39 | 36 | 34 | 26 | 27 |
| Future readiness | 38 | 34 | 28 | 21 | 18 |

- Overall top strengths
▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 18 | 21 | 23 | 18 | 19 |
| Training & education | 55 | 54 | 53 | 46 | 37 |
| Scientific concentration | 3 | 3 | 3 | 21 | 9 |

| Talent | Rank |
|--------------------------------------|------|
| ► Educational assessment PISA - Math | 5 |
| International experience | 45 |
| Foreign highly-skilled personnel | 27 |
| Management of cities | 13 |
| Digital/Technological skills | 15 |
| Net flow of international students | 47 |

| Training & education | Rank |
|--|------|
| Employee training | 13 |
| Total public expenditure on education | 46 |
| Higher education achievement | 25 |
| Pupil-teacher ratio (tertiary education) | 40 |
| Graduates in Sciences | - |
| Women with degrees | - |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 14 |
| Total R&D personnel per capita | 35 |
| Female researchers | - |
| ► R&D productivity by publication | 1 |
| ▷ Scientific and technical employment | 49 |
| High-tech patent grants | 14 |
| ► Robots in Education and R&D | 1 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 34 | 38 | 32 | 26 | 20 |
| Capital | 27 | 27 | 22 | 30 | 32 |
| Technological framework | 45 | 46 | 47 | 40 | 32 |

| Regulatory framework | Rank |
|--------------------------------------|------|
| Starting a business | 16 |
| ► Enforcing contracts | 6 |
| Immigration laws | 36 |
| Development and application of techn | 24 |
| Scientific research legislation | 19 |
| ▷ Intellectual property rights | 48 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 33 |
| Funding for technological development | 24 |
| Banking and financial services | 42 |
| Country credit rating | 27 |
| Venture capital | 38 |
| Investment in Telecommunications | 17 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 15 |
| Mobile Broadband subscribers | 35 |
| Wireless broadband | 30 |
| ▷ Internet users | 56 |
| Internet bandwidth speed | 25 |
| High-tech exports (%) | 6 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 38 | 36 | 32 | 23 | 24 |
| Business agility | 34 | 32 | 24 | 19 | 1 |
| IT integration | 49 | 50 | 44 | 41 | 41 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 28 |
| Internet retailing | 21 |
| Tablet possession | 31 |
| Smartphone possession | 16 |
| Attitudes toward globalization | 10 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 19 |
| ► World robots distribution | 1 |
| Agility of companies | 25 |
| Use of big data and analytics | 12 |
| Knowledge transfer | 31 |

| IT integration | Rank |
|-----------------------------|------|
| ▷ E-Government | 50 |
| Public-private partnerships | 15 |
| Cyber security | 16 |
| ▷ Software piracy | 56 |

CHINA

2020

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 21 | 23 | 18 | 19 | 13 |
| Training & education | 54 | 53 | 46 | 37 | 40 |
| Scientific concentration | 3 | 3 | 21 | 9 | 2 |

| Talent | Rank |
|--------------------------------------|------|
| ► Educational assessment PISA - Math | 1 |
| ▷ International experience | 44 |
| Foreign highly-skilled personnel | 32 |
| Management of cities | 11 |
| Digital/Technological skills | 12 |
| ▷ Net flow of international students | 46 |

| Training & education | Rank |
|--|------|
| Employee training | 19 |
| ▷ Total public expenditure on education | 51 |
| Higher education achievement | 19 |
| Pupil-teacher ratio (tertiary education) | 38 |
| Graduates in Sciences | - |
| Women with degrees | - |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 15 |
| Total R&D personnel per capita | 36 |
| Female researchers | - |
| ► R&D productivity by publication | 1 |
| ► Scientific and technical employment | 2 |
| High-tech patent grants | 9 |
| ► Robots in Education and R&D | 1 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 38 | 32 | 26 | 20 | 18 |
| Capital | 27 | 22 | 30 | 32 | 31 |
| Technological framework | 46 | 47 | 40 | 32 | 32 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 16 |
| Enforcing contracts | 5 |
| Immigration laws | 33 |
| Development & application of tech. | 23 |
| Scientific research legislation | 21 |
| Intellectual property rights | 42 |

| Capital | Rank |
|--|------|
| IT & media stock market capitalization | 22 |
| Funding for technological development | 20 |
| Banking and financial services | 43 |
| Country credit rating | 27 |
| Venture capital | 38 |
| Investment in Telecommunications | 36 |

| Technological framework | Rank |
|------------------------------|------|
| Communications technology | 16 |
| Mobile Broadband subscribers | 36 |
| Wireless broadband | 24 |
| ▷ Internet users | 56 |
| Internet bandwidth speed | 25 |
| High-tech exports (%) | 7 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 36 | 32 | 23 | 24 | 17 |
| Business agility | 32 | 24 | 19 | 1 | 4 |
| IT integration | 50 | 44 | 41 | 41 | 35 |

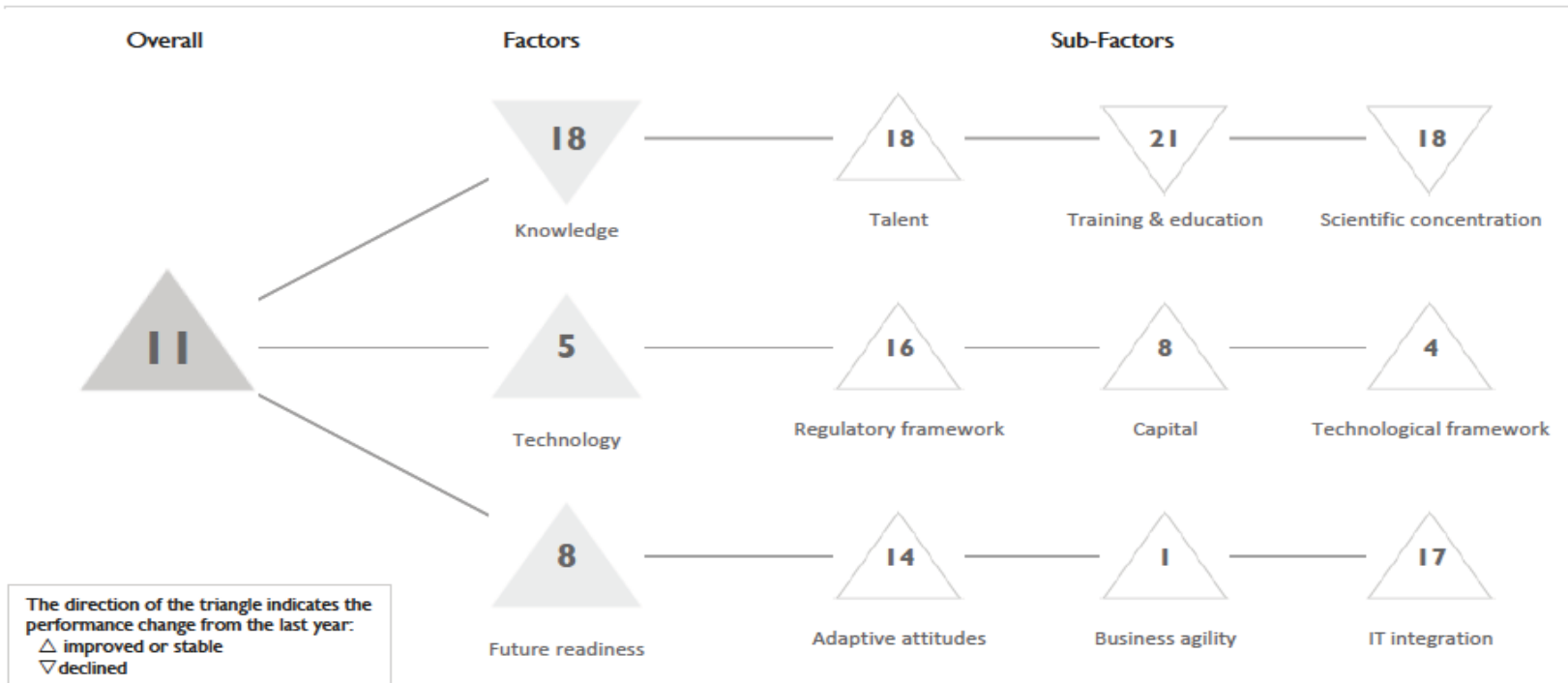
| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | 9 |
| Internet retailing | 19 |
| Tablet possession | 31 |
| Smartphone possession | 17 |
| Attitudes toward globalization | 8 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 11 |
| ► World robots distribution | 1 |
| Agility of companies | 29 |
| Use of big data and analytics | 8 |
| Knowledge transfer | 24 |
| Entrepreneurial fear of failure | 35 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | 40 |
| Public-private partnerships | 11 |
| Cyber security | 15 |
| ▷ Software piracy | 56 |

TAIWAN, CHINA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years

| | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|
| OVERALL | 16 | 12 | 16 | 13 | 11 |
| Knowledge | 19 | 16 | 19 | 17 | 18 |
| Technology | 8 | 7 | 11 | 9 | 5 |
| Future readiness | 22 | 16 | 22 | 12 | 8 |

- Overall top strengths
- ▷ Overall top weaknesses

TAIWAN, CHINA

2019

KNOWLEDGE

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------------|------|------|------|------|------|
| Talent | 19 | 19 | 18 | 25 | 21 |
| Training & education | 22 | 23 | 28 | 25 | 20 |
| Scientific concentration | 19 | 19 | 17 | 13 | 15 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 3 |
| International experience | 36 |
| ▷ Foreign highly-skilled personnel | 48 |
| Management of cities | 24 |
| Digital/Technological skills | 27 |
| Net flow of international students | 12 |

| Training & education | Rank |
|--|------|
| Employee training | 14 |
| ▷ Total public expenditure on education | 45 |
| Higher education achievement | 4 |
| ▷ Pupil-teacher ratio (tertiary education) | 54 |
| ▶ Graduates in Sciences | 3 |
| Women with degrees | 35 |

| Scientific concentration | Rank |
|-------------------------------------|------|
| Total expenditure on R&D (%) | 5 |
| ▶ Total R&D personnel per capita | 2 |
| ▷ Female researchers | 50 |
| R&D productivity by publication | 35 |
| Scientific and technical employment | 37 |
| High-tech patent grants | 17 |
| Robots in Education and R&D | 21 |

TECHNOLOGY

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 22 | 25 | 24 | 21 | 23 |
| Capital | 6 | 6 | 8 | 13 | 12 |
| Technological framework | 4 | 6 | 4 | 10 | 4 |

| Regulatory framework | Rank |
|--|------|
| Starting a business | 11 |
| Enforcing contracts | 10 |
| Immigration laws | 39 |
| Development and application of technol | 36 |
| Scientific research legislation | 23 |
| Intellectual property rights | 24 |

| Capital | Rank |
|--|------|
| ▶ IT & media stock market capitalization | 2 |
| Funding for technological development | 23 |
| Banking and financial services | 18 |
| Country credit rating | 22 |
| Venture capital | 27 |
| ▷ Investment in Telecommunications | 45 |

| Technological framework | Rank |
|--------------------------------|------|
| Communications technology | 24 |
| ▶ Mobile Broadband subscribers | 1 |
| Wireless broadband | 16 |
| Internet users | 21 |
| Internet bandwidth speed | 18 |
| ▶ High-tech exports (%) | 3 |

FUTURE READINESS

| Subfactors | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 19 | 19 | 19 | 28 | 14 |
| Business agility | 19 | 24 | 6 | 13 | 3 |
| IT integration | 23 | 24 | 22 | 23 | 24 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | - |
| Internet retailing | 20 |
| Tablet possession | 27 |
| Smartphone possession | 4 |
| Attitudes toward globalization | 11 |

| Business agility | Rank |
|-------------------------------|------|
| Opportunities and threats | 4 |
| World robots distribution | 7 |
| Agility of companies | 3 |
| Use of big data and analytics | 14 |
| Knowledge transfer | 19 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | - |
| Public-private partnerships | 18 |
| Cyber security | 12 |
| Software piracy | 25 |

TAIWAN, CHINA

2020

- Overall top strengths
- ▷ Overall top weaknesses

KNOWLEDGE

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------------|------|------|------|------|------|
| Talent | 19 | 18 | 25 | 21 | 18 |
| Training & education | 23 | 28 | 25 | 20 | 21 |
| Scientific concentration | 19 | 17 | 13 | 15 | 18 |

| Talent | Rank |
|------------------------------------|------|
| Educational assessment PISA - Math | 4 |
| International experience | 34 |
| ► Foreign highly-skilled personnel | 47 |
| Management of cities | 18 |
| Digital/Technological skills | 25 |
| Net flow of international students | 11 |

| Training & education | Rank |
|--|------|
| Employee training | 12 |
| ▷ Total public expenditure on education | 46 |
| Higher education achievement | 3 |
| ▷ Pupil-teacher ratio (tertiary education) | 51 |
| Graduates in Sciences | 5 |
| Women with degrees | 33 |

| Scientific concentration | Rank |
|---------------------------------------|------|
| Total expenditure on R&D (%) | 4 |
| ► Total R&D personnel per capita | 2 |
| ► Female researchers | 53 |
| R&D productivity by publication | 37 |
| ▷ Scientific and technical employment | 44 |
| High-tech patent grants | 17 |
| Robots in Education and R&D | 17 |

TECHNOLOGY

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------|------|------|------|------|------|
| Regulatory framework | 25 | 24 | 21 | 23 | 16 |
| Capital | 6 | 8 | 13 | 12 | 8 |
| Technological framework | 6 | 4 | 10 | 4 | 4 |

| Regulatory framework | Rank |
|------------------------------------|------|
| Starting a business | 10 |
| Enforcing contracts | 11 |
| Immigration laws | 28 |
| Development & application of tech. | 28 |
| Scientific research legislation | 19 |
| Intellectual property rights | 22 |

| Capital | Rank |
|--|------|
| ► IT & media stock market capitalization | 1 |
| Funding for technological development | 18 |
| Banking and financial services | 16 |
| Country credit rating | 23 |
| Venture capital | 19 |
| Investment in Telecommunications | 37 |

| Technological framework | Rank |
|--------------------------------|------|
| Communications technology | 22 |
| ► Mobile Broadband subscribers | 1 |
| Wireless broadband | 14 |
| Internet users | 29 |
| Internet bandwidth speed | 5 |
| High-tech exports (%) | 5 |

FUTURE READINESS

| Subfactors | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------------|------|------|------|------|------|
| Adaptive attitudes | 19 | 19 | 28 | 14 | 14 |
| Business agility | 24 | 6 | 13 | 3 | 1 |
| IT integration | 24 | 22 | 23 | 24 | 17 |

| Adaptive attitudes | Rank |
|--------------------------------|------|
| E-Participation | - |
| Internet retailing | 21 |
| Tablet possession | 25 |
| ► Smartphone possession | 2 |
| Attitudes toward globalization | 10 |

| Business agility | Rank |
|---------------------------------|------|
| Opportunities and threats | 2 |
| World robots distribution | 7 |
| ► Agility of companies | 1 |
| Use of big data and analytics | 5 |
| Knowledge transfer | 19 |
| Entrepreneurial fear of failure | 10 |

| IT integration | Rank |
|-----------------------------|------|
| E-Government | - |
| Public-private partnerships | 15 |
| Cyber security | 8 |
| Software piracy | 25 |



IMD WORLD
COMPETITIVENESS
CENTER

IMD WORLD TALENT RANKING 2020



WORLD TALENT RANKING 2020

Investment and development

The investment in and
development of home-grown talent

Appeal

The extent to which a country taps
into the overseas talent pool

Readiness

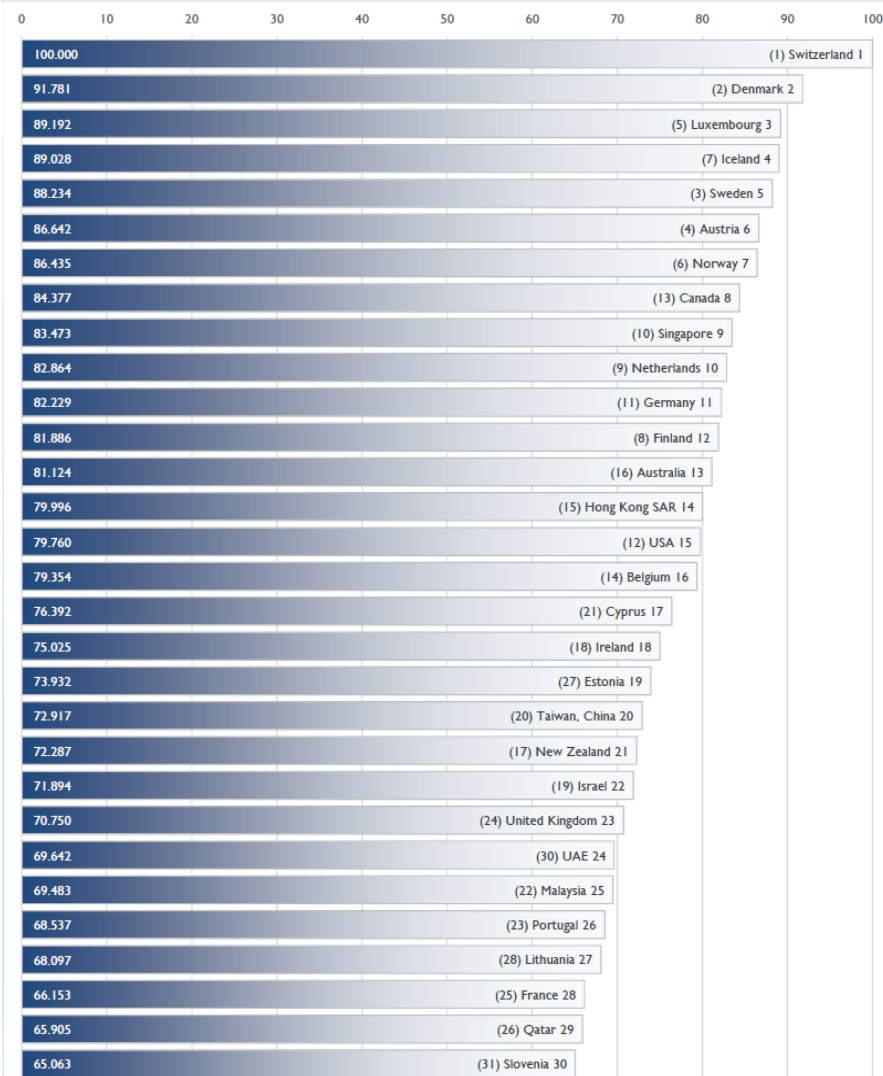
The availability of skills and
competencies in the talent pool

IMD World Talent Ranking

ที่มา : IMD

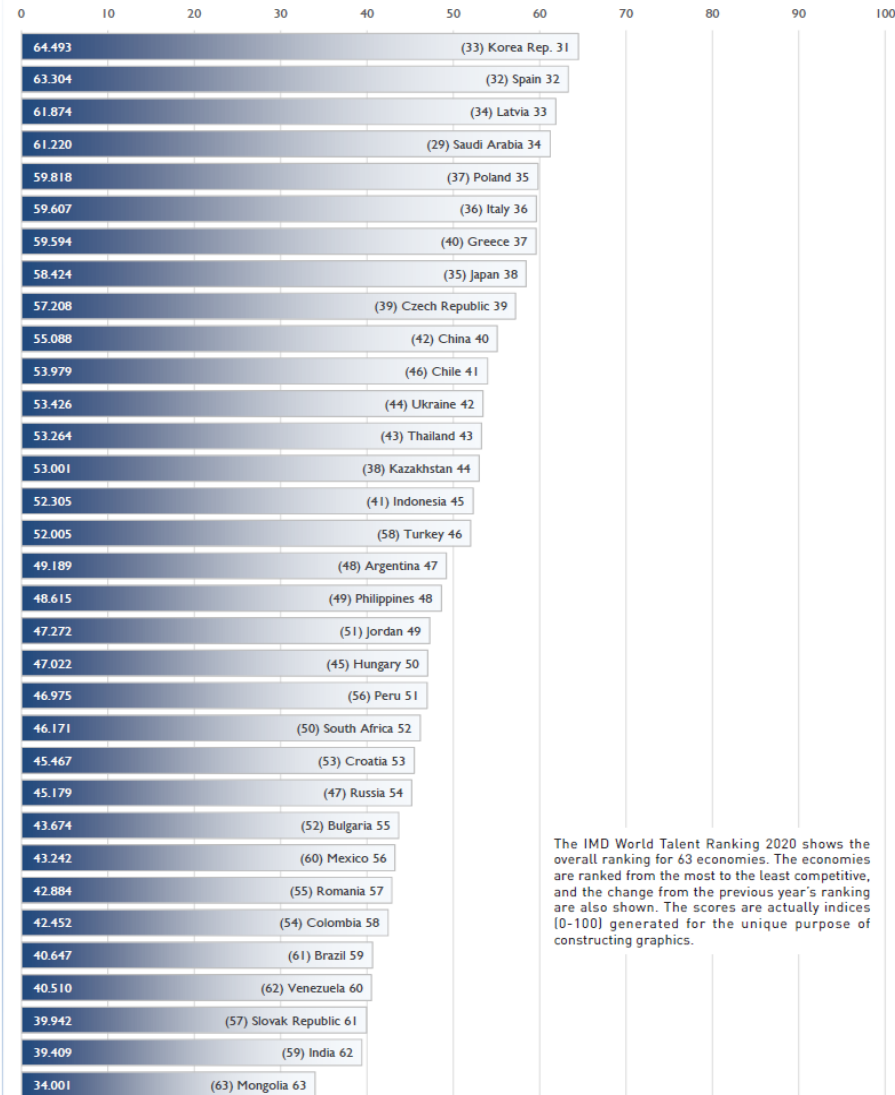
The 2020 IMD World Talent Ranking

Talent COMPETITIVENESS RANKING (Ranks 1 - 30)



(2019 rankings are in parentheses)

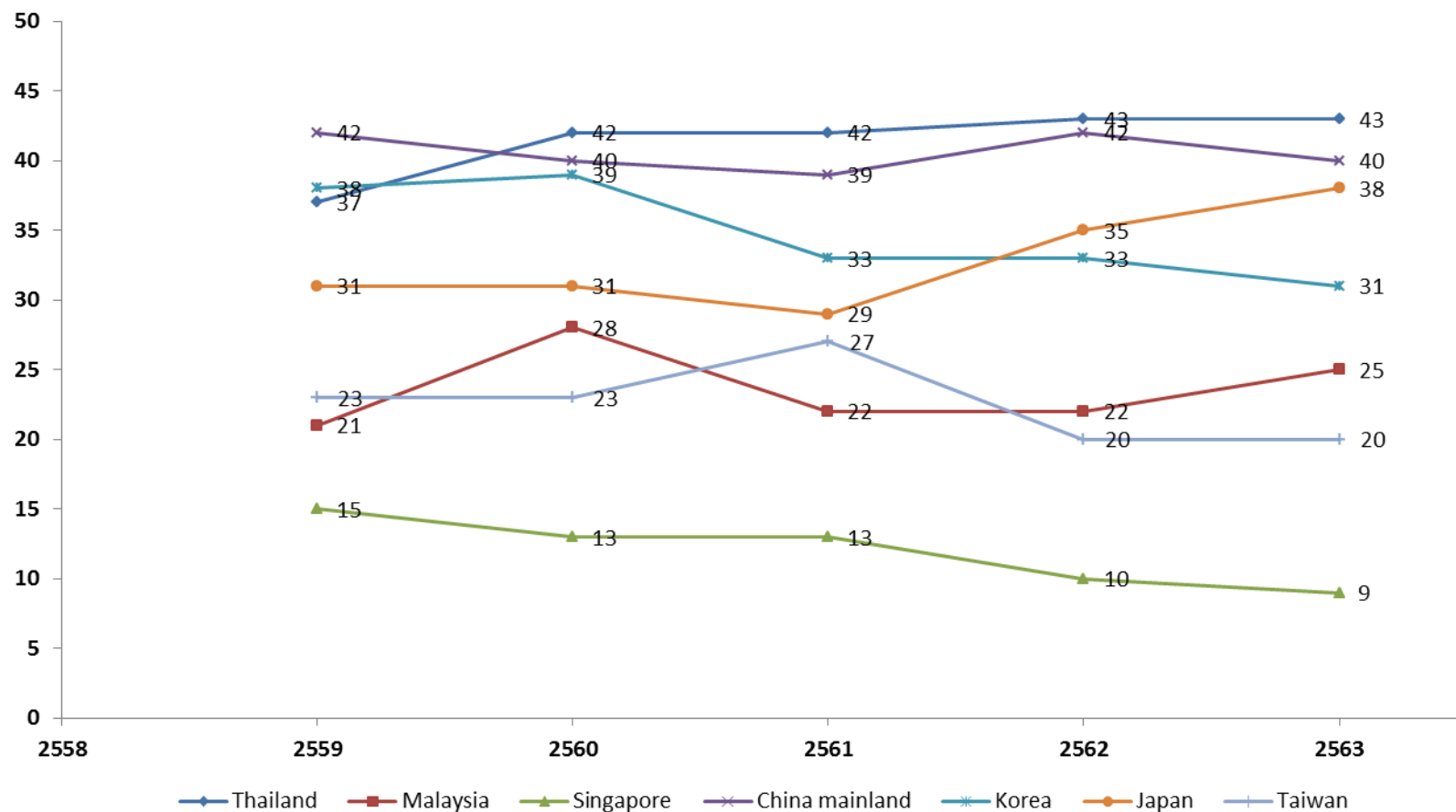
Talent COMPETITIVENESS RANKING (Ranks 31 - 63)



(2019 rankings are in parentheses)

The IMD World Talent Ranking 2020 shows the overall ranking for 63 economies. The economies are ranked from the most to the least competitive, and the change from the previous year's ranking are also shown. The scores are actually indices [0-100] generated for the unique purpose of constructing graphics.

การจัดอันดับความสามารถด้านบุคลากร ของประเทศต่าง ๆ โดยรวมปี 2559-2563

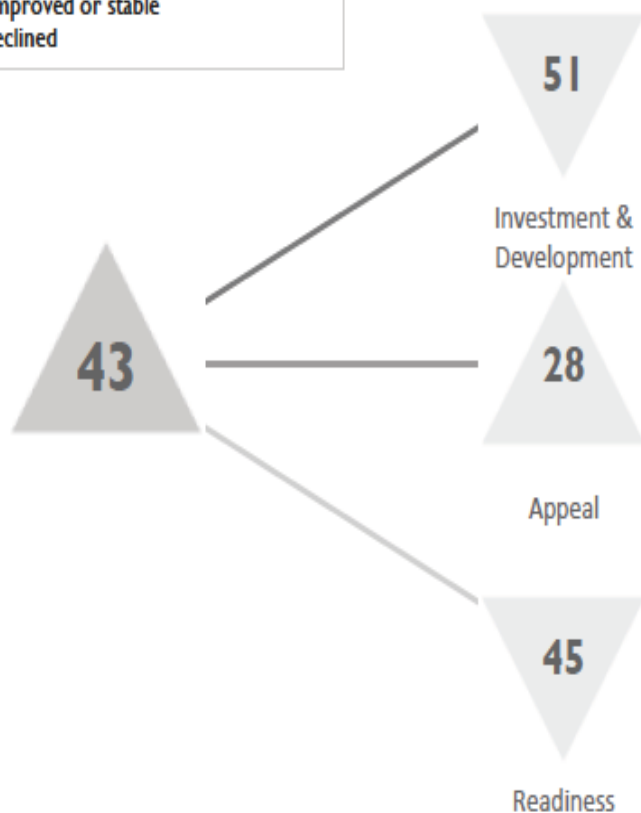


THAILAND

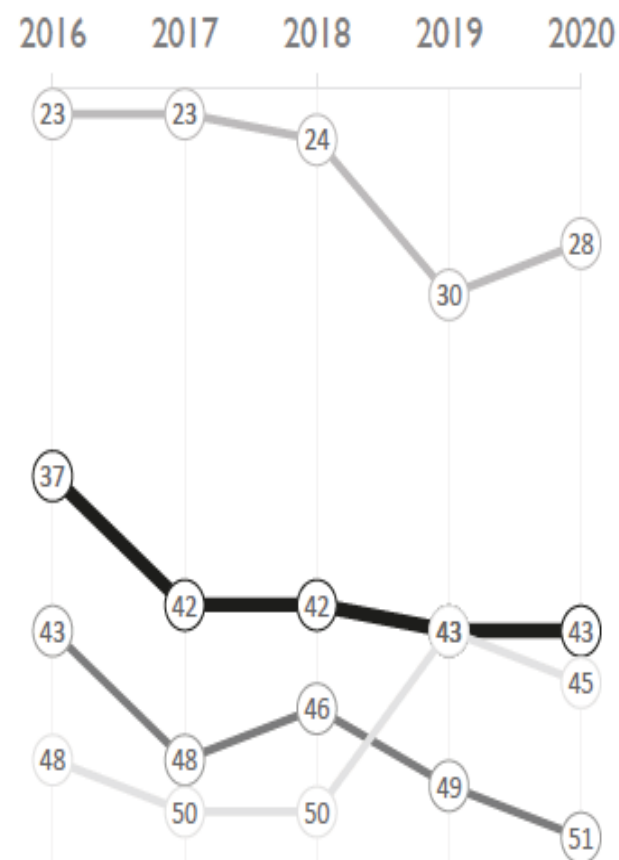
OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:

- △ improved or stable
- ▽ declined



- Overall
- Investment & Development
- Appeal
- Readiness



- ▶ Overall top strengths
- ▷ Overall top weaknesses

THAILAND 2019

Investment & Development

| | | Value | 2019 Rank |
|--|--|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.5 % | 52 |
| Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | 18.0 % | 43 |
| ▷ Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 930 US\$ | 55 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.20 ratio | 36 |
| ▷ Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 24.16 ratio | 58 |
| ▶ Apprenticeships | are sufficiently implemented | 5.50 Survey [0..10] | 19 |
| Employee training | is a high priority in companies | 6.26 Survey [0..10] | 25 |
| Female labor force | Percentage of total labor force | 45.49 % | 34 |
| Health infrastructure | meets the needs of society | 6.48 Survey [0..10] | 28 |

Appeal

| | | Value | 2019 Rank |
|--------------------------------------|---|---------------------|-----------|
| Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 83.60 index | 39 |
| Attracting and retaining talents | is a priority in companies | 6.69 Survey [0..10] | 35 |
| Worker motivation | in companies is high | 6.06 Survey [0..10] | 26 |
| ▶ Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 5.60 Survey [0..10] | 23 |
| Quality of life | is high | 6.42 Survey [0..10] | 36 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 5.66 Survey [0..10] | 29 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 12,681 US\$ | 44 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 184,089 US\$ | 26 |
| ▶ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 4.09 % | 5 |
| Justice | is fairly administered | 6.00 Survey [0..10] | 28 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 26.27 micrograms | 55 |

Readiness

| | | Value | 2019 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 0.88 % | 32 |
| Skilled labor | is readily available | 5.86 Survey [0..10] | 29 |
| Finance skills | are readily available | 6.02 Survey [0..10] | 38 |
| ▶ International experience | of senior managers is generally significant | 6.04 Survey [0..10] | 20 |
| Competent senior managers | are readily available | 6.06 Survey [0..10] | 24 |
| Primary and secondary education | meets the needs of a competitive economy | 5.25 Survey [0..10] | 45 |
| ▶ Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 27.86 % | 15 |
| University education | meets the needs of a competitive economy | 5.52 Survey [0..10] | 44 |
| Management education | meets the needs of the business community | 5.94 Survey [0..10] | 40 |
| Language skills | are meeting the needs of enterprises | 4.95 Survey [0..10] | 46 |
| ▷ Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 0.48 number | 51 |
| Educational assessment - PISA | PISA survey of 15-year olds | 418 Average | 49 |

THAILAND 2020

- Overall top strengths
- ▷ Overall top weaknesses

Investment & Development

| | | Value | 2020 Rank |
|---|---|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.0 % | 57 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 1,167 US\$ | 52 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.89 ratio | 42 |
| ▷ Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 25.95 ratio | 59 |
| ► Apprenticeships | are sufficiently implemented | 5.77 Survey [0..10] | 17 |
| Employee training | is a high priority in companies | 6.33 Survey [0..10] | 25 |
| Female labor force | Percentage of total labor force | 45.53 % | 34 |
| Health infrastructure | meets the needs of society | 7.51 Survey [0..10] | 22 |

Appeal

| | | Value | 2020 Rank |
|--------------------------------------|---|---------------------|-----------|
| Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 83.60 index | 39 |
| Attracting and retaining talents | is a priority in companies | 6.98 Survey [0..10] | 27 |
| Worker motivation | in companies is high | 6.22 Survey [0..10] | 27 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 5.63 Survey [0..10] | 26 |
| Quality of life | is high | 6.45 Survey [0..10] | 38 |
| ► Foreign highly-skilled personnel | are attracted to your country's business environment | 6.86 Survey [0..10] | 16 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 12,681 US\$ | 44 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 184,089 US\$ | 26 |
| ► Effective personal income tax rate | Percentage of an income equal to GDP per capita | 4.09 % | 5 |
| Justice | is fairly administered | 5.96 Survey [0..10] | 30 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 26.34 micrograms | 55 |

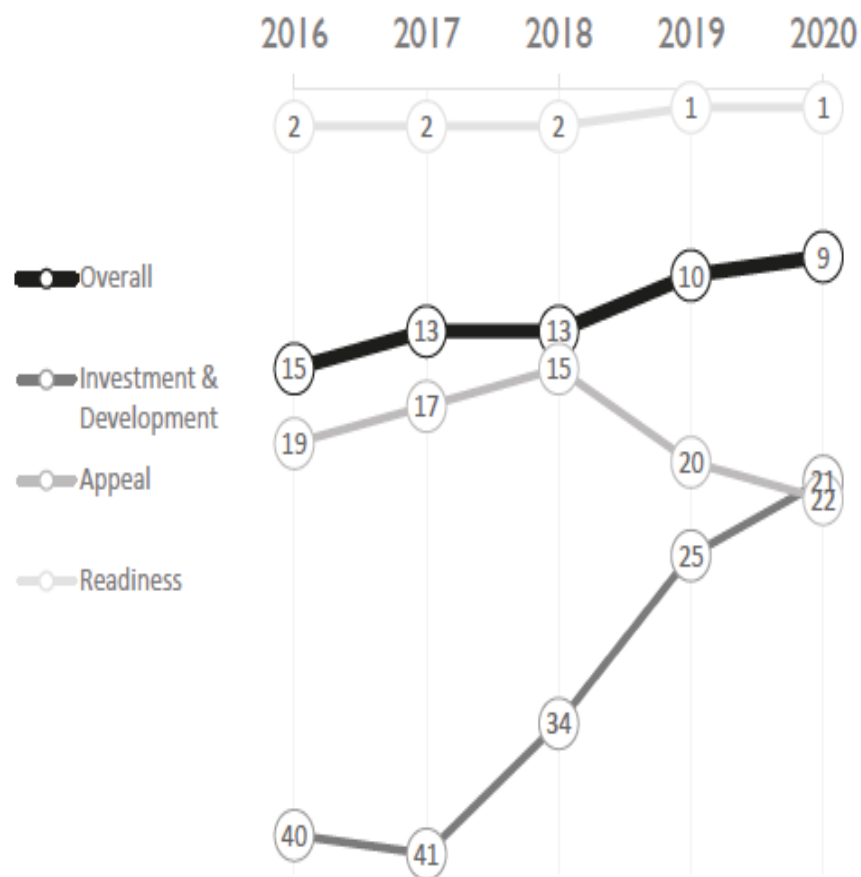
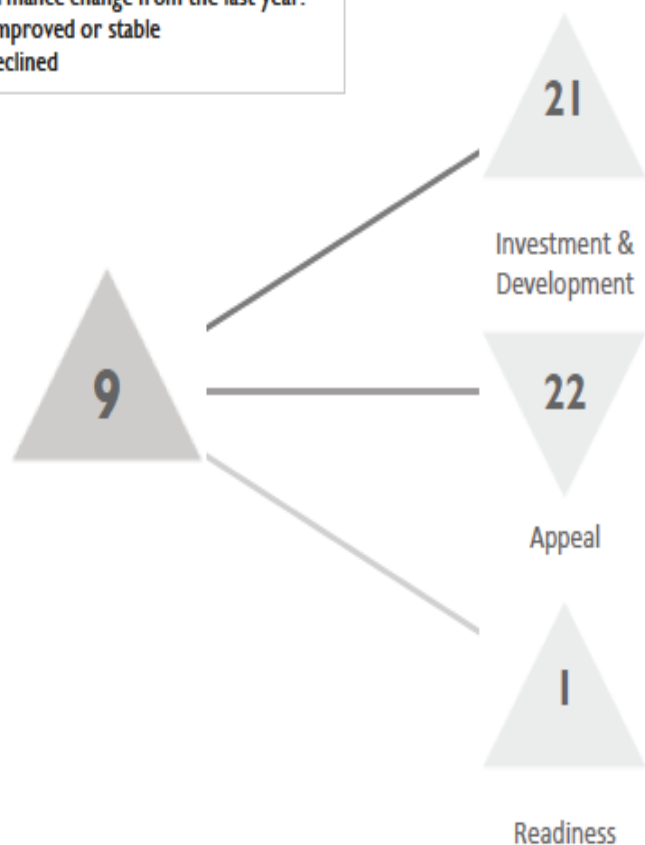
Readiness

| | | Value | 2020 Rank |
|---------------------------------|---|---------------------|-----------|
| ▷ Labor force growth | Percentage change | -0.67 % | 55 |
| Skilled labor | is readily available | 6.29 Survey [0..10] | 21 |
| Finance skills | are readily available | 6.37 Survey [0..10] | 37 |
| ► International experience | of senior managers is generally significant | 6.33 Survey [0..10] | 15 |
| Competent senior managers | are readily available | 6.29 Survey [0..10] | 20 |
| Primary and secondary education | meets the needs of a competitive economy | 5.80 Survey [0..10] | 39 |
| ► Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 27.86 % | 16 |
| University education | meets the needs of a competitive economy | 5.96 Survey [0..10] | 38 |
| Management education | meets the needs of the business community | 6.45 Survey [0..10] | 34 |
| Language skills | are meeting the needs of enterprises | 5.02 Survey [0..10] | 47 |
| ▷ Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 0.48 number | 53 |
| Educational assessment - PISA | PISA survey of 15-year olds | 412 Average | 50 |

SINGAPORE

OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:
 △ improved or stable
 ▽ declined



- ▶ Overall top strengths
- ▷ Overall top weaknesses

SINGAPORE 2019

Investment & Development

| | | Value | 2019 Rank |
|--|--|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 2.7 % | 61 |
| Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | - % | - |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 12,890 US\$ | 8 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 14.69 ratio | 28 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 11.48 ratio | 26 |
| Apprenticeships | are sufficiently implemented | 5.03 Survey [0..10] | 28 |
| Employee training | is a high priority in companies | 6.19 Survey [0..10] | 28 |
| Female labor force | Percentage of total labor force | 45.76 % | 32 |
| Health infrastructure | meets the needs of society | 8.46 Survey [0..10] | 4 |

Appeal

| | | Value | 2019 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 110.10 index | 57 |
| Attracting and retaining talents | is a priority in companies | 7.46 Survey [0..10] | 19 |
| Worker motivation | in companies is high | 6.49 Survey [0..10] | 20 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 6.84 Survey [0..10] | 9 |
| Quality of life | is high | 8.68 Survey [0..10] | 12 |
| ▶ Foreign highly-skilled personnel | are attracted to your country's business environment | 8.19 Survey [0..10] | 2 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | - US\$ | - |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 299,993 US\$ | 4 |
| ▷ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 18.79 % | 34 |
| Justice | is fairly administered | 8.16 Survey [0..10] | 10 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 19.43 micrograms | 43 |

Readiness

| | | Value | 2019 Rank |
|-----------------------------------|---|---------------------|-----------|
| ▷ Labor force growth | Percentage change | 0.51 % | 45 |
| Skilled labor | is readily available | 6.27 Survey [0..10] | 16 |
| Finance skills | are readily available | 7.22 Survey [0..10] | 13 |
| International experience | of senior managers is generally significant | 7.29 Survey [0..10] | 9 |
| Competent senior managers | are readily available | 6.76 Survey [0..10] | 7 |
| ▶ Primary and secondary education | meets the needs of a competitive economy | 8.71 Survey [0..10] | 3 |
| ▶ Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 34.50 % | 2 |
| University education | meets the needs of a competitive economy | 8.49 Survey [0..10] | 5 |
| Management education | meets the needs of the business community | 8.00 Survey [0..10] | 4 |
| Language skills | are meeting the needs of enterprises | 8.51 Survey [0..10] | 9 |
| ▶ Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 9.48 number | 3 |
| ▶ Educational assessment - PISA | PISA survey of 15-year olds | 560 Average | 1 |

SINGAPORE 2020

- Overall top strengths
- ▷ Overall top weaknesses

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 2.6 % | 61 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 13,453 US\$ | 9 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 14.33 ratio | 28 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 11.31 ratio | 24 |
| Apprenticeships | are sufficiently implemented | 5.58 Survey [0..10] | 24 |
| Employee training | is a high priority in companies | 6.82 Survey [0..10] | 16 |
| Female labor force | Percentage of total labor force | 46.27 % | 28 |
| Health infrastructure | meets the needs of society | 8.85 Survey [0..10] | 4 |

Appeal

| | | Value | 2020 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 110.10 index | 57 |
| Attracting and retaining talents | is a priority in companies | 7.58 Survey [0..10] | 18 |
| Worker motivation | in companies is high | 6.89 Survey [0..10] | 17 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 6.95 Survey [0..10] | 8 |
| Quality of life | is high | 8.61 Survey [0..10] | 16 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 8.03 Survey [0..10] | 5 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | - US\$ | - |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 299,993 US\$ | 4 |
| ▷ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 18.79 % | 34 |
| Justice | is fairly administered | 8.39 Survey [0..10] | 7 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 19.72 micrograms | 44 |

Readiness

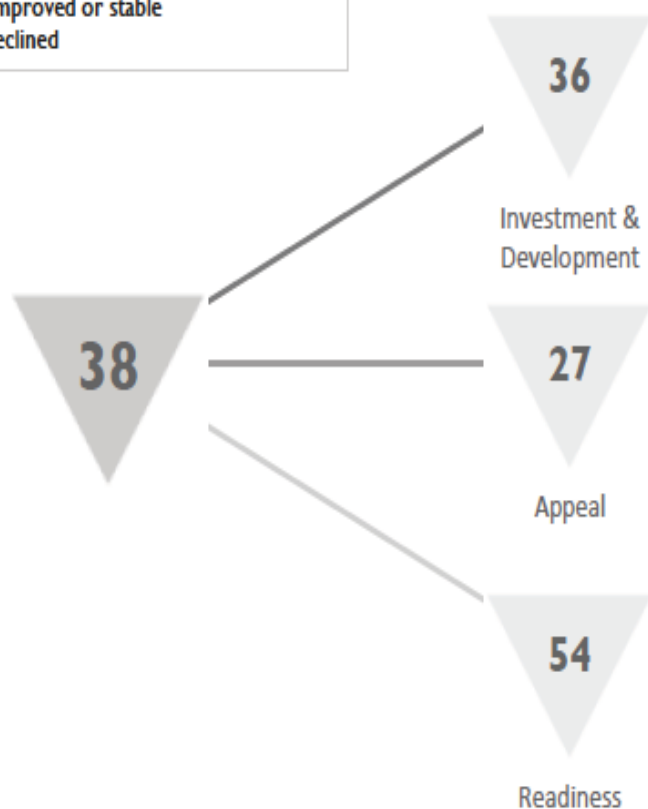
| | | Value | 2020 Rank |
|-----------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 1.77 % | 15 |
| ► Skilled labor | is readily available | 7.34 Survey [0..10] | 3 |
| Finance skills | are readily available | 7.68 Survey [0..10] | 7 |
| International experience | of senior managers is generally significant | 7.34 Survey [0..10] | 7 |
| Competent senior managers | are readily available | 7.00 Survey [0..10] | 7 |
| ► Primary and secondary education | meets the needs of a competitive economy | 8.87 Survey [0..10] | 2 |
| Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 33.48 % | 4 |
| ► University education | meets the needs of a competitive economy | 8.82 Survey [0..10] | 3 |
| ► Management education | meets the needs of the business community | 8.16 Survey [0..10] | 3 |
| Language skills | are meeting the needs of enterprises | 8.37 Survey [0..10] | 11 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 9.18 number | 4 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 556 Average | 2 |

JAPAN

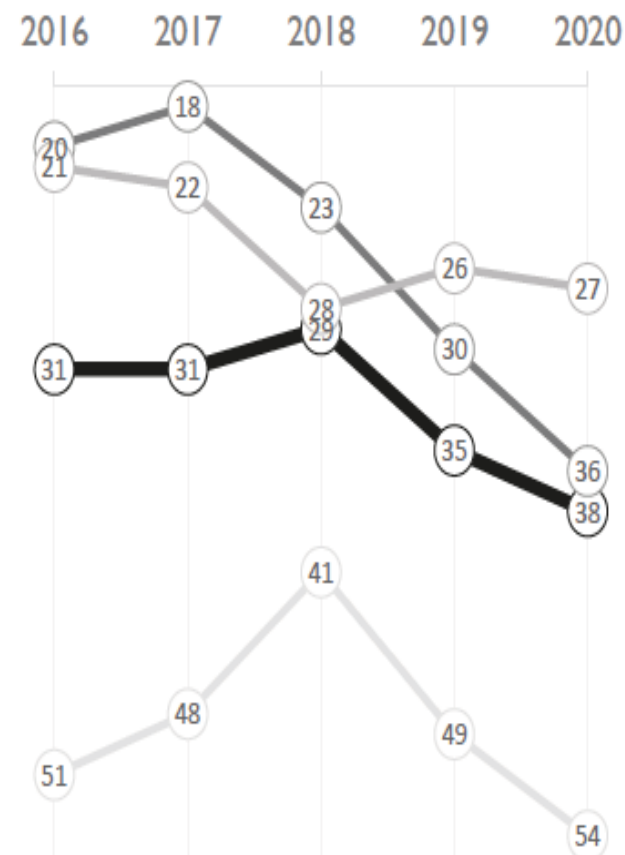
OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:

- △ improved or stable
- ▽ declined



- Overall
- Investment & Development
- Appeal
- Readiness



JAPAN 2019

Investment & Development

| | | Value | 2019 Rank |
|---|--|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.2 % | 55 |
| ► Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | 23.9 % | 13 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 7,538 US\$ | 23 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.43 ratio | 39 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 12.45 ratio | 34 |
| ► Apprenticeships | are sufficiently implemented | 6.15 Survey [0..10] | 11 |
| Employee training | is a high priority in companies | 6.78 Survey [0..10] | 15 |
| Female labor force | Percentage of total labor force | 44.13 % | 42 |
| Health infrastructure | meets the needs of society | 7.24 Survey [0..10] | 21 |

Appeal

| | | Value | 2019 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 114.70 index | 59 |
| ► Attracting and retaining talents | is a priority in companies | 8.03 Survey [0..10] | 4 |
| Worker motivation | in companies is high | 6.03 Survey [0..10] | 27 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 4.13 Survey [0..10] | 44 |
| Quality of life | is high | 7.70 Survey [0..10] | 24 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 3.77 Survey [0..10] | 51 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 45,806 US\$ | 14 |
| ► Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 265,052 US\$ | 11 |
| Effective personal income tax rate | Percentage of an income equal to GDP per capita | 14.33 % | 26 |
| Justice | is fairly administered | 7.34 Survey [0..10] | 20 |
| Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 11.79 micrograms | 17 |

Readiness

| | | Value | 2019 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 1.64 % | 18 |
| Skilled labor | is readily available | 4.99 Survey [0..10] | 44 |
| Finance skills | are readily available | 5.98 Survey [0..10] | 39 |
| ▷ International experience | of senior managers is generally significant | 2.49 Survey [0..10] | 63 |
| ▷ Competent senior managers | are readily available | 3.11 Survey [0..10] | 60 |
| Primary and secondary education | meets the needs of a competitive economy | 6.31 Survey [0..10] | 32 |
| Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 21.01 % | 42 |
| University education | meets the needs of a competitive economy | 4.88 Survey [0..10] | 51 |
| Management education | meets the needs of the business community | 4.73 Survey [0..10] | 53 |
| ▷ Language skills | are meeting the needs of enterprises | 3.12 Survey [0..10] | 62 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 1.30 number | 46 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 535 Average | 4 |

- Overall top strengths
- ▷ Overall top weaknesses

JAPAN 2020

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 3.1 % | 52 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 7,704 US\$ | 23 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.17 ratio | 36 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 12.30 ratio | 33 |
| ► Apprenticeships | are sufficiently implemented | 5.93 Survey [0..10] | 12 |
| Employee training | is a high priority in companies | 6.24 Survey [0..10] | 28 |
| Female labor force | Percentage of total labor force | 44.40 % | 43 |
| Health infrastructure | meets the needs of society | 7.26 Survey [0..10] | 24 |

Appeal

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 114.70 index | 59 |
| ► Attracting and retaining talents | is a priority in companies | 7.76 Survey [0..10] | 14 |
| Worker motivation | in companies is high | 5.83 Survey [0..10] | 37 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 4.79 Survey [0..10] | 36 |
| Quality of life | is high | 7.54 Survey [0..10] | 28 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 3.50 Survey [0..10] | 54 |
| ► Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 45,806 US\$ | 14 |
| ► Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 265,052 US\$ | 11 |
| Effective personal income tax rate | Percentage of an income equal to GDP per capita | 14.33 % | 26 |
| Justice | is fairly administered | 6.72 Survey [0..10] | 22 |
| Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 11.86 micrograms | 17 |

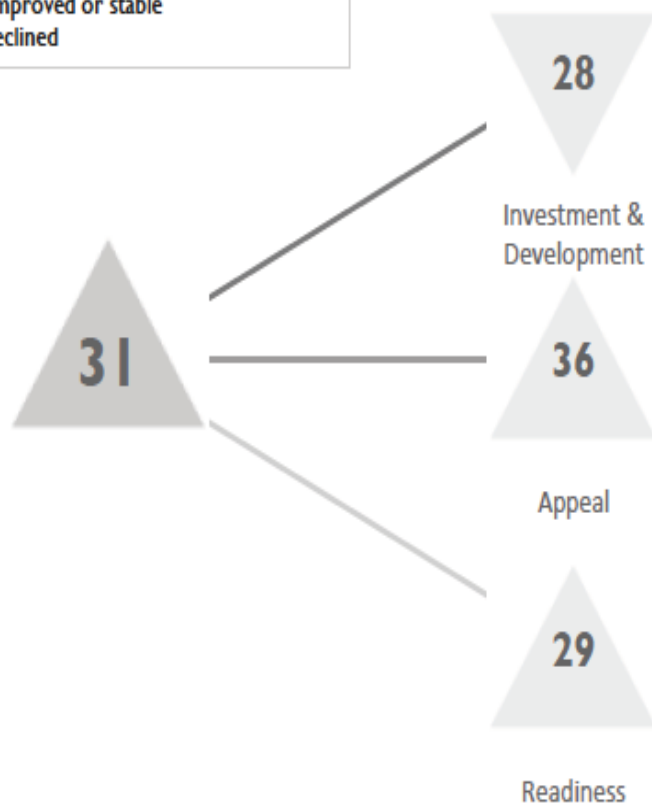
Readiness

| | | Value | 2020 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 0.82 % | 34 |
| Skilled labor | is readily available | 5.13 Survey [0..10] | 48 |
| Finance skills | are readily available | 5.28 Survey [0..10] | 53 |
| ▷ International experience | of senior managers is generally significant | 2.75 Survey [0..10] | 63 |
| ▷ Competent senior managers | are readily available | 3.16 Survey [0..10] | 61 |
| Primary and secondary education | meets the needs of a competitive economy | 6.09 Survey [0..10] | 33 |
| Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 21.71 % | 42 |
| University education | meets the needs of a competitive economy | 4.89 Survey [0..10] | 52 |
| ▷ Management education | meets the needs of the business community | 4.65 Survey [0..10] | 57 |
| ▷ Language skills | are meeting the needs of enterprises | 2.99 Survey [0..10] | 62 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 1.44 number | 45 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 520 Average | 5 |

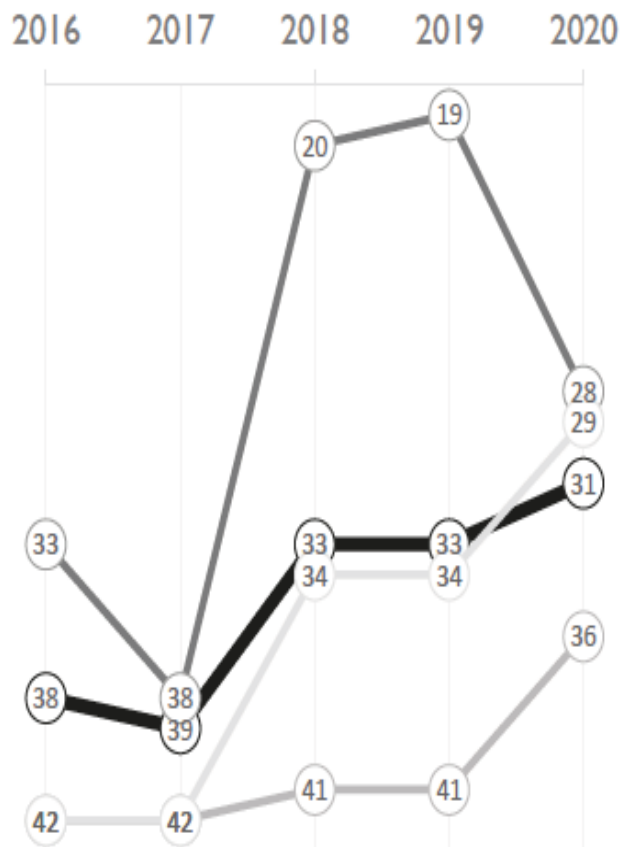
KOREA REP.

OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:
 △ improved or stable
 ▽ declined



● Overall
 ● Investment & Development
 ● Appeal
 ● Readiness



- ▶ Overall top strengths
- ▷ Overall top weaknesses

KOREA REP. 2019

Investment & Development

| | | Value | 2019 Rank |
|---|--|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 5.0 % | 24 |
| ▶ Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | 28.2 % | 3 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 6,070 US\$ | 27 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.42 ratio | 38 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 13.54 ratio | 44 |
| Apprenticeships | are sufficiently implemented | 5.52 Survey [0..10] | 18 |
| Employee training | is a high priority in companies | 5.98 Survey [0..10] | 33 |
| Female labor force | Percentage of total labor force | 42.64 % | 46 |
| Health infrastructure | meets the needs of society | 7.39 Survey [0..10] | 18 |

Appeal

| | | Value | 2019 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 109.40 index | 56 |
| Attracting and retaining talents | is a priority in companies | 7.61 Survey [0..10] | 14 |
| Worker motivation | in companies is high | 5.32 Survey [0..10] | 41 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 4.81 Survey [0..10] | 30 |
| Quality of life | is high | 5.41 Survey [0..10] | 43 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 4.05 Survey [0..10] | 49 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 24,963 US\$ | 28 |
| ▶ Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 249,573 US\$ | 14 |
| ▶ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 8.43 % | 13 |
| Justice | is fairly administered | 3.71 Survey [0..10] | 49 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5. Micrograms per cubic metre | 25.00 micrograms | 53 |

Readiness

| | | Value | 2019 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 0.53 % | 43 |
| Skilled labor | is readily available | 5.52 Survey [0..10] | 34 |
| Finance skills | are readily available | 6.24 Survey [0..10] | 34 |
| ▷ International experience | of senior managers is generally significant | 4.76 Survey [0..10] | 52 |
| Competent senior managers | are readily available | 4.67 Survey [0..10] | 48 |
| Primary and secondary education | meets the needs of a competitive economy | 4.74 Survey [0..10] | 47 |
| ▶ Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 29.91 % | 9 |
| ▷ University education | meets the needs of a competitive economy | 4.38 Survey [0..10] | 55 |
| ▷ Management education | meets the needs of the business community | 5.04 Survey [0..10] | 51 |
| Language skills | are meeting the needs of enterprises | 5.65 Survey [0..10] | 44 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 1.38 number | 43 |
| ▶ Educational assessment - PISA | PISA survey of 15-year olds | 520 Average | 9 |

KOREA REP. 2020

- Overall top strengths
- ▷ Overall top weaknesses

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 4.3 % | 37 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 6,230 US\$ | 29 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.51 ratio | 39 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 12.78 ratio | 36 |
| Apprenticeships | are sufficiently implemented | 5.67 Survey [0..10] | 18 |
| Employee training | is a high priority in companies | 6.84 Survey [0..10] | 15 |
| ▷ Female labor force | Percentage of total labor force | 42.92 % | 45 |
| Health infrastructure | meets the needs of society | 8.00 Survey [0..10] | 15 |

Appeal

| | | Value | 2020 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 109.40 index | 56 |
| ► Attracting and retaining talents | is a priority in companies | 7.81 Survey [0..10] | 11 |
| Worker motivation | in companies is high | 5.48 Survey [0..10] | 43 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 5.46 Survey [0..10] | 28 |
| Quality of life | is high | 6.43 Survey [0..10] | 39 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 4.70 Survey [0..10] | 43 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 24,963 US\$ | 28 |
| ► Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 249,586 US\$ | 14 |
| ► Effective personal income tax rate | Percentage of an income equal to GDP per capita | 8.43 % | 13 |
| Justice | is fairly administered | 5.04 Survey [0..10] | 40 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 25.14 micrograms | 53 |

Readiness

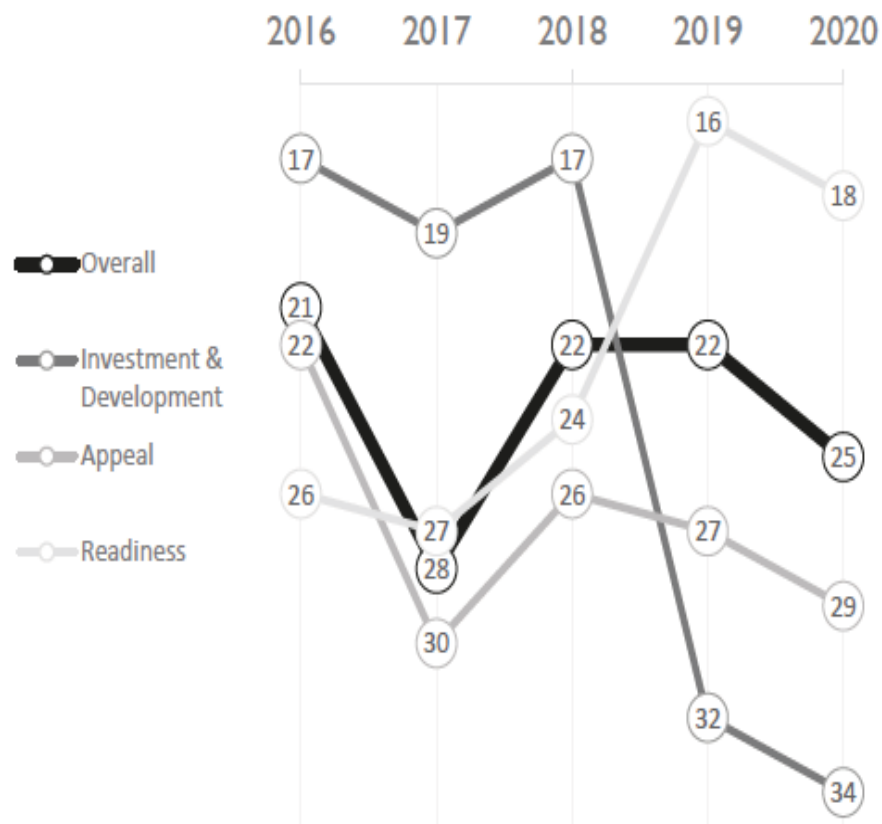
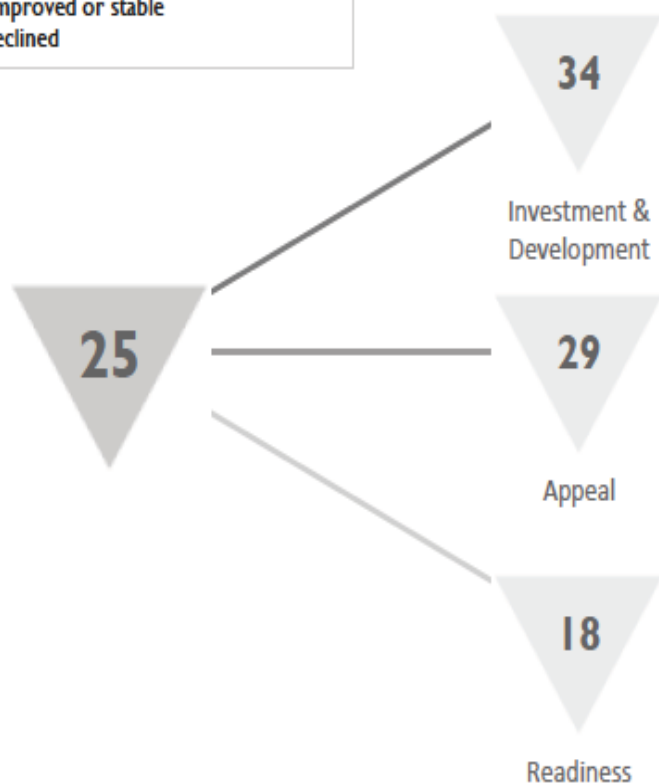
| | | Value | 2020 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 1.04 % | 25 |
| Skilled labor | is readily available | 5.97 Survey [0..10] | 31 |
| Finance skills | are readily available | 6.59 Survey [0..10] | 28 |
| International experience | of senior managers is generally significant | 5.51 Survey [0..10] | 39 |
| Competent senior managers | are readily available | 5.27 Survey [0..10] | 42 |
| Primary and secondary education | meets the needs of a competitive economy | 5.53 Survey [0..10] | 44 |
| ► Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 29.35 % | 10 |
| ▷ University education | meets the needs of a competitive economy | 5.30 Survey [0..10] | 48 |
| ▷ Management education | meets the needs of the business community | 5.53 Survey [0..10] | 48 |
| Language skills | are meeting the needs of enterprises | 6.08 Survey [0..10] | 38 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 1.64 number | 41 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 520 Average | 6 |

MALAYSIA

OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:

- △ improved or stable
- ▽ declined



- Overall top strengths
- ▷ Overall top weaknesses

MALAYSIA 2019

Investment & Development

| | | Value | 2019 Rank |
|--|--|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 4.5 % | 34 |
| Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | 21.5 % | 29 |
| ▷ Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 1,745 US\$ | 46 |
| ► Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 11.60 ratio | 10 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 12.00 ratio | 31 |
| Apprenticeships | are sufficiently implemented | 5.95 Survey [0..10] | 13 |
| Employee training | is a high priority in companies | 6.64 Survey [0..10] | 18 |
| ▷ Female labor force | Percentage of total labor force | 38.94 % | 52 |
| Health infrastructure | meets the needs of society | 7.42 Survey [0..10] | 17 |

Appeal

| | | Value | 2019 Rank |
|--|---|---------------------|-----------|
| Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 68.50 index | 13 |
| Attracting and retaining talents | is a priority in companies | 6.61 Survey [0..10] | 37 |
| Worker motivation | in companies is high | 6.29 Survey [0..10] | 24 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 5.56 Survey [0..10] | 24 |
| Quality of life | is high | 6.85 Survey [0..10] | 33 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 6.56 Survey [0..10] | 16 |
| ▷ Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 13,564 US\$ | 41 |
| ▷ Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 119,219 US\$ | 42 |
| Effective personal income tax rate | Percentage of an income equal to GDP per capita | 10.53 % | 15 |
| Justice | is fairly administered | 6.63 Survey [0..10] | 25 |
| Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 15.96 micrograms | 29 |

Readiness

| | | Value | 2019 Rank |
|---------------------------------|---|---------------------|-----------|
| ► Labor force growth | Percentage change | 2.00 % | 11 |
| ► Skilled labor | is readily available | 6.88 Survey [0..10] | 5 |
| Finance skills | are readily available | 6.86 Survey [0..10] | 21 |
| International experience | of senior managers is generally significant | 6.51 Survey [0..10] | 12 |
| ► Competent senior managers | are readily available | 6.67 Survey [0..10] | 9 |
| Primary and secondary education | meets the needs of a competitive economy | 6.61 Survey [0..10] | 25 |
| ► Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 32.10 % | 6 |
| University education | meets the needs of a competitive economy | 6.56 Survey [0..10] | 29 |
| Management education | meets the needs of the business community | 6.61 Survey [0..10] | 28 |
| Language skills | are meeting the needs of enterprises | 6.93 Survey [0..10] | 25 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 3.15 number | 23 |
| ▷ Educational assessment - PISA | PISA survey of 15-year olds | 445 Average | 41 |

- ▶ Overall top strengths
- ▷ Overall top weaknesses

MALAYSIA 2020

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 4.4 % | 34 |
| ▷ Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 3,267 US\$ | 42 |
| ▶ Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 11.70 ratio | 12 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 11.30 ratio | 22 |
| Apprenticeships | are sufficiently implemented | 5.31 Survey [0..10] | 28 |
| Employee training | is a high priority in companies | 6.13 Survey [0..10] | 31 |
| ▷ Female labor force | Percentage of total labor force | 39.01 % | 55 |
| Health infrastructure | meets the needs of society | 7.30 Survey [0..10] | 23 |

Appeal

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| ▶ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 68.50 index | 13 |
| Attracting and retaining talents | is a priority in companies | 6.50 Survey [0..10] | 41 |
| Worker motivation | in companies is high | 5.97 Survey [0..10] | 31 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 5.24 Survey [0..10] | 30 |
| Quality of life | is high | 7.00 Survey [0..10] | 33 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 5.99 Survey [0..10] | 25 |
| ▷ Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 13,564 US\$ | 41 |
| ▷ Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 119,219 US\$ | 42 |
| ▶ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 10.53 % | 15 |
| Justice | is fairly administered | 6.23 Survey [0..10] | 27 |
| Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 16.04 micrograms | 29 |

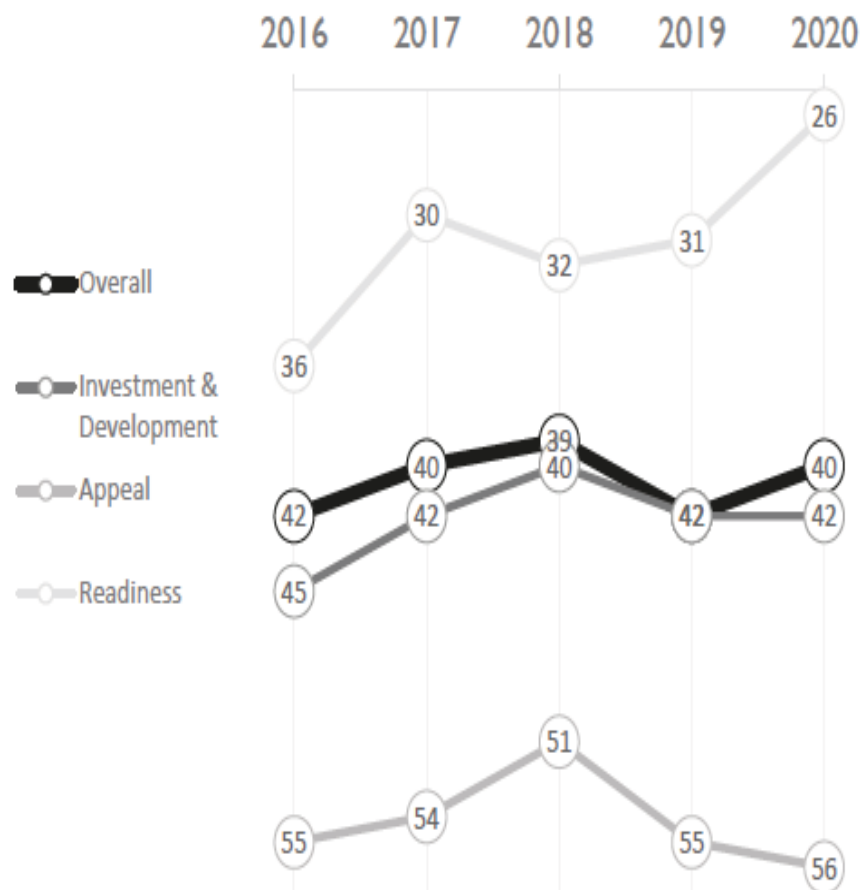
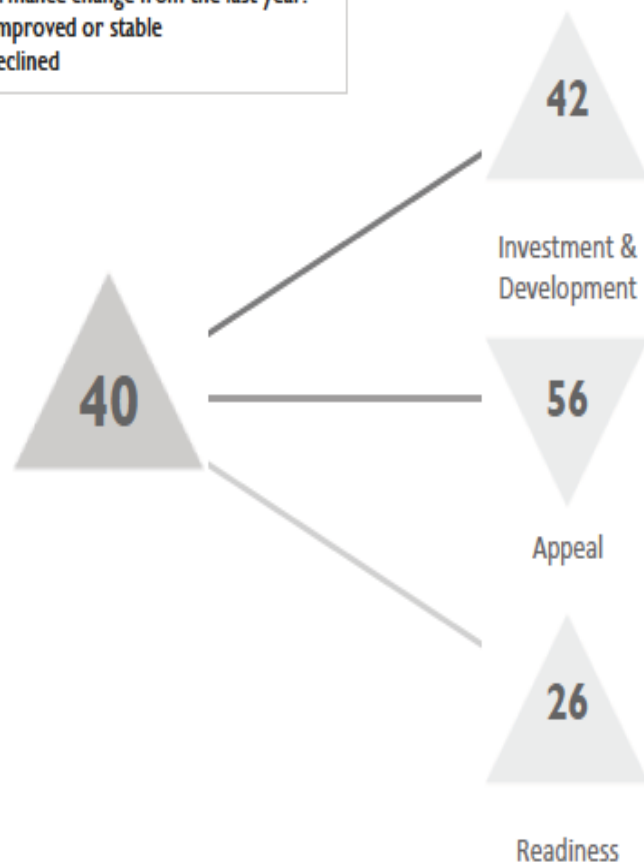
Readiness

| | | Value | 2020 Rank |
|---------------------------------|---|---------------------|-----------|
| ▶ Labor force growth | Percentage change | 1.97 % | 12 |
| Skilled labor | is readily available | 5.99 Survey [0..10] | 30 |
| Finance skills | are readily available | 6.43 Survey [0..10] | 33 |
| International experience | of senior managers is generally significant | 5.80 Survey [0..10] | 32 |
| Competent senior managers | are readily available | 6.10 Survey [0..10] | 24 |
| Primary and secondary education | meets the needs of a competitive economy | 6.53 Survey [0..10] | 29 |
| ▶ Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 40.77 % | 1 |
| University education | meets the needs of a competitive economy | 6.31 Survey [0..10] | 32 |
| Management education | meets the needs of the business community | 6.32 Survey [0..10] | 39 |
| Language skills | are meeting the needs of enterprises | 6.82 Survey [0..10] | 28 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 3.15 number | 27 |
| ▷ Educational assessment - PISA | PISA survey of 15-year olds | 431 Average | 44 |

CHINA

OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽ declined



Investment & Development

| | | Value | 2019 Rank |
|--|--|---------------------|-----------|
| Total public expenditure on education | Percentage of GDP | 3.6 % | 47 |
| Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | - % | - |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 1,631 US\$ | 48 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.59 ratio | 40 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 13.31 ratio | 42 |
| Apprenticeships | are sufficiently implemented | 5.28 Survey [0..10] | 23 |
| ► Employee training | is a high priority in companies | 6.81 Survey [0..10] | 13 |
| Female labor force | Percentage of total labor force | - % | - |
| Health infrastructure | meets the needs of society | 5.94 Survey [0..10] | 32 |

Appeal

| | | Value | 2019 Rank |
|--|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 108.60 index | 55 |
| Attracting and retaining talents | is a priority in companies | 7.34 Survey [0..10] | 23 |
| ► Worker motivation | in companies is high | 6.88 Survey [0..10] | 16 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 4.71 Survey [0..10] | 32 |
| Quality of life | is high | 6.26 Survey [0..10] | 37 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 5.79 Survey [0..10] | 27 |
| ▷ Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 11,684 US\$ | 48 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 155,675 US\$ | 34 |
| Effective personal income tax rate | Percentage of an income equal to GDP per capita | 20.14 % | 38 |
| Justice | is fairly administered | 5.88 Survey [0..10] | 30 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 53.14 micrograms | 59 |

Readiness

| | | Value | 2019 Rank |
|-----------------------------------|---|---------------------|-----------|
| ▷ Labor force growth | Percentage change | -0.04 % | 56 |
| Skilled labor | is readily available | 5.91 Survey [0..10] | 27 |
| Finance skills | are readily available | 6.52 Survey [0..10] | 28 |
| International experience | of senior managers is generally significant | 5.07 Survey [0..10] | 45 |
| Competent senior managers | are readily available | 5.93 Survey [0..10] | 26 |
| ► Primary and secondary education | meets the needs of a competitive economy | 7.76 Survey [0..10] | 11 |
| Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | - % | - |
| ► University education | meets the needs of a competitive economy | 7.34 Survey [0..10] | 19 |
| Management education | meets the needs of the business community | 6.83 Survey [0..10] | 26 |
| Language skills | are meeting the needs of enterprises | 5.73 Survey [0..10] | 42 |
| ▷ Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 0.11 number | 57 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 525 Average | 6 |

CHINA MAINLAND 2020

- Overall top strengths
- ▷ Overall top weaknesses

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.5 % | 49 |
| ▷ Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 1,755 US\$ | 50 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 16.43 ratio | 38 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 13.26 ratio | 44 |
| Apprenticeships | are sufficiently implemented | 5.51 Survey [0..10] | 27 |
| ► Employee training | is a high priority in companies | 6.64 Survey [0..10] | 19 |
| Female labor force | Percentage of total labor force | - % | - |
| Health infrastructure | meets the needs of society | 6.43 Survey [0..10] | 31 |

Appeal

| | | Value | 2020 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 108.60 index | 55 |
| Attracting and retaining talents | is a priority in companies | 6.86 Survey [0..10] | 29 |
| ► Worker motivation | in companies is high | 6.97 Survey [0..10] | 16 |
| Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 4.94 Survey [0..10] | 33 |
| Quality of life | is high | 6.54 Survey [0..10] | 36 |
| Foreign highly-skilled personnel | are attracted to your country's business environment | 5.45 Survey [0..10] | 32 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 11,684 US\$ | 48 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 155,675 US\$ | 34 |
| Effective personal income tax rate | Percentage of an income equal to GDP per capita | 20.14 % | 38 |
| Justice | is fairly administered | 5.83 Survey [0..10] | 32 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 53.45 micrograms | 59 |

Readiness

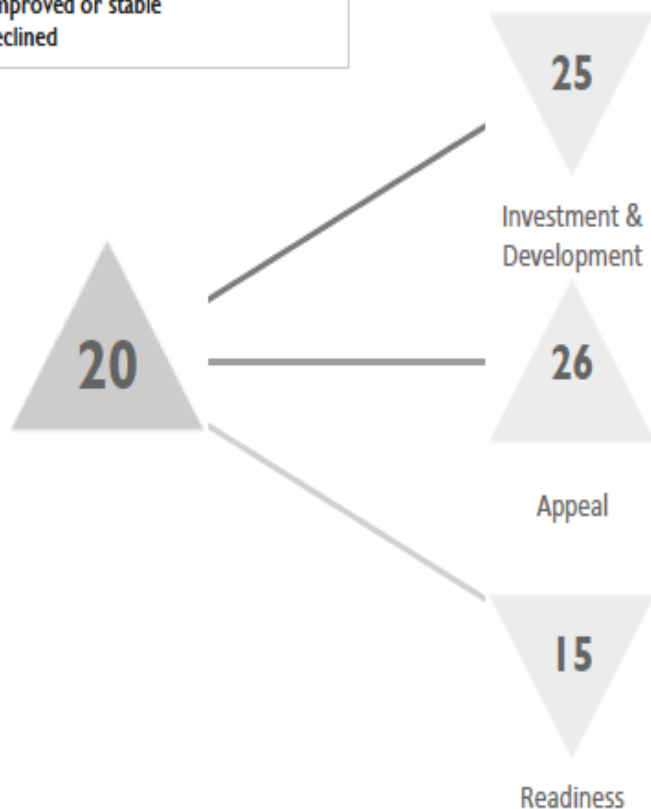
| | | Value | 2020 Rank |
|-----------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | -0.05 % | 48 |
| ► Skilled labor | is readily available | 6.60 Survey [0..10] | 14 |
| Finance skills | are readily available | 6.46 Survey [0..10] | 31 |
| International experience | of senior managers is generally significant | 5.22 Survey [0..10] | 44 |
| Competent senior managers | are readily available | 5.76 Survey [0..10] | 35 |
| ► Primary and secondary education | meets the needs of a competitive economy | 7.56 Survey [0..10] | 18 |
| Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | - % | - |
| University education | meets the needs of a competitive economy | 7.05 Survey [0..10] | 24 |
| Management education | meets the needs of the business community | 6.72 Survey [0..10] | 29 |
| Language skills | are meeting the needs of enterprises | 5.85 Survey [0..10] | 42 |
| ▷ Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 0.13 number | 55 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 579 Average | 1 |

TAIWAN, CHINA

OVERALL PERFORMANCE (63 countries)

The direction of the triangle indicates the performance change from the last year:

- △ improved or stable
- ▽ declined

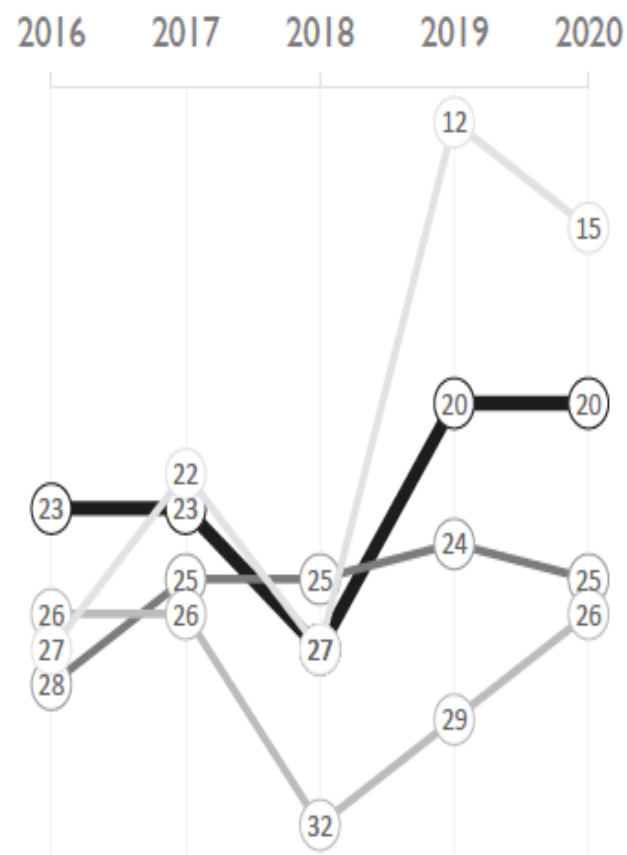


● Overall

● Investment & Development

● Appeal

● Readiness



- ▶ Overall top strengths
- ▷ Overall top weaknesses

TAIWAN, CHINA 2019

Investment & Development

| | | Value | 2019 Rank |
|---|--|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.8 % | 46 |
| Gov. expenditure on education per student | Percentage of GDP per capita (secondary education) | 23.2 % | 15 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 4,942 US\$ | 33 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 12.10 ratio | 17 |
| ▷ Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 13.90 ratio | 46 |
| Apprenticeships | are sufficiently implemented | 5.83 Survey [0..10] | 14 |
| Employee training | is a high priority in companies | 6.79 Survey [0..10] | 14 |
| Female labor force | Percentage of total labor force | 44.40 % | 40 |
| ▶ Health infrastructure | meets the needs of society | 8.42 Survey [0..10] | 6 |

Appeal

| | | Value | 2019 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 89.70 index | 48 |
| Attracting and retaining talents | is a priority in companies | 6.61 Survey [0..10] | 38 |
| ▶ Worker motivation | in companies is high | 7.01 Survey [0..10] | 12 |
| ▷ Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 3.74 Survey [0..10] | 46 |
| Quality of life | is high | 7.15 Survey [0..10] | 30 |
| ▷ Foreign highly-skilled personnel | are attracted to your country's business environment | 4.14 Survey [0..10] | 48 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 26,500 US\$ | 27 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 185,939 US\$ | 25 |
| ▶ Effective personal income tax rate | Percentage of an income equal to GDP per capita | 5.77 % | 9 |
| Justice | is fairly administered | 5.52 Survey [0..10] | 36 |
| Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 20.00 micrograms | 44 |

Readiness

| | | Value | 2019 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 0.67 % | 41 |
| Skilled labor | is readily available | 5.92 Survey [0..10] | 26 |
| Finance skills | are readily available | 6.85 Survey [0..10] | 22 |
| International experience | of senior managers is generally significant | 5.22 Survey [0..10] | 36 |
| Competent senior managers | are readily available | 5.64 Survey [0..10] | 31 |
| Primary and secondary education | meets the needs of a competitive economy | 6.46 Survey [0..10] | 30 |
| ▶ Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 33.15 % | 3 |
| University education | meets the needs of a competitive economy | 6.23 Survey [0..10] | 34 |
| Management education | meets the needs of the business community | 6.78 Survey [0..10] | 27 |
| Language skills | are meeting the needs of enterprises | 5.77 Survey [0..10] | 40 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 5.15 number | 13 |
| ▶ Educational assessment - PISA | PISA survey of 15-year olds | 537 Average | 2 |

TAIWAN, CHINA 2020

- Overall top strengths
- ▷ Overall top weaknesses

Investment & Development

| | | Value | 2020 Rank |
|--|---|---------------------|-----------|
| ▷ Total public expenditure on education | Percentage of GDP | 3.7 % | 45 |
| Total public exp. on education per student | Spending per enrolled pupil/student, all levels | 5,223 US\$ | 33 |
| Pupil-teacher ratio (primary education) | Ratio of students to teaching staff | 12.10 ratio | 16 |
| Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff | 12.90 ratio | 39 |
| Apprenticeships | are sufficiently implemented | 5.86 Survey [0..10] | 15 |
| Employee training | is a high priority in companies | 6.99 Survey [0..10] | 12 |
| Female labor force | Percentage of total labor force | 44.49 % | 40 |
| ► Health infrastructure | meets the needs of society | 8.77 Survey [0..10] | 5 |

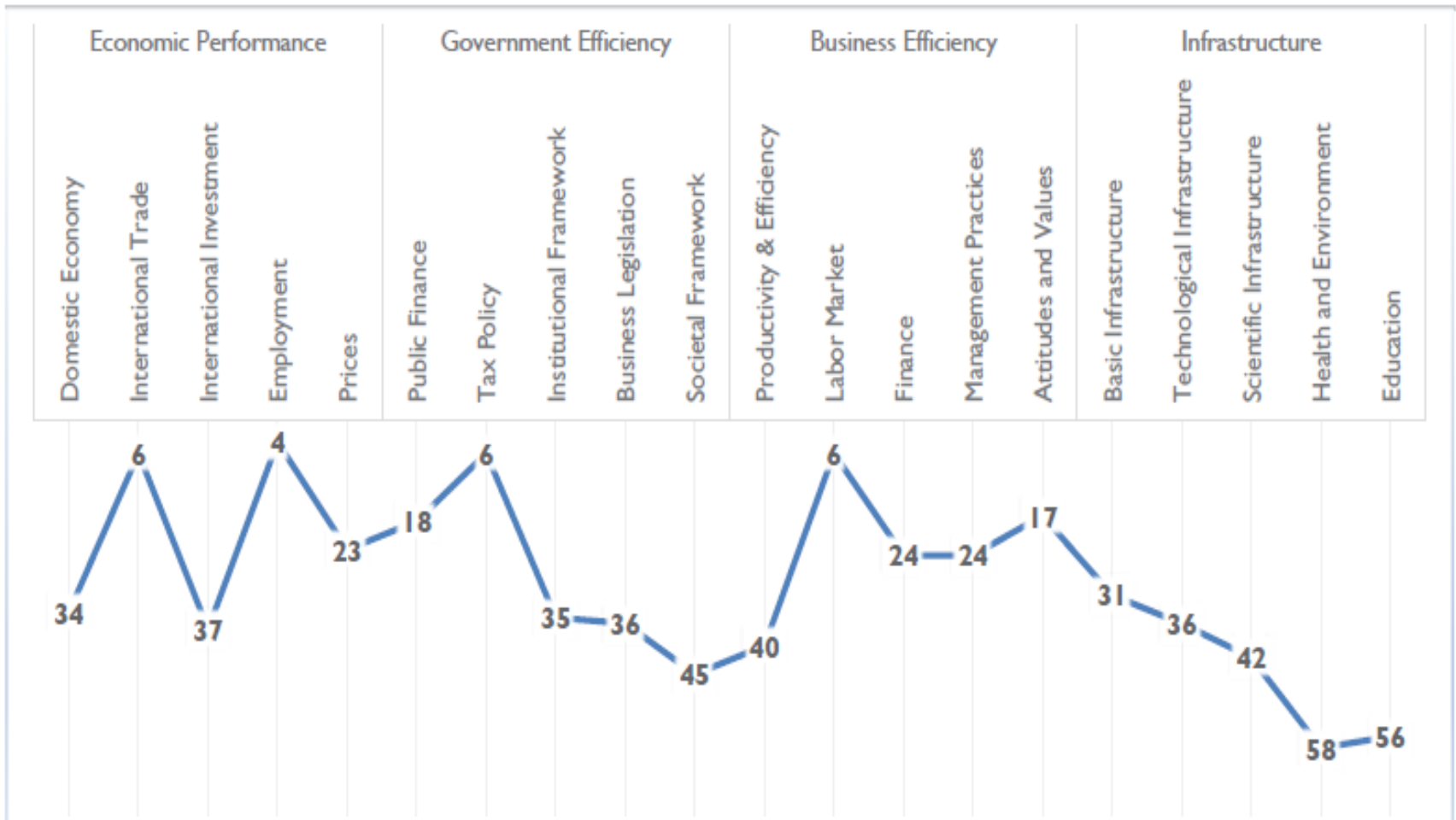
Appeal

| | | Value | 2020 Rank |
|--------------------------------------|---|---------------------|-----------|
| ▷ Cost-of-living index | Index of a basket of goods & services in the main city, including housing (New York City = 100) | 89.70 index | 48 |
| Attracting and retaining talents | is a priority in companies | 6.73 Survey [0..10] | 34 |
| ► Worker motivation | in companies is high | 7.21 Survey [0..10] | 8 |
| ▷ Brain drain | (well-educated and skilled people) does not hinder competitiveness in your economy | 3.94 Survey [0..10] | 48 |
| Quality of life | is high | 7.98 Survey [0..10] | 22 |
| ▷ Foreign highly-skilled personnel | are attracted to your country's business environment | 4.59 Survey [0..10] | 47 |
| Remuneration in services professions | Gross annual income including supplements such as bonuses, US\$ | 26,500 US\$ | 27 |
| Remuneration of management | Total base salary plus bonuses and long-term incentives, US\$ | 185,939 US\$ | 25 |
| ► Effective personal income tax rate | Percentage of an income equal to GDP per capita | 5.77 % | 9 |
| Justice | is fairly administered | 5.94 Survey [0..10] | 31 |
| ▷ Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre | 18.30 micrograms | 43 |

Readiness

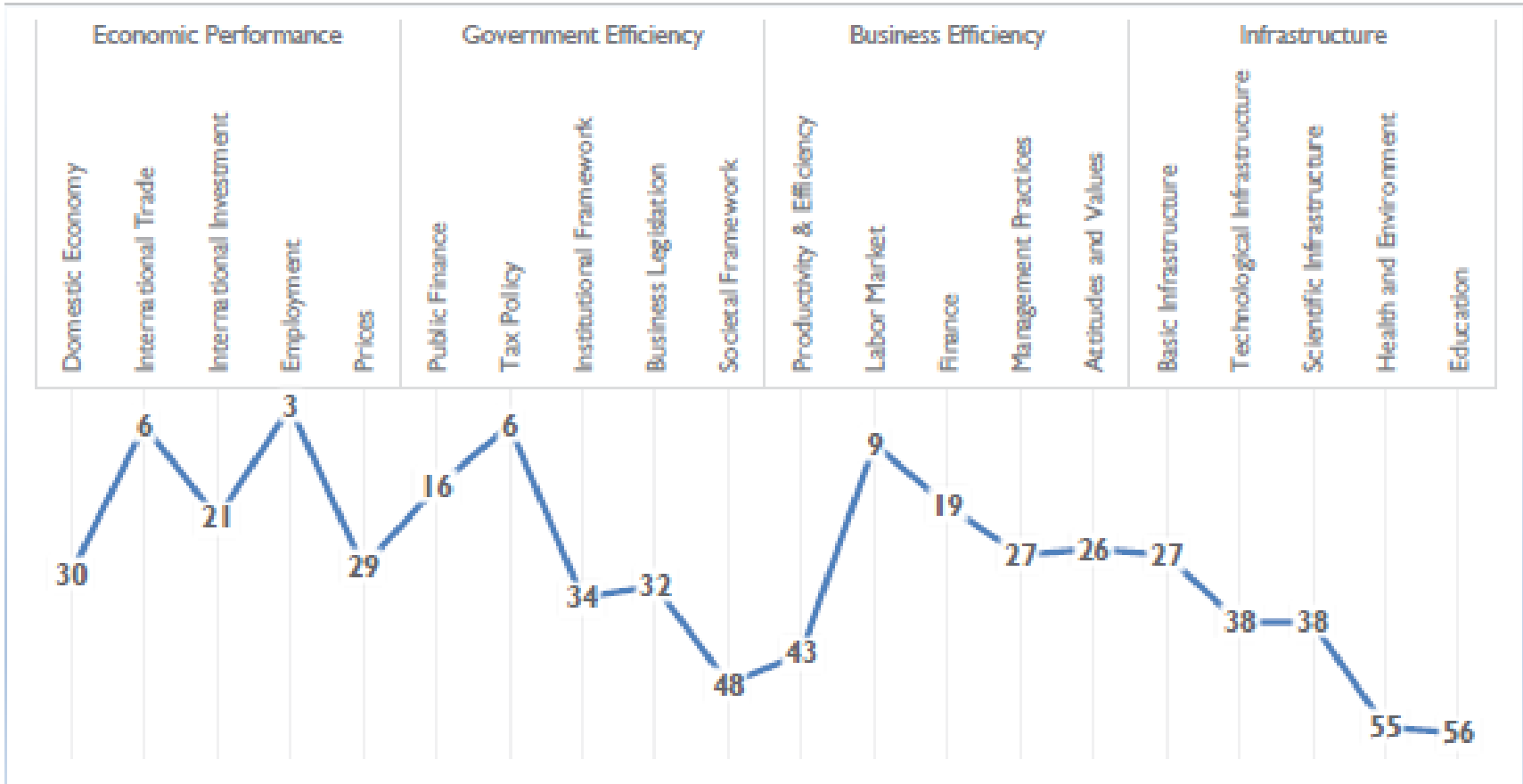
| | | Value | 2020 Rank |
|---------------------------------|---|---------------------|-----------|
| Labor force growth | Percentage change | 0.61 % | 37 |
| Skilled labor | is readily available | 6.18 Survey [0..10] | 24 |
| Finance skills | are readily available | 6.80 Survey [0..10] | 24 |
| International experience | of senior managers is generally significant | 5.72 Survey [0..10] | 34 |
| Competent senior managers | are readily available | 5.92 Survey [0..10] | 28 |
| Primary and secondary education | meets the needs of a competitive economy | 7.54 Survey [0..10] | 19 |
| ► Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences | 32.85 % | 5 |
| University education | meets the needs of a competitive economy | 6.89 Survey [0..10] | 27 |
| Management education | meets the needs of the business community | 6.81 Survey [0..10] | 27 |
| Language skills | are meeting the needs of enterprises | 6.28 Survey [0..10] | 33 |
| Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants | 5.48 number | 13 |
| ► Educational assessment - PISA | PISA survey of 15-year olds | 516 Average | 8 |

อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2561 จำแนกตามปัจจัยหลักในแต่ละหมวด



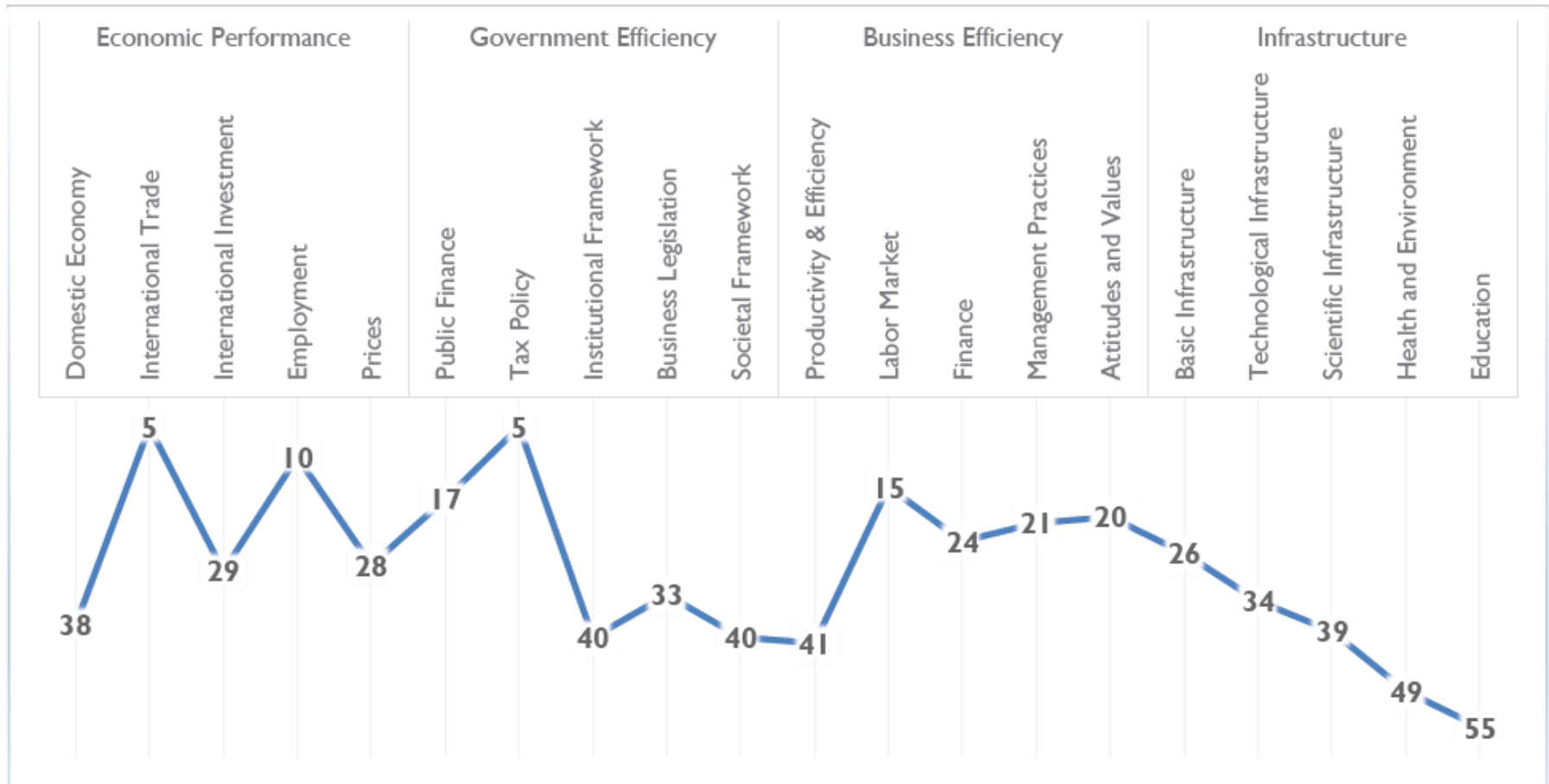
อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2562 จำแนกตามปัจจัยหลักในแต่ละหมวด

COMPETITIVENESS LANDSCAPE



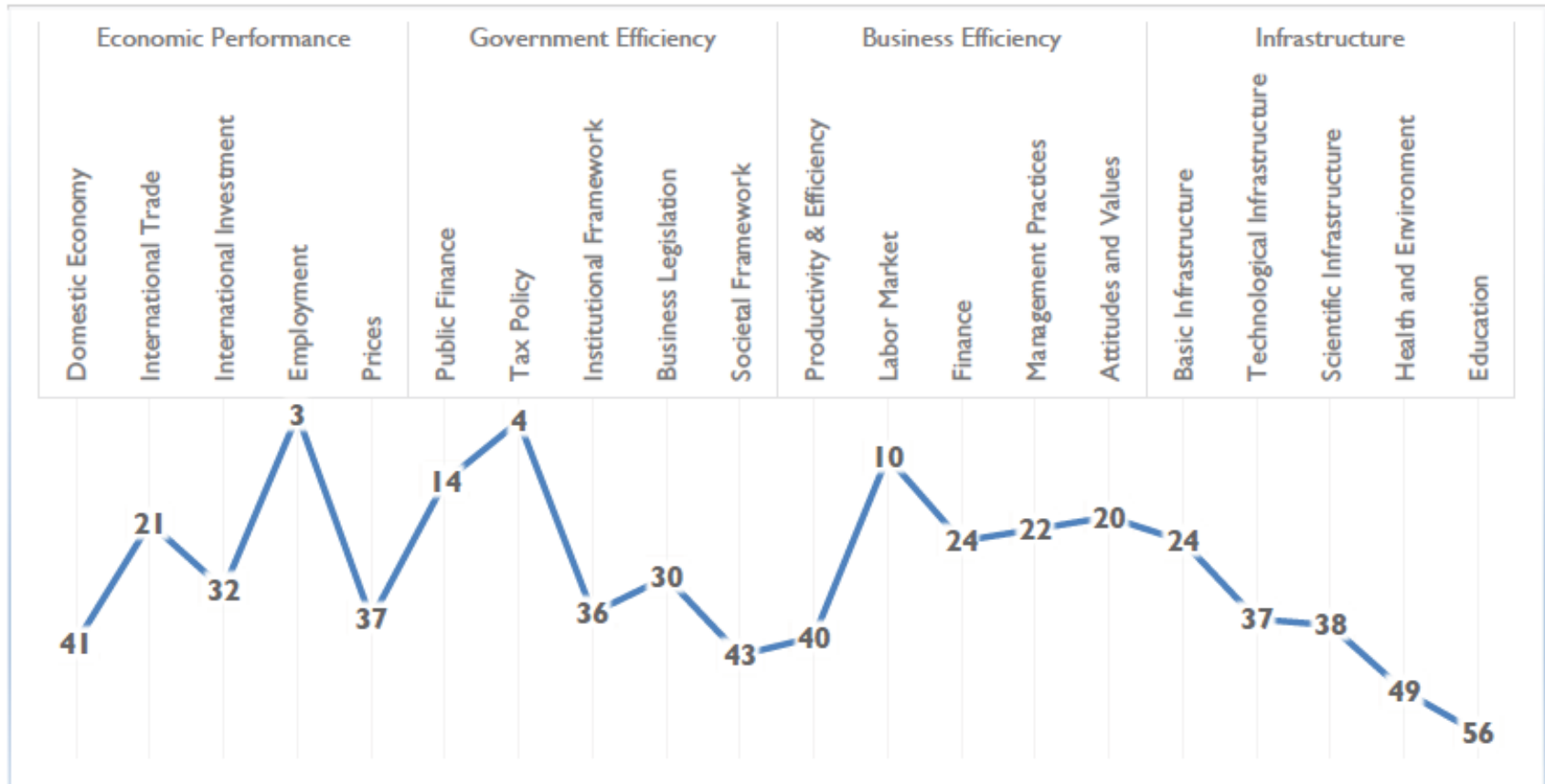
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COMPETITIVENESS LANDSCAPE



อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2564 จำแนกตามปัจจัยหลักในแต่ละหมวด

COMPETITIVENESS LANDSCAPE



2021

Basic Infrastructure

| | | |
|---------------|---|--|
| 4.1.01 [B] | Land area | Square kilometers ('000) |
| 4.1.02 | Arable area | Square meters per capita |
| 4.1.03 | Water resources | Total internal renewable per capita in cubic meters |
| 4.1.04 [S] | Access to water | Access to water is adequately ensured and managed |
| 4.1.05 [S] | Management of cities | Management of cities supports business development |
| 4.1.06 [B] | Population - market size | Estimates in millions |
| 4.1.07 | Population - growth | Percentage change |
| 4.1.08 [B][2] | Dependent Population | Percentage of total population |
| 4.1.09 | Dependency ratio | Population under 15 and over 64 years old, divided by active population (15 to 64 years) |
| 4.1.10 | Roads | Density of the network, km roads/square km land area |
| 4.1.11 | Railroads | Density of the network, km per square km |
| 4.1.12 [B] | Air transportation | Number of passengers carried by main companies, thousands |
| 4.1.13 [S] | Quality of air transportation | Quality of air transportation encourages business development |
| 4.1.14 [S] | Distribution infrastructure | The distribution infrastructure of goods and services is generally efficient |
| 4.1.15 [S] | Energy infrastructure | Energy infrastructure is adequate and efficient |
| 4.1.16 [B] | Total indigenous energy production | Millions MTOE |
| 4.1.17 | Total indigenous energy production (%) | Percentage of total requirements in tons of oil equivalent |
| 4.1.18 [B] | Total final energy consumption | Millions MTOE |
| 4.1.19 [B] | Total final energy consumption per capita | MTOE per capita |
| 4.1.20 | Electricity costs for industrial clients | US\$ per kwh |

2021

Technological Infrastructure

| | | |
|------------|---------------------------------------|--|
| 4.2.01 | Investment in Telecommunications | Percentage of GDP |
| 4.2.02 | Mobile Broadband subscribers | 4G & 5G market, % of mobile market |
| 4.2.03 | Mobile Telephone costs | Monthly Blended Average Revenue per User |
| 4.2.04 [S] | Communications technology | Communications technology (voice and data) meets business requirements |
| 4.2.05 | Computers in use | Worldwide share/ Source: Computer Industry Almanac |
| 4.2.06 | Computers per capita | Number of computers per 1000 people/ Source: Computer Industry Almanac |
| 4.2.07 | Internet users | Number of internet users per 1000 people |
| 4.2.08 | Broadband subscribers | Number of subscriptions per 1000 inhabitants |
| 4.2.09 | Internet bandwidth speed | Average speed |
| 4.2.10 [S] | Digital/Technological skills | Digital/Technological skills are readily available |
| 4.2.11 [S] | Qualified engineers | Qualified engineers are available in your labor market |
| 4.2.12 [S] | Public-private partnerships | Public and private sector ventures are supporting technological development |
| 4.2.13 [S] | Development & application of tech. | Development and application of technology are supported by the legal environment |
| 4.2.14 [S] | Funding for technological development | Funding for technological development is readily available |
| 4.2.15 | High-tech exports (\$) | US\$ millions |
| 4.2.16 | High-tech exports (%) | Percentage of manufactured exports |
| 4.2.17 | ICT service exports | Percentage of service exports |
| 4.2.18 [S] | Cyber security | Cyber security is being adequately addressed by corporations |

Scientific Infrastructure

| | | |
|------------|--|---|
| 4.3.01 | Total expenditure on R&D (\$) | US\$ millions |
| 4.3.02 | Total expenditure on R&D (%) | Percentage of GDP |
| 4.3.03 [B] | Total expenditure on R&D per capita (\$) | US\$ per capita |
| 4.3.04 | Business expenditure on R&D (\$) | US\$ millions |
| 4.3.05 | Business expenditure on R&D (%) | Percentage of GDP |
| 4.3.06 | Total R&D personnel | Full-time work equivalent (FTE thousands) |
| 4.3.07 | Total R&D personnel per capita | Full-time work equivalent (FTE) per 1000 people |
| 4.3.08 [B] | Total R&D personnel in business enterprise | Full-time work equivalent (FTE thousands) |
| 4.3.09 [B] | Total R&D personnel in business per capita | Full-time work equivalent (FTE) per 1000 people |
| 4.3.10 | Researchers in R&D per capita | Full-time work equivalent (FTE) per 1000 people |
| 4.3.11 | Graduates in Sciences | % of graduates in ICT, Engineering, Math & Natural Sciences |
| 4.3.12 | Scientific articles | Scientific articles published by origin of author |
| 4.3.13 [B] | Nobel prizes | Awarded in physics, chemistry, physiology or medicine and economics since 1950 |
| 4.3.14 | Nobel prizes per capita | Awarded in physics, chemistry, physiology or medicine and economics since 1950 per million people |
| 4.3.15 | Patent applications | Number of applications filed by applicant's origin |
| 4.3.16 | Patent applications per capita | Number of applications filed by applicant's origin, per 100,000 inhabitants |
| 4.3.17 | Patent grants | Number of patents granted by applicant's origin (average 2017-2019) |
| 4.3.18 | Number of patents in force | by applicant's origin, per 100,000 inhabitants |
| 4.3.19 | Medium- and high-tech value added | Proportion of total manufacturing value added, expressed as a percentage |
| 4.3.20 [S] | Scientific research legislation | Laws relating to scientific research do encourage innovation |
| 4.3.21 [S] | Intellectual property rights | Intellectual property rights are adequately enforced |
| 4.3.22 [S] | Knowledge transfer | Knowledge transfer is highly developed between companies and universities |

2021

Health and Environment

| | | |
|------------|--------------------------------------|---|
| 4.4.01 | Total health expenditure | Percentage of GDP |
| 4.4.02 [B] | Total health expenditure per capita | US\$ per capita |
| 4.4.03 [B] | Public expenditure on health (%) | Percentage of total health expenditure |
| 4.4.04 [S] | Health infrastructure | Health infrastructure meets the needs of society |
| 4.4.05 | Universal health care coverage index | Index (0-100) measuring coverage of essential health services |
| 4.4.06 | Life expectancy at birth | Average estimate |
| 4.4.07 [B] | Healthy life expectancy | Average estimate |
| 4.4.08 [B] | Infant mortality | Under five mortality rate per 1000 live births |
| 4.4.09 [2] | Medical assistance | Number of inhabitants per physician and per nurse |
| 4.4.10 [B] | Urban population | Percentage of total population |
| 4.4.11 | Human development index | Combines economic - social - educational indicators/ Source: Human Development Report |
| 4.4.12 | Energy intensity | Total energy consumed for each 1000 US\$ of GDP in MTOE |
| 4.4.13 [B] | Safely treated waste water | Percentage of waste water |
| 4.4.14 | Water use efficiency | US\$ per cubic meter |
| 4.4.15 [B] | CO2 emissions | Metric tons of carbon dioxide from fuel combustion |
| 4.4.16 | CO2 emissions intensity | CO2 emissions from fuel combustion in metric tons per one million US\$ of GDP |
| 4.4.17 | Exposure to particle pollution | Mean population exposure to PM2.5, Micrograms per cubic metre |
| 4.4.18 | Renewable energies (%) | Share of renewables in total energy requirements, % |
| 4.4.19 | Forest area growth | Five year percentage change of hectares |
| 4.4.20 [B] | Total biocapacity | Global hectares per capita of biologically productive space |
| 4.4.21 [B] | Ecological footprint | Global hectares per person |
| 4.4.22 | Ecological balance (reserve/deficit) | Total biocapacity minus total footprint in global hectares per capita |
| 4.4.23 | Environment-related technologies | Development of environment-related technologies, % inventions worldwide |
| 4.4.24 | Environmental agreements | Multilateral agreements on hazardous waste, proportion fulfilled |
| 4.4.25 [S] | Sustainable development | Sustainable development is a priority in companies |
| 4.4.26 [S] | Pollution problems | Pollution problems do not seriously affect your economy |
| 4.4.27 [S] | Environmental laws | Environmental laws and compliance do not hinder the competitiveness of businesses |
| 4.4.28 [S] | Quality of life | Quality of life is high |

2021

Education

| | | |
|------------|--|--|
| 4.5.01 | Total public expenditure on education | Percentage of GDP |
| 4.5.02 [B] | Total public expenditure on education per capita | US\$ per capita |
| 4.5.03 | Total public exp. on education per student | Spending per enrolled pupil/student, all levels |
| 4.5.04 | Pupil-teacher ratio (primary education) | Ratio of students to teaching staff |
| 4.5.05 | Pupil-teacher ratio (secondary education) | Ratio of students to teaching staff |
| 4.5.06 | Secondary school enrollment | Percentage of relevant age group receiving full-time education |
| 4.5.07 | Higher education achievement | Percentage of population that has attained at least tertiary education for persons 25-34 |
| 4.5.08 | Women with degrees | Share of women who have a degree in the population 25-65 |
| 4.5.09 | Student mobility inbound | Foreign tertiary-level students per 1000 inhabitants |
| 4.5.10 [B] | Student mobility outbound | National tertiary-level students studying abroad per 1000 inhabitants |
| 4.5.11 | [3] Educational assessment - PISA | PISA survey of 15-year olds |
| 4.5.12 | Students who are not low achievers - PISA | % of students who are not low achievers in maths, sciences and reading |
| 4.5.13 [B] | English proficiency - TOEFL | TOEFL scores |
| 4.5.14 [S] | Primary and secondary education | Primary and secondary education meets the needs of a competitive economy |
| 4.5.15 [S] | University education | University education meets the needs of a competitive economy |
| 4.5.16 [S] | Management education | Management education meets the needs of the business community |
| 4.5.17 | University education index | Country score calculated from Times Higher Education university ranking |
| 4.5.18 | Illiteracy | Adult (over 15 years) illiteracy rate as a percentage of population |
| 4.5.19 [S] | Language skills | Language skills are meeting the needs of enterprises |

=Hard Statistics

[S]=Survey Data

[B]=Background Data

INFRASTRUCTURE ของประเทศไทย ปี 2561

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.2.02 Mobile Broadband subscribers | 3 |
| 4.1.11 Dependency ratio | 9 |
| 4.2.03 Mobile Telephone costs | 13 |
| 4.2.17 High-tech exports (%) | 13 |
| 4.2.01 Investment in Telecommunications | 18 |
| 4.4.17 Renewable energies (%) | 20 |
| 4.2.09 Internet bandwidth speed | 20 |
| 4.4.22 Sustainable development | 23 |
| 4.2.13 Public-private partnerships | 26 |
| 4.3.11 Science degrees | 29 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.5.05 Pupil-teacher ratio (secondary education) | 62 |
| 4.4.08 Medical assistance | 60 |
| 4.4.11 Energy intensity | 59 |
| 4.4.01 Total health expenditure | 59 |
| 4.2.08 Broadband subscribers | 58 |
| 4.3.18 Number of patents in force | 56 |
| 4.5.06 Secondary school enrollment | 55 |
| 4.2.06 Computers per capita | 55 |
| 4.4.10 Human development index | 55 |
| 4.3.16 Patent applications per capita | 55 |

INFRASTRUCTURE ของประเทศไทย ปี 2562

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.2.02 Mobile Broadband subscribers | 4 |
| 4.1.10 Dependency ratio | 9 |
| 4.2.16 High-tech exports (%) | 9 |
| 4.2.03 Mobile Telephone costs | 13 |
| 4.4.18 Renewable energy (%) | 19 |
| 4.2.01 Investment in Telecommunications | 19 |
| 4.2.12 Public-private partnerships | 20 |
| 4.2.04 Communication technology | 23 |
| 4.1.16 Energy infrastructure | 25 |
| 4.4.25 Sustainable development | 27 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.4.09 Medical assistance | 60 |
| 4.5.06 Pupil-teacher ratio (secondary education) | 60 |
| 4.2.08 Broadband subscribers | 58 |
| 4.4.12 Energy intensity | 58 |
| 4.4.01 Total health expenditure | 57 |
| 4.5.07 Secondary school enrollment | 56 |
| 4.2.06 Computers per capita | 55 |
| 4.4.17 Exposure to particle pollution | 55 |
| 4.2.07 Internet users | 54 |
| 4.3.18 Number of patents in force | 54 |

INFRASTRUCTURE ของประเทศไทย ปี 2563

STRENGTHS

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.1.09 Dependency ratio | 7 |
| 4.2.02 Mobile Broadband subscribers | 10 |
| 4.2.16 High-tech exports (%) | 11 |
| 4.2.01 Investment in Telecommunications | 14 |
| 4.2.03 Mobile Telephone costs | 15 |
| 4.4.25 Sustainable development | 16 |
| 4.2.12 Public-private partnerships | 16 |
| 4.2.09 Internet bandwidth speed | 20 |
| 4.4.18 Renewable energies (%) | 20 |
| 4.1.15 Energy infrastructure | 20 |

| Infrastructure | Rank |
|---|------|
| 4.4.09 Medical assistance | 60 |
| 4.2.17 ICT service exports | 60 |
| 4.4.12 Energy intensity | 58 |
| 4.2.08 Broadband subscribers | 58 |
| 4.5.01 Total public expenditure on education | 58 |
| 4.5.06 Pupil-teacher ratio (secondary education) | 57 |
| 4.5.07 Secondary school enrollment | 57 |
| 4.4.01 Total health expenditure | 57 |
| 4.3.18 Number of patents in force | 56 |
| 4.5.04 Total public exp. on education per student | 56 |

INFRASTRUCTURE ของประเทศไทย ปี 2564

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.1.09 Dependency ratio | 7 |
| 4.2.01 Investment in Telecommunications | 10 |
| 4.2.16 High-tech exports (%) | 12 |
| 4.4.04 Health infrastructure | 16 |
| 4.3.11 Graduates in Science | 16 |
| 4.2.03 Mobile Telephone costs | 20 |
| 4.2.09 Internet bandwidth speed | 20 |
| 4.1.15 Energy infrastructure | 20 |
| 4.4.18 Renewable energy (%) | 21 |
| 4.4.25 Sustainable development | 21 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.5.06 Secondary school enrollment | 61 |
| 4.5.05 Pupil-teacher ratio (secondary education) | 60 |
| 4.2.17 ICT service exports | 60 |
| 4.1.07 Population - growth | 60 |
| 4.4.09 Medical assistance | 59 |
| 4.2.06 Computers per capita | 59 |
| 4.5.01 Total public expenditure on education | 59 |
| 4.4.12 Energy intensity | 59 |
| 4.4.01 Total health expenditure | 57 |
| 4.4.14 Water use efficiency | 56 |

INFRASTRUCTURE ของประเทศไทยปี 2561

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.4.21 Environment-related technologies | 1 |
| 4.2.08 Broadband subscribers | 1 |
| 4.3.18 Number of patents in force | 1 |
| 4.2.02 Mobile Broadband subscribers | 1 |
| 4.4.05 Life expectancy at birth | 2 |
| 4.3.11 Science degrees | 3 |
| 4.3.05 Business expenditure on R&D (%) | 3 |
| 4.3.16 Patent applications per capita | 4 |
| 4.5.06 Secondary school enrollment | 5 |
| 4.2.07 Internet users | 5 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.1.11 Dependency ratio | 62 |
| 4.5.18 Language skills | 61 |
| 4.2.03 Mobile Telephone costs | 57 |
| 4.5.01 Total public expenditure on education | 57 |
| 4.2.01 Investment in Telecommunications | 56 |
| 4.1.08 Population - growth | 54 |
| 4.5.16 Management education | 53 |
| 4.1.24 Electricity costs for industrial clients | 52 |
| 4.4.17 Renewable energies (%) | 48 |
| 4.2.10 Digital/Technological skills | 48 |

INFRASTRUCTURE ของประเทศไทยปี 2562

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.4.25 Sustainable development | 1 |
| 4.2.02 Mobile Broadband subscribers | 1 |
| 4.4.23 Environment-related technologies | 2 |
| 4.2.08 Broadband subscribers | 2 |
| 4.3.18 Number of patents in force | 2 |
| 4.4.06 Life expectancy at birth | 2 |
| 4.3.11 Science degrees | 3 |
| 4.3.05 Business expenditure on R&D (%) | 4 |
| 4.3.16 Patent applications per capita | 4 |
| 4.5.07 Secondary school enrollment | 4 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.1.10 Dependency ratio | 63 |
| 4.5.19 Language skills | 62 |
| 4.2.10 Digital/Technological skills | 60 |
| 4.2.03 Mobile Telephone costs | 58 |
| 4.2.01 Investment in Telecommunications | 57 |
| 4.1.07 Population - growth | 56 |
| 4.5.01 Total public expenditure on education | 55 |
| 4.5.16 Management education | 53 |
| 4.5.15 University education | 51 |
| 4.1.21 Electricity costs for industrial clients | 50 |

INFRASTRUCTURE ของประเทศไทยปี 2563

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.2.08 Broadband subscribers | 1 |
| 4.2.02 Mobile Broadband subscribers | 1 |
| 4.4.23 Environment-related technologies | 2 |
| 4.4.06 Life expectancy at birth | 2 |
| 4.3.18 Number of patents in force | 3 |
| 4.3.05 Business expenditure on R&D (%) | 4 |
| 4.3.16 Patent applications per capita | 4 |
| 4.5.07 Secondary school enrollment | 4 |
| 4.5.13 Students who are not low achievers -PISA | 5 |
| 4.2.07 Internet users | 5 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.1.09 Dependency ratio | 63 |
| 4.2.10 Digital/Technological skills | 62 |
| 4.5.19 Language skills | 62 |
| 4.2.03 Mobile Telephone costs | 61 |
| 4.5.17 Management education | 57 |
| 4.1.07 Population - growth | 56 |
| 4.5.01 Total public expenditure on education | 55 |
| 4.2.17 ICT service exports | 54 |
| 4.5.16 University education | 52 |
| 4.2.01 Investment in Telecommunications | 52 |

INFRASTRUCTURE ของประเทศไทยปี 2564

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.2.08 Broadband subscribers | 1 |
| 4.4.25 Sustainable development | 1 |
| 4.4.23 Environment-related technologies | 2 |
| 4.4.06 Life expectancy at birth | 2 |
| 4.3.18 Number of patents in force | 3 |
| 4.3.05 Business expenditure on R&D (%) | 4 |
| 4.3.16 Patent applications per capita | 4 |
| 4.3.02 Total expenditure on R&D (%) | 5 |
| 4.4.01 Total health expenditure | 5 |
| 4.5.12 Students who are not low achievers -PISA | 5 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.1.09 Dependency ratio | 64 |
| 4.2.03 Mobile Telephone costs | 62 |
| 4.2.10 Digital/Technological skills | 62 |
| 4.5.19 Language skills | 62 |
| 4.5.01 Total public expenditure on education | 57 |
| 4.5.16 Management education | 55 |
| 4.5.15 University education | 54 |
| 4.2.17 ICT service exports | 54 |
| 4.1.07 Population - growth | 54 |
| 4.1.20 Electricity costs for industrial clients | 53 |

INFRASTRUCTURE ของประเทศไทย ปี 2561

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.2.09 Internet bandwidth speed | 1 |
| 4.3.05 Business expenditure on R&D (%) | 2 |
| 4.3.02 Total expenditure on R&D (%) | 2 |
| 4.5.07 Higher education achievement | 3 |
| 4.3.16 Patent applications per capita | 3 |
| 4.3.10 Researchers in R&D per capita | 3 |
| 4.3.18 Number of patents in force | 3 |
| 4.4.21 Environment-related technologies | 4 |
| 4.1.11 Dependency ratio | 4 |
| 4.5.03 Government expenditure on education per student | 4 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.4.17 Renewable energies (%) | 58 |
| 4.4.16 Exposure to particle pollution | 56 |
| 4.4.23 Pollution problems | 55 |
| 4.2.03 Mobile Telephone costs | 52 |
| 4.2.14 Development and application of technology | 52 |
| 4.5.15 University education | 49 |
| 4.5.05 Pupil-teacher ratio (secondary education) | 48 |
| 4.2.01 Investment in Telecommunications | 47 |
| 4.4.25 Quality of life | 47 |
| 4.5.16 Management education | 47 |

INFRASTRUCTURE ของประเทศไทย ปี 2562

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.02 Total expenditure on R&D (%) | 1 |
| 4.3.05 Business expenditure on R&D (%) | 2 |
| 4.3.10 Researchers in R&D per capita | 2 |
| 4.5.08 Higher education achievement | 3 |
| 4.3.16 Patent applications per capita | 3 |
| 4.5.03 Gov. expenditure on education per student | 3 |
| 4.4.23 Environment-related technologies | 4 |
| 4.3.19 Medium- and high-tech value added | 4 |
| 4.3.18 Number of patents in force | 4 |
| 4.1.10 Dependency ratio | 4 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.4.18 Renewable energy (%) | 57 |
| 4.2.03 Mobile Telephone costs | 57 |
| 4.5.15 University education | 55 |
| 4.4.26 Pollution problems | 54 |
| 4.4.17 Exposure to particle pollution | 53 |
| 4.5.16 Management education | 51 |
| 4.2.13 Development and application of technology | 50 |
| 4.5.14 Primary and secondary education | 47 |
| 4.2.01 Investment in Telecommunications | 46 |
| 4.5.06 Pupil-teacher ratio (secondary education) | 46 |

INFRASTRUCTURE ของประเทศไทย ปี 2563

| STRENGTHS | | WEAKNESSES | |
|--|------|--|------|
| Infrastructure | Rank | Infrastructure | Rank |
| 4.3.05 Business expenditure on R&D (%) | 2 | 4.4.24 Environmental agreements | 56 |
| 4.3.02 Total expenditure on R&D (%) | 2 | 4.4.18 Renewable energy (%) | 56 |
| 4.2.09 Internet bandwidth speed | 2 | 4.2.03 Mobile Telephone costs | 55 |
| 4.3.10 Researchers in R&D per capita | 2 | 4.4.19 Forest area growth | 55 |
| 4.4.23 Environment-related technologies | 3 | 4.4.17 Exposure to particle pollution | 53 |
| 4.3.16 Patent applications per capita | 3 | 4.5.17 Management education | 48 |
| 4.3.07 Total R&D personnel per capita | 3 | 4.5.15 University education | 48 |
| 4.1.10 Dependency ratio | 3 | 4.1.07 Population - growth | 45 |
| 4.5.08 Higher education achievement | 4 | 4.5.10 Student mobility inbound | 44 |
| 4.3.19 Medium- and high-tech value added | 4 | 4.2.13 Development and application of technology | 44 |

INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2561

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.3.11 Science degrees | 5 |
| 4.4.21 Environment-related technologies | 6 |
| 4.1.11 Dependency ratio | 7 |
| 4.1.18 Maintenance and development | 9 |
| 4.2.17 High-tech exports (%) | 10 |
| 4.2.19 Cyber security | 10 |
| 4.1.06 Management of cities | 10 |
| 4.2.13 Public-private partnerships | 11 |
| 4.5.14 Science in schools | 11 |
| 4.2.18 ICT service exports | 12 |

WEAKNESSES

| Infrastructure | Rank |
|---------------------------------------|------|
| 4.4.16 Exposure to particle pollution | 57 |
| 4.4.10 Human development index | 57 |
| 4.2.07 Internet users | 56 |
| 4.5.09 Student mobility inbound | 56 |
| 4.4.23 Pollution problems | 56 |
| 4.5.08 Women with degrees | 54 |
| 4.4.11 Energy intensity | 52 |
| 4.4.08 Medical assistance | 51 |
| 4.2.06 Computers per capita | 49 |
| 4.4.01 Total health expenditure | 49 |

INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2562

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.4.23 Environment-related technologies | 5 |
| 4.3.11 Science degrees | 5 |
| 4.2.16 High-tech exports (%) | 6 |
| 4.1.10 Dependency ratio | 8 |
| 4.2.17 ICT service exports | 10 |
| 4.5.14 Primary and secondary education | 11 |
| 4.3.05 Business expenditure on R&D (%) | 13 |
| 4.1.05 Management of cities | 13 |
| 4.3.02 Total expenditure on R&D (%) | 14 |
| 4.1.16 Energy infrastructure | 14 |

WEAKNESSES

| Infrastructure | Rank |
|---------------------------------------|------|
| 4.2.09 Internet bandwidth speed | 61 |
| 4.4.17 Exposure to particle pollution | 59 |
| 4.5.10 Student mobility inbound | 57 |
| 4.2.07 Internet users | 56 |
| 4.4.26 Pollution problems | 56 |
| 4.4.11 Human development index | 54 |
| 4.4.12 Energy intensity | 52 |
| 4.4.09 Medical assistance | 52 |
| 4.4.01 Total health expenditure | 51 |
| 4.2.06 Computers per capita | 49 |

INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2563

STRENGTHS

WEAKNESSES

| Infrastructure | Rank | Infrastructure | Rank |
|---|------|---|------|
| 4.5.13 Students who are not low achievers -PISA | 1 | 4.4.17 Exposure to particle pollution | 59 |
| 4.5.18 University education index | 4 | 4.2.07 Internet users | 56 |
| 4.3.11 Science degrees | 4 | 4.5.10 Student mobility inbound | 56 |
| 4.4.23 Environment-related technologies | 5 | 4.4.11 Human development index | 55 |
| 4.2.16 High-tech exports (%) | 7 | 4.5.01 Total public expenditure on education | 51 |
| 4.1.09 Dependency ratio | 9 | 4.4.12 Energy intensity | 51 |
| 4.2.12 Public-private partnerships | 11 | 4.4.01 Total health expenditure | 50 |
| 4.4.19 Forest area growth | 11 | 4.4.09 Medical assistance | 50 |
| 4.1.05 Management of cities | 11 | 4.2.06 Computers per capita | 49 |
| 4.2.10 Digital/Technological skills | 12 | 4.5.04 Total public exp. on education per student | 48 |

INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2564

STRENGTHS

Infrastructure

Rank

| | |
|---|----|
| 4.5.13 Students who are not low achievers -PISA | 1 |
| 4.4.23 Environment-related technologies | 3 |
| 4.4.19 Forest area growth | 3 |
| 4.5.17 University education index | 3 |
| 4.2.12 Public-private partnerships | 4 |
| 4.5.14 Primary and secondary education | 7 |
| 4.1.09 Dependency ratio | 8 |
| 4.2.16 High-tech exports (%) | 8 |
| 4.1.05 Management of cities | 11 |
| 4.2.17 ICT service exports | 12 |

WEAKNESSES

Infrastructure

Rank

| | |
|---|----|
| 4.4.17 Exposure to particle pollution | 61 |
| 4.2.07 Internet users | 58 |
| 4.5.09 Student mobility inbound | 56 |
| 4.4.11 Human development index | 56 |
| 4.5.01 Total public expenditure on education | 52 |
| 4.4.12 Energy intensity | 52 |
| 4.5.03 Total public exp. on education per student | 50 |
| 4.4.09 Medical assistance | 50 |
| 4.2.06 Computers per capita | 49 |
| 4.4.01 Total health expenditure | 49 |

INFRASTRUCTURE ของประเทศไทยมาเลเซีย ปี 2561

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.11 Science degrees | 4 |
| 4.2.17 High-tech exports (%) | 4 |
| 4.2.01 Investment in Telecommunications | 5 |
| 4.5.08 Women with degrees | 7 |
| 4.5.04 Pupil-teacher ratio (primary education) | 9 |
| 4.2.13 Public-private partnerships | 10 |
| 4.1.24 Electricity costs for industrial clients | 12 |
| 4.1.11 Dependency ratio | 14 |
| 4.4.22 Sustainable development | 16 |
| 4.2.14 Development and application of technology | 17 |

WEAKNESSES

| Infrastructure | Rank |
|---------------------------------------|------|
| 4.4.01 Total health expenditure | 55 |
| 4.4.11 Energy intensity | 53 |
| 4.4.08 Medical assistance | 53 |
| 4.4.17 Renewable energies (%) | 50 |
| 4.2.08 Broadband subscribers | 49 |
| 4.4.10 Human development index | 48 |
| 4.3.16 Patent applications per capita | 46 |
| 4.1.05 Access to commodities | 46 |
| 4.1.04 Access to water | 45 |
| 4.2.09 Internet bandwidth speed | 44 |

INFRASTRUCTURE ของประเทศมาเลเซีย ปี 2562

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.11 Science degrees | 4 |
| 4.5.09 Women with degrees | 4 |
| 4.2.16 High-tech exports (%) | 4 |
| 4.2.01 Investment in Telecommunications | 6 |
| 4.2.03 Mobile Telephone costs | 9 |
| 4.2.12 Public-private partnerships | 9 |
| 4.5.05 Pupil-teacher ratio (primary education) | 11 |
| 4.1.10 Dependency ratio | 11 |
| 4.4.04 Health infrastructure | 17 |
| 4.4.27 Environmental laws | 17 |

WEAKNESSES

| Infrastructure | Rank |
|---------------------------------------|------|
| 4.4.01 Total health expenditure | 56 |
| 4.4.12 Energy intensity | 55 |
| 4.4.09 Medical assistance | 54 |
| 4.2.08 Broadband subscribers | 51 |
| 4.4.18 Renewable energy (%) | 50 |
| 4.4.11 Human development index | 47 |
| 4.3.16 Patent applications per capita | 46 |
| 4.4.06 Life expectancy at birth | 46 |
| 4.2.06 Computers per capita | 43 |
| 4.3.18 Number of patents in force | 40 |

INFRASTRUCTURE ของประเทศมาเลเซีย ปี 2563

STRENGTHS

WEAKNESSES

Infrastructure

Rank

Infrastructure

Rank

4.2.16 High-tech exports (%) 3

4.5.09 Women with degrees 4

4.3.11 Science degrees 5

4.2.01 Investment in Telecommunications 8

4.5.05 Pupil-teacher ratio (primary education) 11

4.1.09 Dependency ratio 12

4.1.20 Electricity costs for industrial clients 15

4.4.24 Environmental agreements 17

4.2.12 Public-private partnerships 17

4.2.13 Development and application of technology 20

4.4.01 Total health expenditure 56

4.4.09 Medical assistance 56

4.2.08 Broadband subscribers 54

4.4.12 Energy intensity 54

4.4.18 Renewable energy (%) 53

4.4.11 Human development index 49

4.4.05 Universal health care coverage index 49

4.5.04 Total public exp. on education per student 46

4.3.16 Patent applications per capita 46

4.4.06 Life expectancy at birth 46

INFRASTRUCTURE ของประเทศมาเลเซีย ปี 2564

STRENGTHS

| Infrastructure | Rank |
|---|------|
| 4.3.11 Graduates in Science | 1 |
| 4.2.16 High-tech exports (%) | 4 |
| 4.5.08 Women with degrees | 4 |
| 4.5.04 Pupil-teacher ratio (primary education) | 12 |
| 4.1.09 Dependency ratio | 12 |
| 4.1.20 Electricity costs for industrial clients | 14 |
| 4.2.12 Public-private partnerships | 17 |
| 4.4.24 Environmental agreements | 17 |
| 4.4.25 Sustainable development | 19 |
| 4.4.04 Health infrastructure | 22 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.4.01 Total health expenditure | 59 |
| 4.4.09 Medical assistance | 55 |
| 4.4.12 Energy intensity | 55 |
| 4.2.08 Broadband subscribers | 54 |
| 4.4.18 Renewable energy (%) | 54 |
| 4.4.11 Human development index | 49 |
| 4.4.05 Universal health care coverage index | 49 |
| 4.4.19 Forest area growth | 48 |
| 4.5.06 Secondary school enrollment | 47 |
| 4.3.16 Patent applications per capita | 46 |

INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2561

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.11 Science degrees | 1 |
| 4.5.07 Higher education achievement | 1 |
| 4.2.17 High-tech exports (%) | 1 |
| 4.5.14 Science in schools | 1 |
| 4.2.07 Internet users | 1 |
| 4.1.06 Management of cities | 1 |
| 4.1.18 Maintenance and development | 1 |
| 4.2.14 Development and application of technology | 1 |
| 4.2.08 Broadband subscribers | 2 |
| 4.4.24 Environmental laws | 2 |

WEAKNESSES

| Infrastructure | Rank |
|--|------|
| 4.5.01 Total public expenditure on education | 60 |
| 4.4.17 Renewable energies (%) | 57 |
| 4.4.16 Exposure to particle pollution | 55 |
| 4.2.03 Mobile Telephone costs | 53 |
| 4.4.01 Total health expenditure | 53 |
| 4.1.08 Population - growth | 50 |
| 4.4.08 Medical assistance | 41 |
| 4.2.01 Investment in Telecommunications | 40 |
| 4.4.21 Environment-related technologies | 24 |

INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2562

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.2.09 Internet bandwidth speed | 1 |
| 4.3.19 Medium- and high-tech value added | 1 |
| 4.3.11 Science degrees | 1 |
| 4.2.08 Broadband subscribers | 1 |
| 4.4.27 Environmental laws | 1 |
| 4.1.05 Management of cities | 1 |
| 4.2.13 Development and application of technology | 1 |
| 4.3.20 Scientific research legislation | 1 |
| 4.1.14 Quality of air transportation | 1 |
| 4.2.02 Mobile Broadband subscribers | 1 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.5.01 Total public expenditure on education | 60 |
| 4.4.18 Renewable energy (%) | 58 |
| 4.2.03 Mobile Telephone costs | 56 |
| 4.1.21 Electricity costs for industrial clients | 53 |
| 4.4.01 Total health expenditure | 52 |
| 4.4.17 Exposure to particle pollution | 43 |
| 4.2.01 Investment in Telecommunications | 40 |
| 4.1.07 Population - growth | 38 |
| 4.4.23 Environment-related technologies | 28 |

INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2563

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.19 Medium- and high-tech value added | 1 |
| 4.2.09 Internet bandwidth speed | 1 |
| 4.1.05 Management of cities | 1 |
| 4.1.13 Quality of air transportation | 1 |
| 4.2.02 Mobile Broadband subscribers | 1 |
| 4.2.07 Internet users | 1 |
| 4.5.08 Higher education achievement | 2 |
| 4.2.12 Public-private partnerships | 2 |
| 4.5.13 Students who are not low achievers -PISA | 2 |
| 4.2.13 Development and application of technology | 2 |

WEAKNESSES

| Infrastructure | Rank |
|---|------|
| 4.5.01 Total public expenditure on education | 61 |
| 4.4.18 Renewable energy (%) | 59 |
| 4.1.20 Electricity costs for industrial clients | 54 |
| 4.4.01 Total health expenditure | 53 |
| 4.2.03 Mobile Telephone costs | 50 |
| 4.4.17 Exposure to particle pollution | 44 |
| 4.2.01 Investment in Telecommunications | 41 |
| 4.4.19 Forest area growth | 39 |
| 4.5.18 University education index | 37 |
| 4.2.17 ICT service exports | 32 |

INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2564

STRENGTHS

| Infrastructure | Rank |
|--|------|
| 4.3.19 Medium- and high-tech value added | 1 |
| 4.2.09 Internet bandwidth speed | 1 |
| 4.2.13 Development and application of technology | 1 |
| 4.1.13 Quality of air transportation | 1 |
| 4.5.07 Higher education achievement | 2 |
| 4.5.13 Students who are not low achievers -PISA | 2 |
| 4.1.05 Management of cities | 2 |
| 4.2.16 High-tech exports (%) | 3 |
| 4.1.09 Dependency ratio | 3 |
| 4.2.12 Public-private partnerships | 3 |

WEAKNESSES

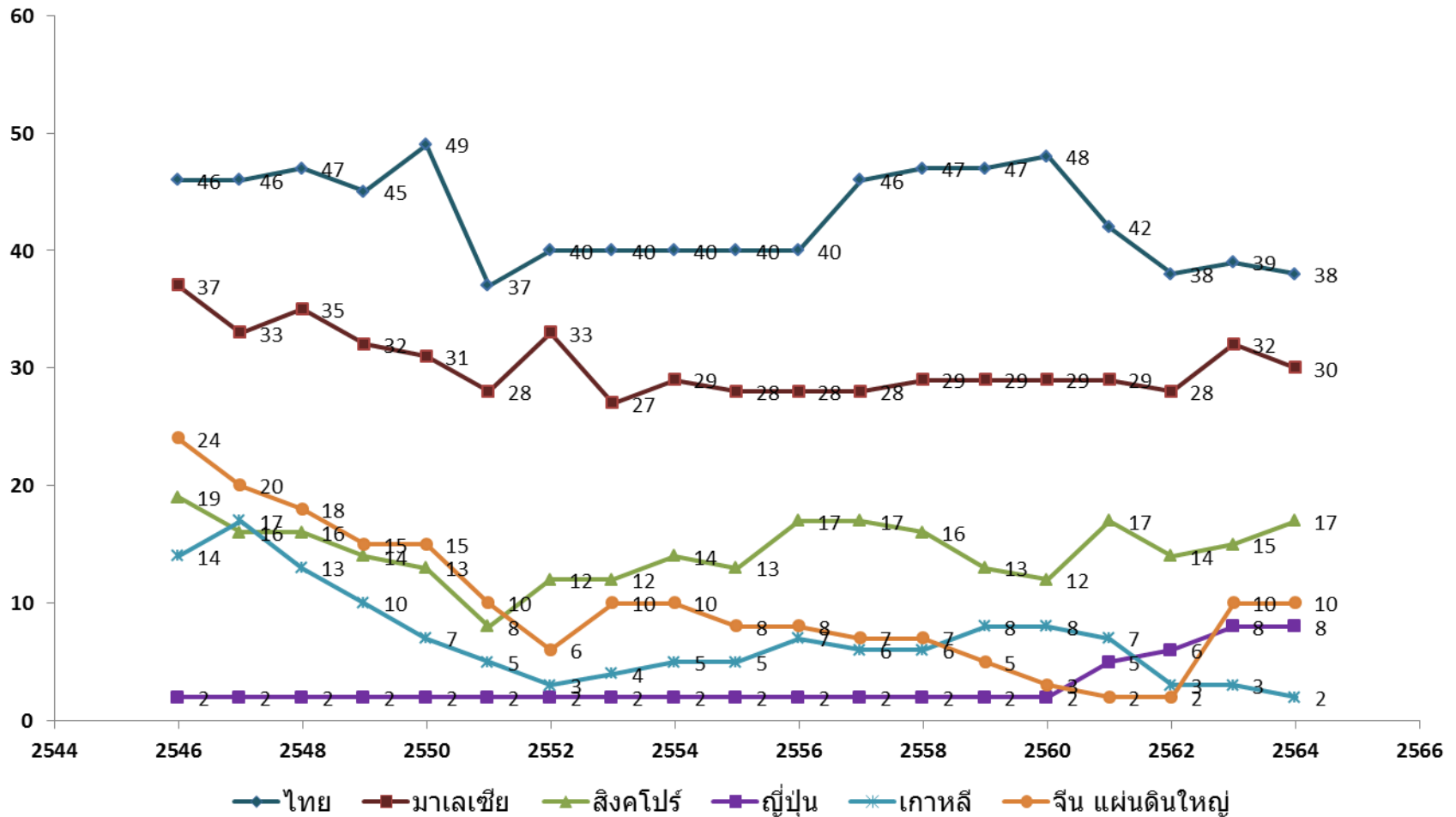
| Infrastructure | Rank |
|---|------|
| 4.5.01 Total public expenditure on education | 63 |
| 4.4.19 Forest area growth | 61 |
| 4.4.18 Renewable energy (%) | 60 |
| 4.1.07 Population growth | 56 |
| 4.2.01 Investment in Telecommunications | 55 |
| 4.1.20 Electricity costs for industrial clients | 54 |
| 4.4.01 Total health expenditure | 53 |
| 4.2.03 Mobile Telephone costs | 52 |
| 4.4.17 Exposure to particle pollution | 42 |
| 4.5.17 University education index | 37 |

**อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐานทาง
วิทยาศาสตร์ และโครงสร้างพื้นฐานทางเทคโนโลยี
ของประเทศไทย ปี 2546 -2564**

| ปี | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 | 2553 | 2554 | 2555 |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| วิทยาศาสตร์ | 46 | 46 | 47 | 45 | 49 | 37 | 40 | 40 | 40 | 40 |
| เทคโนโลยี | 41 | 38 | 37 | 41 | 48 | 43 | 36 | 48 | 52 | 50 |
| จำนวน ประเทศ | 51 | 51 | 51 | 53 | 55 | 55 | 57 | 58 | 59 | 59 |
| ปี | 2556 | 2557 | 2558 | 2559 | 2560 | 2561 | 2562 | 2563 | 2564 | |
| วิทยาศาสตร์ | 40 | 46 | 47 | 47 | 48 | 42 | 38 | 34 | 38 | |
| เทคโนโลยี | 47 | 41 | 44 | 42 | 36 | 36 | 38 | 39 | 37 | |
| จำนวน ประเทศ | 60 | 60 | 61 | 61 | 63 | 63 | 63 | 63 | 64 | |

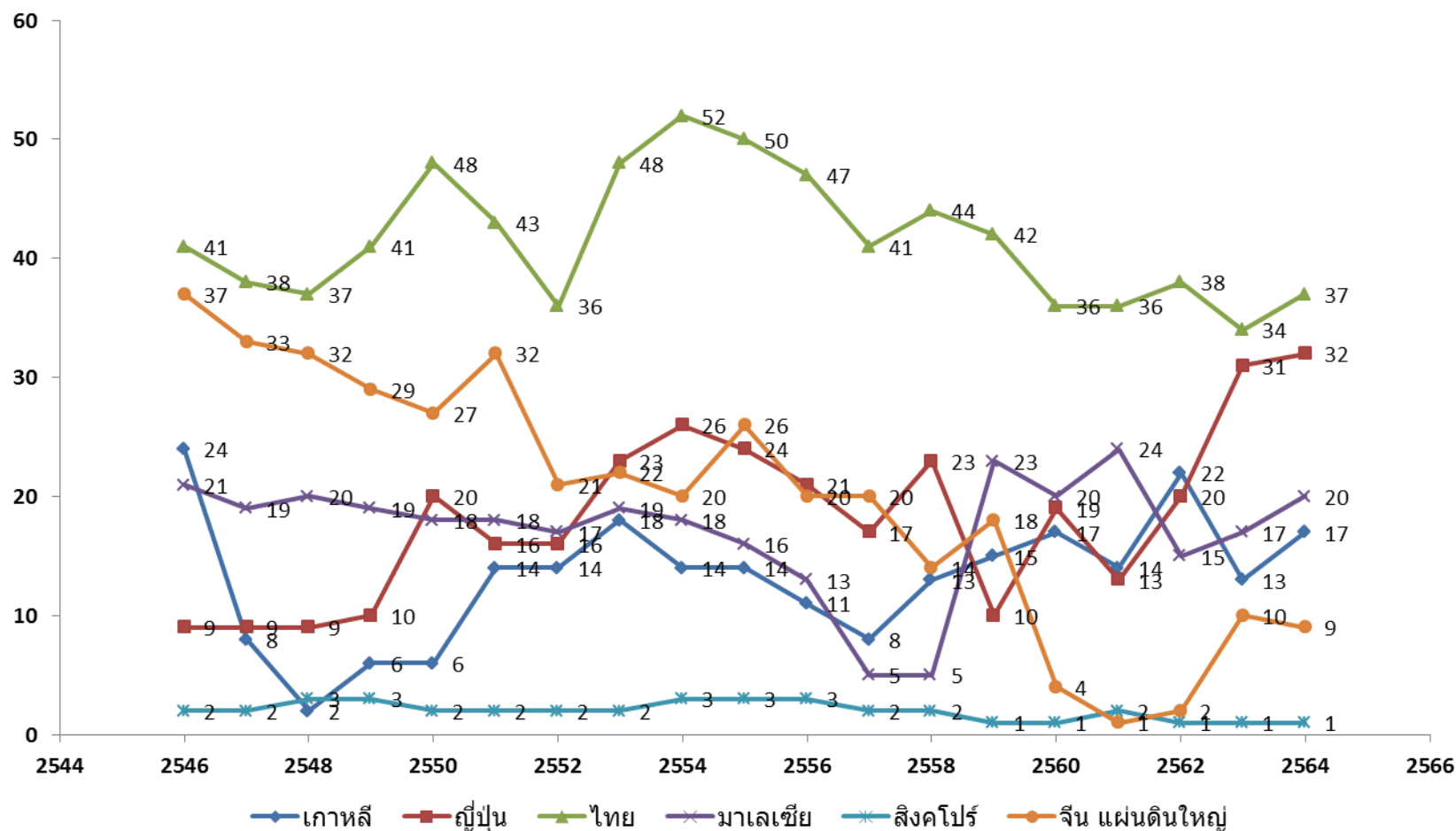
ที่มา : IMD

อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐาน ทางวิทยาศาสตร์ของประเทศต่าง ๆ โดยรวมปี 2546 - 2564



ที่มา : IMD

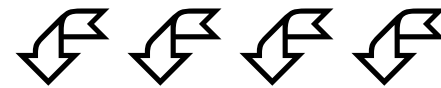
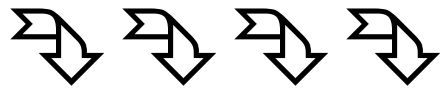
อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐาน ทางเทคโนโลยีของประเทศต่าง ๆ โดยรวม ปี 2546-2564



ที่มา : IMD

เทคโนโลยีกับการพัฒนาประเทศ

ความสำคัญของเทคโนโลยีต่อการพัฒนาประเทศ



ผู้ใดครองเทคโนโลยี

ผู้นั้นครองเศรษฐกิจ

ผู้ใดครองเทคโนโลยี

ผู้นั้นครองอำนาจ