

# 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 : ปี2566)**

**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)**

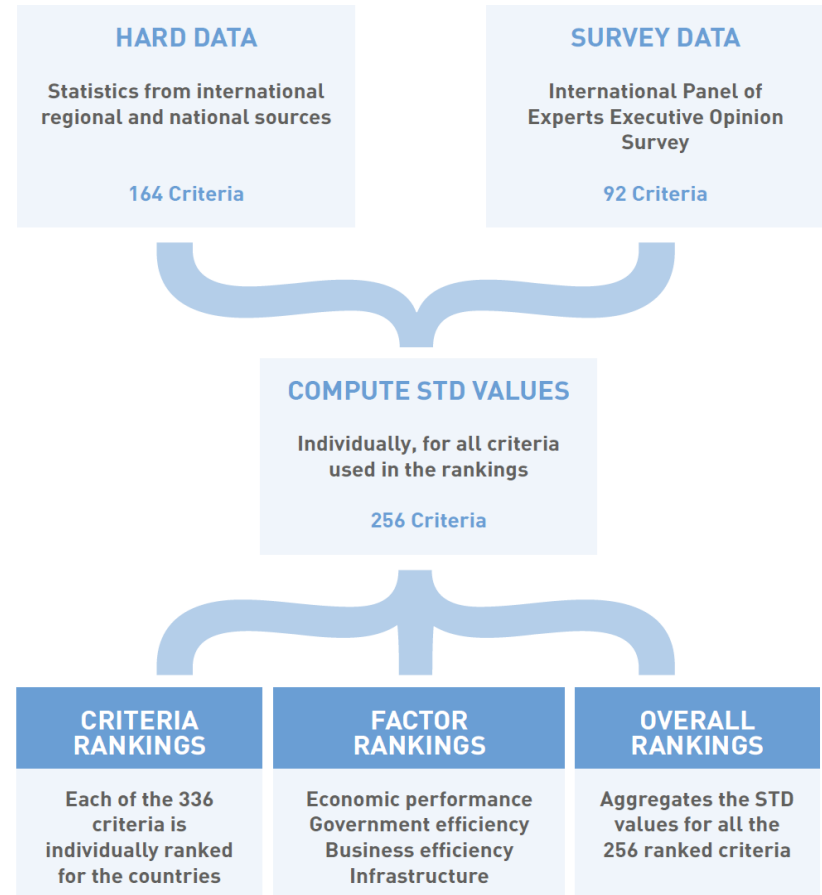
**IMD  
World  
Competitiveness  
Booklet  
2023**



IMD / World Competitiveness Center



## Computing the Rankings



**TABLE 2 • The Breakdown of Competitiveness Factors**



**Economic Performance**

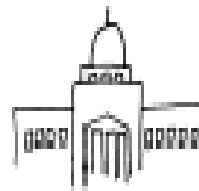
Domestic Economy

International Trade

International Investment

Employment

Prices



**Government Efficiency**

Public Finance

Fiscal Policy

Institutional Framework

Business Legislation

Societal Framework



**Business Efficiency**

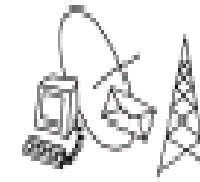
Productivity

Labor Market

Finance

Management Practices

Attitudes and Values



**Infrastructure**

Basic Infrastructure

Technological Infrastructure

Scientific Infrastructure

Health and Environment

Education



# อันดับความสามารถในการแข่งขันของประเทศต่าง ๆ ที่จัดโดย IMD ประจำปี 2566

1	Denmark
2	Ireland
3	Switzerland
4	Singapore
5	Netherlands
6	Taiwan, China
7	Hong Kong SAR
8	Sweden
9	USA
10	UAE
11	Finland
12	Qatar
13	Belgium
14	Norway
15	Canada
16	Iceland
17	Saudi Arabia
18	Czech Republic
19	Australia
20	Luxembourg
21	China
22	Germany

23	Israel
24	Austria
25	Bahrain
26	Estonia
27	Malaysia
28	Korea Rep.
29	United Kingdom
30	Thailand
31	New Zealand
32	Lithuania
33	France
34	Indonesia
35	Japan
36	Spain
37	Kazakhstan
38	Kuwait
39	Portugal
40	India
41	Italy
42	Slovenia
43	Poland
44	Chile

45	Cyprus
46	Hungary
47	Turkey
48	Romania
49	Greece
50	Croatia
51	Latvia
52	Philippines
53	Slovak Republic
54	Jordan
55	Peru
56	Mexico
57	Bulgaria
58	Colombia
59	Botswana
60	Brazil
61	South Africa
62	Mongolia
63	Argentina
64	Venezuela

# อันดับความสามารถในการแข่งขันของประเทศไทย

## ปี 2546 - 2566

สมรรถนะทางเศรษฐกิจ



ประสิทธิภาพของรัฐบาล

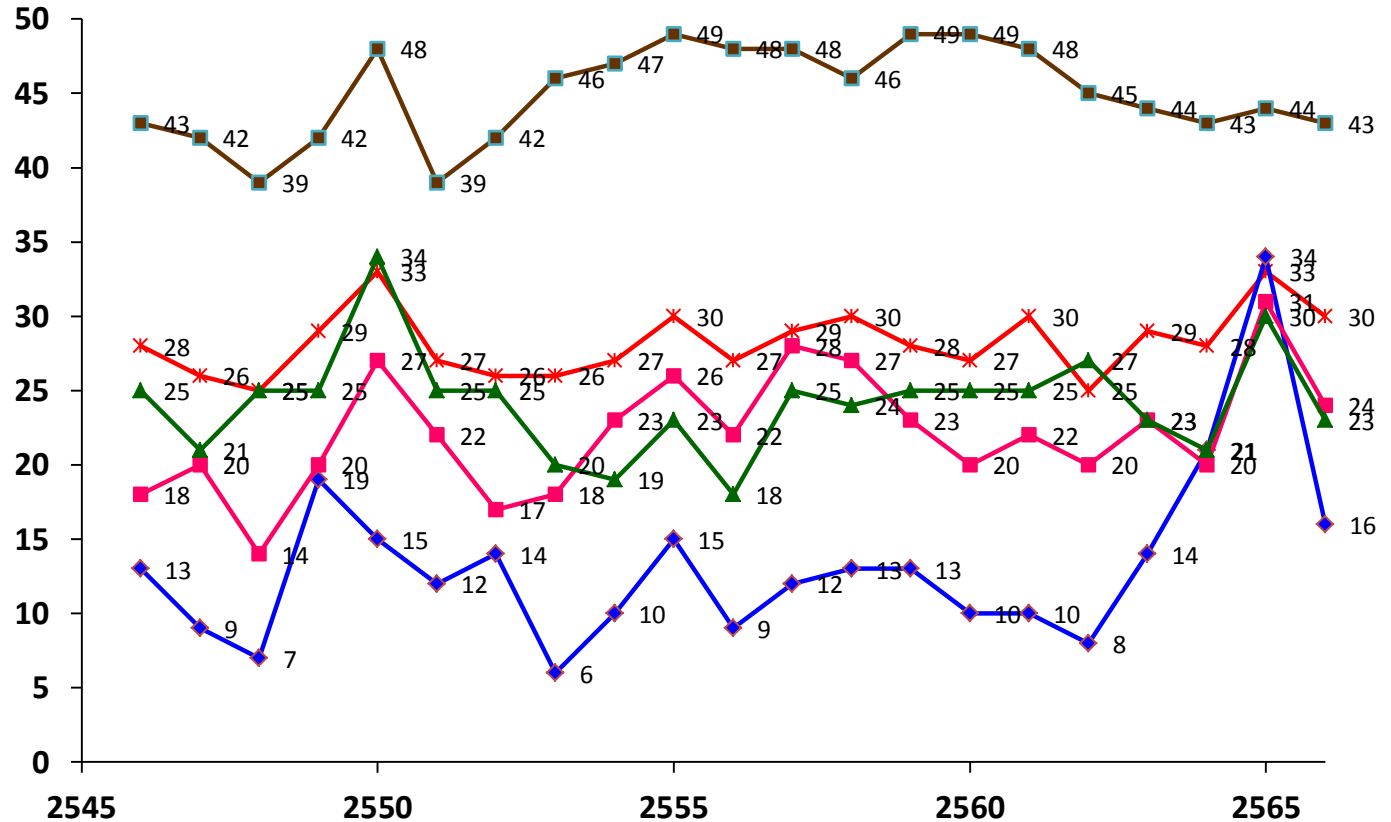


\* อันดับรวม

ประสิทธิภาพของภาคธุรกิจ



โครงสร้างพื้นฐาน

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, 65 : 63 ประเทศ	2564, 66 : 64 ประเทศ	

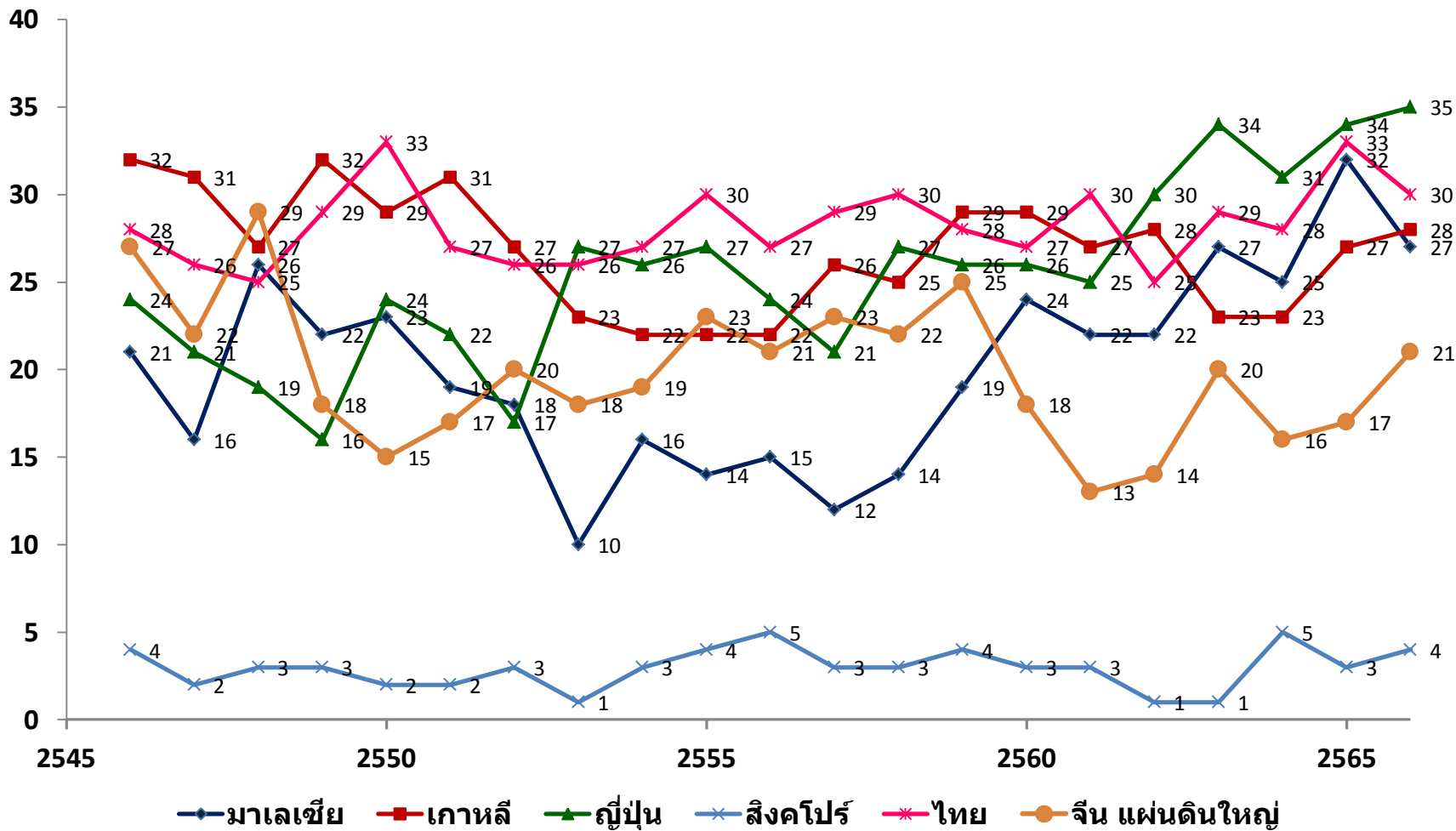
ที่มา : IMD

# อันดับความสามารถในการแข่งขันของประเทศไทย จำแนกตามปัจจัยหลัก โดย IMD ปี 2546 - 2566

	ปัจจัยหลัก				อันดับ โดยรวม	จำนวน ประเทศ
	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
2565	34	31	30	44	33	63
2566	16	24	23	43	30	64



# อันดับความสามารถในการแข่งขันของประเทศต่าง ๆ โดยรวม ปี 2546 - 2566



ที่มา : IMD

## THAILAND

### CHALLENGES IN 2022

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- Revive economic vibrancy.
- Enhance public sector resiliency.
- Improve social inclusiveness.
- Drive for digital capabilities enhancement.
- Establish future oriented talent management.

## SINGAPORE

### CHALLENGES IN 2022

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- Navigate challenges posed by external economic developments, including global supply chain disruptions as well as elevated energy and commodity prices.
- Support the economic recovery of sectors that continue to be affected by the COVID-19 pandemic.
- Help businesses transition towards a low-carbon future.
- Ensure that workers continuously develop new skills and sharpen existing ones to meet labour demand in growth sectors.

## MALAYSIA

### CHALLENGES IN 2022

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- Expanding regulatory reforms initiatives to micro levels through public-private collaboration.
- Enhancing technological adoption to increase productivity at firm level.
- Accelerating talent development initiatives to keep up with new and emerging job challenges and nurture a future-ready workforce.
- Strengthening productivity and competitiveness through mindset change and creativity.

## CHINA - MAINLAND

### CHALLENGES IN 2022

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- Manage the economic and social uncertainty caused by COVID-19 pandemic.
- Achieve socio-economic development goals by using macroeconomic policy mix.
- Expand domestic demand through effective investment and boosting consumption.
- Address ever growing geopolitical risks and governance crises globally.
- Build unified national market to enhance long-term economic prosperity.

## KOREA

### CHALLENGES IN 2022

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- Promote digital and green transformation.
- Prepare for a new geopolitical era.
- Foster inclusive growth as the COVID-19 crisis recedes.
- Handle the inflation uncertainty and its economic impact.
- Integrate ESG practices into the economic system.

## JAPAN

### CHALLENGES IN 2022

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- Achieve a new form of capitalism based on sustainability and human capital.
- Realize a virtuous cycle of growth and distribution.
- Promoting efforts to realize a science and technology nation.
- Resolve the issue of the rapidly aging population.
- Revitalize rural areas through a Vision for a Digital Garden City Nation.

## THAILAND

### CHALLENGES IN 2023

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- Rising cost of living and unbalanced growth.
- Political uncertainty following the General Election 2023.
- Handling of geopolitical risks.
- Awareness and capability to cope with cyber security threats.
- Insufficient skilled labor in the service sectors.

## SINGAPORE

### CHALLENGES IN 2023

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- Navigate the challenges posed by the slowing global economy amidst tightening financial conditions and rising protectionism.
- Help businesses and households cope with elevated costs and inflationary pressures.
- Ensure that businesses and workers continue to upgrade their capabilities for Singapore to stay competitive and seize new opportunities.

## MALAYSIA

### CHALLENGES IN 2023

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- Strengthen talent development through Demand-Driven Labor Market model to ensure industry-ready workforce.
- Embrace a digital-first mindset and enhance digital technology across various sectors.
- Boost productivity and competitiveness through regulatory reforms for ease of doing business at national and sub-national levels.
- Enhance environmentally sustainable development for better quality of life.

## CHINA - MAINLAND

### CHALLENGES IN 2023

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- Maintain stable economic growth and increase employment.
- Expand domestic demand through effective investment and by boosting consumption.
- Promote in-depth integration of digital and real economy to facilitate high-quality development.
- Deepen reform and open up to boost market vitality.
- Enhance doing business environment and restore confidence in the private economy.

## KOREA

### CHALLENGES IN 2023

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- Boost export performance in the face of a global economic slowdown.
- Internalize the cost increase resulting from efforts to restore and diversify the supply chain.
- While pursuing fiscal soundness, strengthen safety nets for vulnerable groups and struggling businesses.
- Enhance global policy coordination with like-minded countries.
- Provide support for startups to ensure their growth is not hindered by liquidity constraints.

## JAPAN

### CHALLENGES IN 2023

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- Activate a new form of capitalism.
- Promote focused investment such as in human capital, Generation X, and digital experience.
- Incorporate the resolution of social issues into the growth strategy.
- Strengthen diplomacy and economic, energy and food security.
- Put public finances on a sound footing.

# What is the IMD World Competitiveness Ranking?



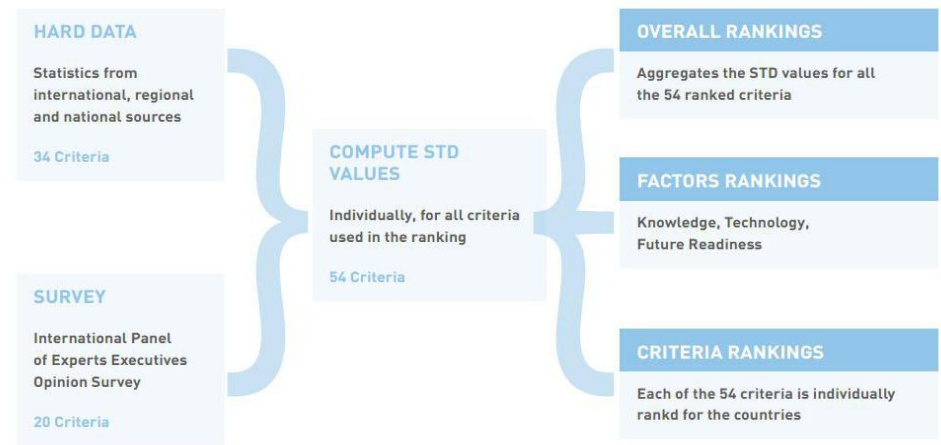
## IMD WORLD DIGITAL COMPETITIVENESS RANKING 2022



### Digital Competitiveness Factors and Sub-factors



### Computing the Rankings



## Factor I: Knowledge

### 1.1 Talent

1.1.1	<b>Educational assessment PISA - Math</b> PISA survey of 15-year olds
1.1.2 [S]	<b>International experience</b> International experience of senior managers is generally significant
1.1.3 [S]	<b>Foreign highly-skilled personnel</b> Foreign highly-skilled personnel are attracted to your country's business environment
1.1.4 [S]	<b>Management of cities</b> Management of cities supports business development
1.1.5 [S]	<b>Digital/Technological skills</b> Digital/Technological skills are readily available
1.1.6	<b>Net flow of international students</b> Tertiary-level international students (inbound minus students outbound) (per 1000 people)

### 1.2 Training & education

1.2.1 [S]	<b>Employee training</b> Employee training is a high priority in companies
1.2.2	<b>Total public expenditure on education</b> Percentage of GDP
1.2.3	<b>Higher education achievement</b> Percentage of population that has attained at least tertiary education for persons 25-34
1.2.4	<b>Pupil-teacher ratio (tertiary education)</b> Number of pupils per teacher
1.2.5	<b>Graduates in Sciences</b> % of graduates in ICT, Engineering, Math & Natural Sciences
1.2.6	<b>Women with degrees</b> Share of women who have a degree in the population 25-65

### 1.3 Scientific concentration

1.3.1	<b>Total expenditure on R&amp;D (%)</b> Percentage of GDP
1.3.2	<b>Total R&amp;D personnel per capita</b> Full-time work equivalent (FTE) per 1000 people
1.3.3	<b>Female researchers</b> % of total (headcount FT&PT)
1.3.4	<b>R&amp;D productivity by publication</b> No. of scientific articles over R&D expenditure (as % GDP)
1.3.5	<b>Scientific and technical employment</b> % of total employment
1.3.6	<b>High-tech patent grants</b> % of all patents granted by applicant's origin (average 2017-2019)
1.3.7	<b>Robots in Education and R&amp;D</b> number of robots

## Factor II: Technology

### 2.1 Regulatory framework

2.1.1	<b>Starting a business</b> Distance to Frontier
2.1.2	<b>Enforcing contracts</b> Distance to Frontier
2.1.3 [S]	<b>Immigration laws</b> Immigration laws do not prevent your company from employing foreign labor
2.1.4 [S]	<b>Development &amp; application of technology</b> Development and application of technology are supported by the legal environment
2.1.5 [S]	<b>Scientific research legislation</b> Laws relating to scientific research do encourage innovation
2.1.6 [S]	<b>Intellectual property rights</b> Intellectual property rights are adequately enforced

### 2.2 Capital

2.2.1	<b>IT &amp; media stock market capitalization</b> % of total stock market capitalization
2.2.2 [S]	<b>Funding for technological development</b> Funding for technological development is readily available
2.2.3 [S]	<b>Banking and financial services</b> Banking and financial services do support business activities efficiently
2.2.4	<b>Country credit rating</b> Index [0-60] of three country credit ratings: Fitch, Moody's and S&P
2.2.5 [S]	<b>Venture capital</b> Venture capital is easily available for business
2.2.6	<b>Investment in Telecommunications</b> Percentage of GDP

### 2.3 Technological framework

2.3.1 [S]	<b>Communications technology</b> Communications technology (voice and data) meets business requirements
2.3.2	<b>Mobile Broadband subscribers</b> 4G & 5G market, % of mobile market
2.3.3	<b>Wireless broadband</b> Penetration rate (per 100 people)
2.3.4	<b>Internet users</b> Number of internet users per 1000 people
2.3.5	<b>Internet bandwidth speed</b> Average speed
2.3.6	<b>High-tech exports (%)</b> Percentage of GDP

## Factor III: Future Readiness

### 3.1 Adaptive attitudes

3.1.1	<b>E-Participation</b> Use of online services that facilitate public's interaction with government
3.1.2	<b>Internet retailing</b> US\$ Per '000 People
3.1.3	<b>Tablet possession</b> % households
3.1.4	<b>Smartphone possession</b> % households
3.1.5 [S]	<b>Attitudes toward globalization</b> Attitudes toward globalization are generally positive in your society

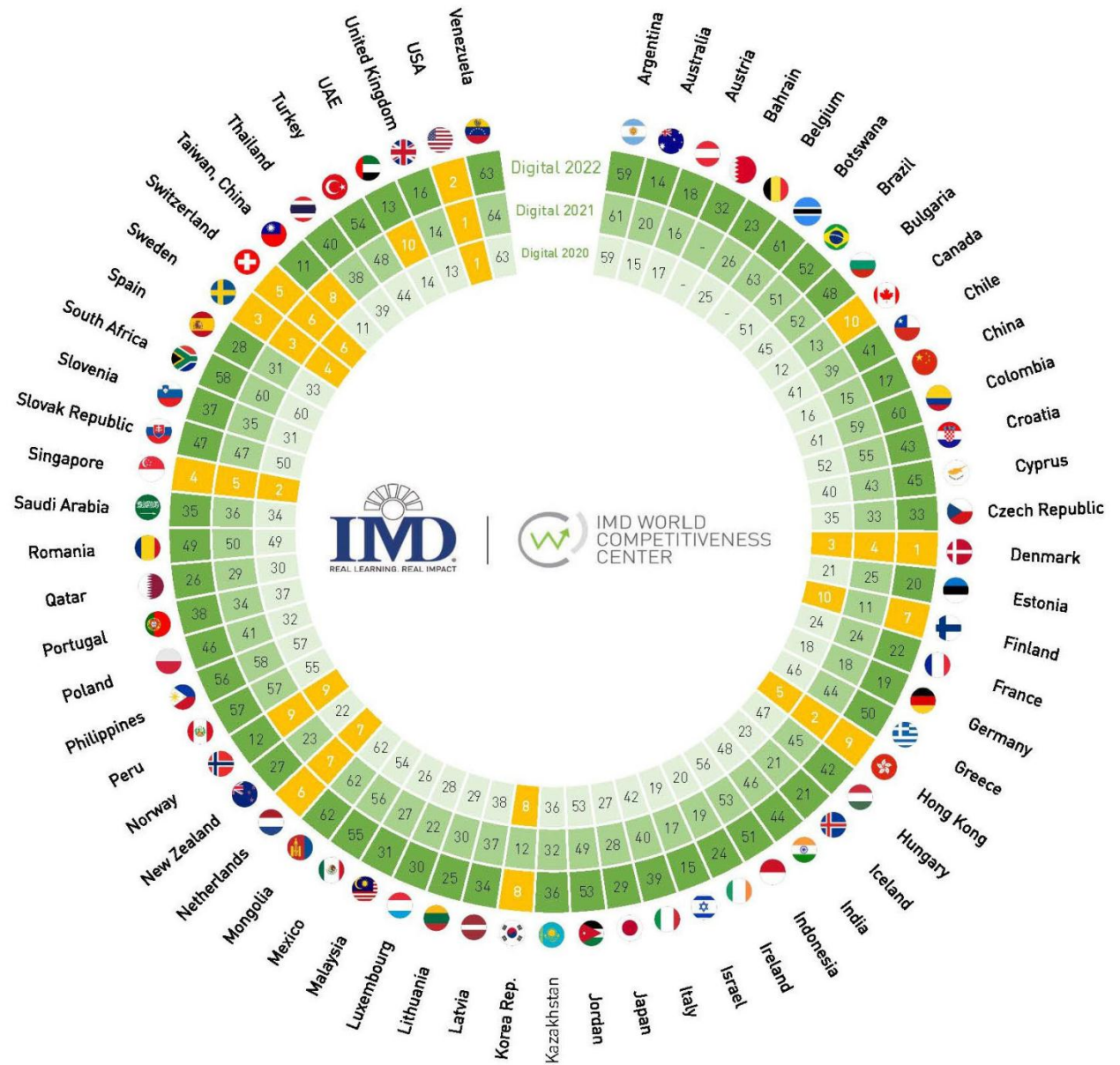
### 3.2 Business agility

3.2.1 [S]	<b>Opportunities and threats</b> Companies are very good at responding quickly to opportunities and threats
3.2.2	<b>World robots distribution</b> Percentage share of world robots
3.2.3 [S]	<b>Agility of companies</b> Companies are agile
3.2.4 [S]	<b>Use of big data and analytics</b> Companies are very good at using big data and analytics to support decision-making
3.2.5 [S]	<b>Knowledge transfer</b> Knowledge transfer is highly developed between companies and universities
3.2.6	<b>Entrepreneurial fear of failure</b> % indicating that fear of failure would prevent them from setting up a business

### 3.3 IT integration

3.3.1	<b>E-Government</b> Provision of online government services to promote access and inclusion of citizens
3.3.2 [S]	<b>Public-private partnerships</b> Public and private sector ventures are supporting technological development
3.3.3 [S]	<b>Cyber security</b> Cyber security is being adequately addressed by corporations
3.3.4	<b>Software piracy</b> % of unlicensed software installation
3.3.5	<b>Government cyber security capacity</b> The government's capability to mitigate harm from cyber security threats
3.3.6	<b>Privacy protection by law content</b> Extent of the legal framework to protect Internet users' privacy

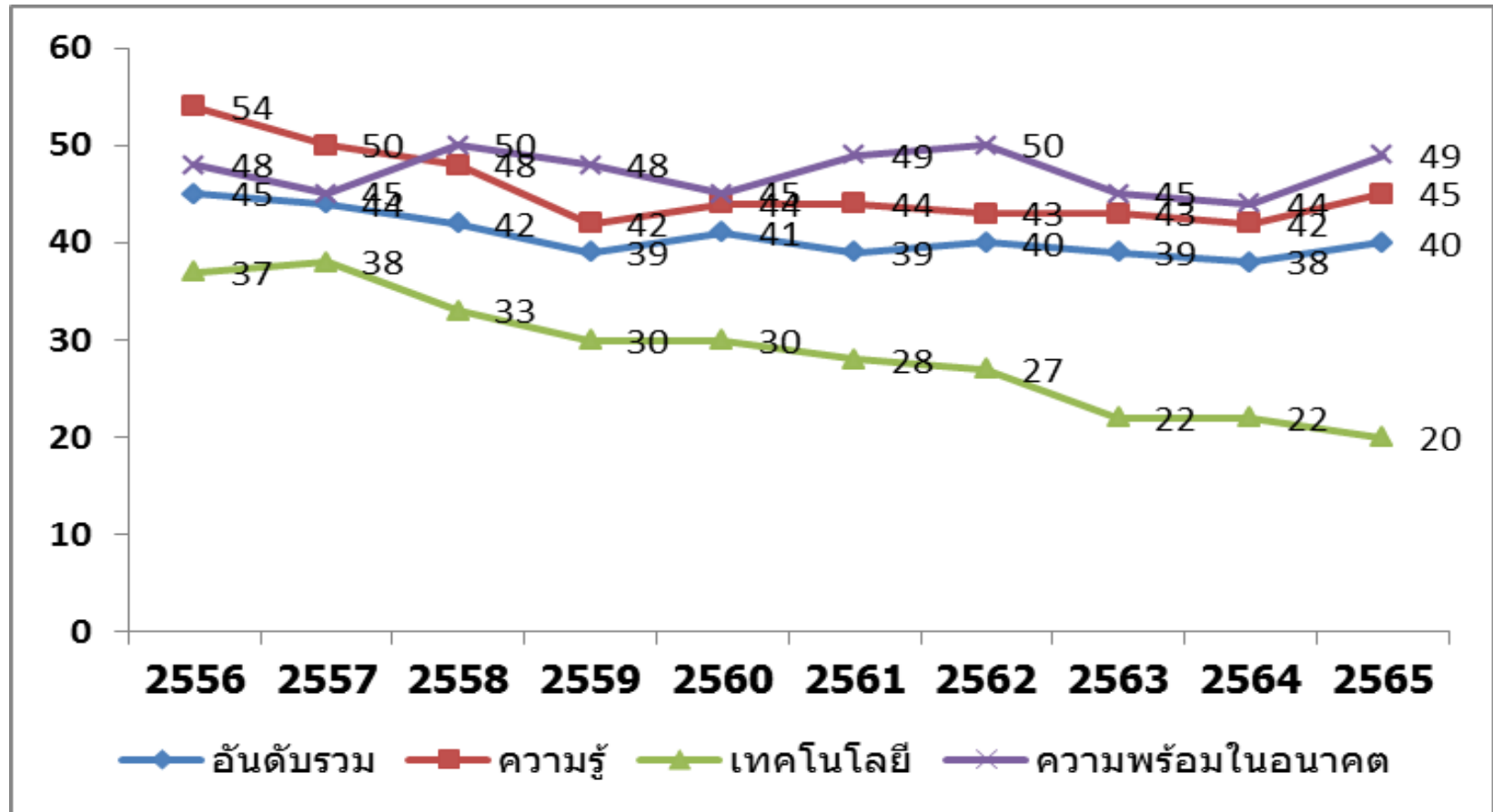
# Digital Competitiveness Ranking 2020, 2021, 2022



ที่มา : IMD 2022



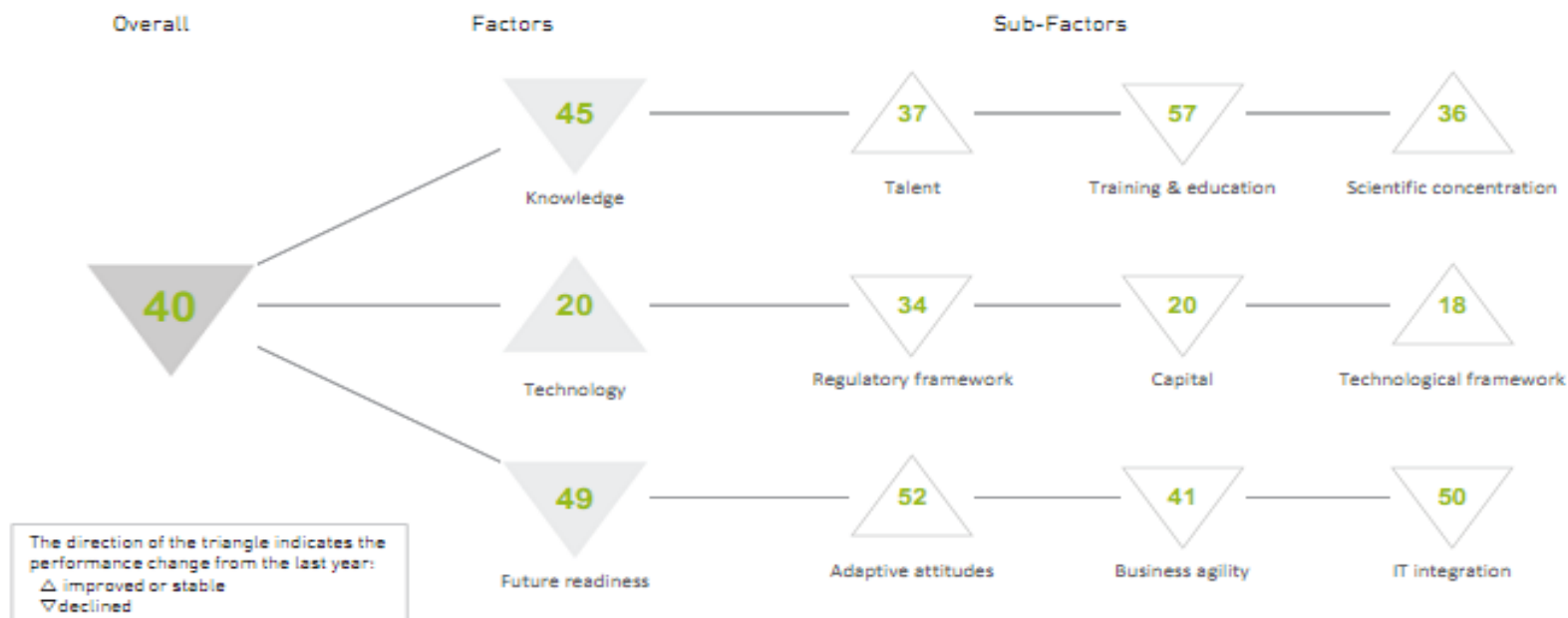
# อันดับความสามารถในการแข่งขันทางดิจิทัล ของประเทศไทย ปี 2556-2565



ที่มา : IMD

# THAILAND

## OVERALL PERFORMANCE (63 countries)



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	39	40	39	38	40
Knowledge	44	43	43	42	45
Technology	28	27	22	22	20
Future readiness	49	50	45	44	49

# THAILAND 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	42	42	40	36	39
Training & education	47	44	50	55	56
Scientific concentration	43	45	35	37	36

Talent		Training & education		Scientific concentration	
	Rank		Rank		Rank
Educational assessment PISA - Math	48	Employee training	20	Total expenditure on R&D (%)	36
International experience	25	▷ Total public expenditure on education	59	Total R&D personnel per capita	40
Foreign highly-skilled personnel	22	Higher education achievement	49	▶ Female researchers	6
Management of cities	28	▷ Pupil-teacher ratio (tertiary education)	56	R&D productivity by publication	31
Digital/Technological skills	42	Graduates in Sciences	17	▷ Scientific and technical employment	58
Net flow of international students	37	Women with degrees	47	High-tech patent grants	42
				Robots in Education and R&D	17

# THAILAND

## 2021

### TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	38	34	33	31	29
Capital	21	28	21	17	19
Technological framework	30	23	29	25	22

Regulatory framework	Rank
Starting a business	27
Enforcing contracts	29
Immigration laws	20
Development & application of tech.	30
Scientific research legislation	31
Intellectual property rights	37

Capital	Rank
IT & media stock market capitalization	16
Funding for technological development	26
Banking and financial services	16
Country credit rating	42
Venture capital	26
▶ Investment in Telecommunications	10

Technological framework	Rank
Communications technology	22
Mobile Broadband subscribers	21
Wireless broadband	24
Internet users	49
Internet bandwidth speed	20
▶ High-tech exports (%)	12

### FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	51	55	58	53	53
Business agility	32	34	30	44	34
IT integration	53	55	51	43	43

Adaptive attitudes	Rank
E-Participation	42
Internet retailing	46
▷ Tablet possession	58
Smartphone possession	46
▶ Attitudes toward globalization	12

Business agility	Rank
Opportunities and threats	25
▶ World robots distribution	11
Agility of companies	29
Use of big data and analytics	29
Knowledge transfer	24
Entrepreneurial fear of failure	54

IT integration	Rank
E-Government	49
Public-private partnerships	22
Cyber security	29
▷ Software piracy	56

# THAILAND

## 2022

- ▶ Overall Top Strengths
- ▷ Overall Top Weaknesses

### KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	42	40	36	39	37
Training & education	44	50	55	56	57
Scientific concentration	45	35	37	36	36

Talent	Rank
Educational assessment PISA - Math	46
International experience	19
Foreign highly-skilled personnel	25
Management of cities	29
Digital/Technological skills	45
Net flow of international students	40

Training & education	Rank
Employee training	20
Total public expenditure on education	50
Higher education achievement	45
▷ Pupil-teacher ratio (tertiary education)	55
Graduates in Sciences	37
Women with degrees	48

Scientific concentration	Rank
Total expenditure on R&D (%)	33
Total R&D personnel per capita	39
▶ Female researchers	06
R&D productivity by publication	30
▷ Scientific and technical employment	55
High-tech patent grants	31
Robots in Education and R&D	17

### TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	34	33	31	29	34
Capital	28	21	17	19	20
Technological framework	23	29	25	22	18

Regulatory framework	Rank
Starting a business	26
Enforcing contracts	28
Immigration laws	32
Development & application of tech.	39
Scientific research legislation	39
Intellectual property rights	43

Capital	Rank
IT & media stock market capitalization	17
Funding for technological development	40
Banking and financial services	23
Country credit rating	41
Venture capital	32
▶ Investment in Telecommunications	07

Technological framework	Rank
Communications technology	15
Mobile Broadband subscribers	25
Wireless broadband	27
Internet users	44
▶ Internet bandwidth speed	14
▶ High-tech exports (%)	11

### FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	55	58	53	53	52
Business agility	34	30	44	34	41
IT integration	55	51	43	43	50

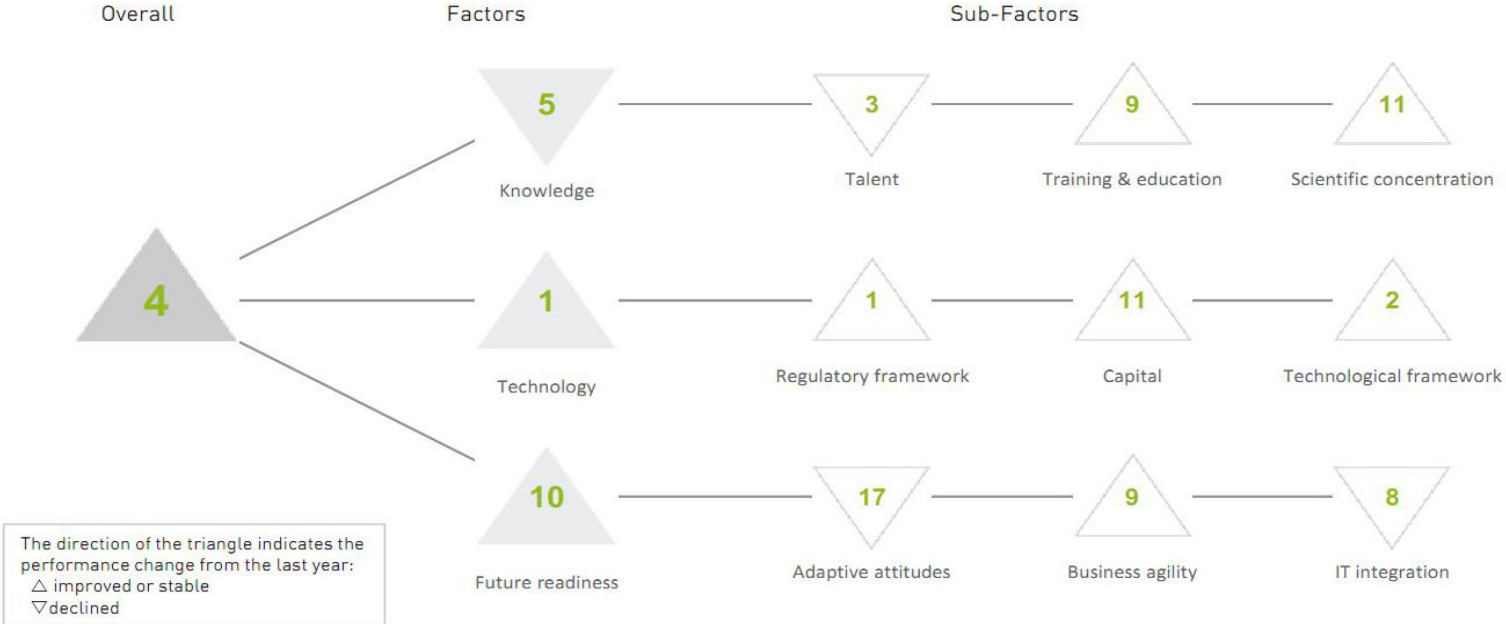
Adaptive attitudes	Rank
E-Participation	40
Internet retailing	50
▷ Tablet possession	57
Smartphone possession	39
Attitudes toward globalization	14

Business agility	Rank
Opportunities and threats	27
▶ World robots distribution	11
Agility of companies	37
Use of big data and analytics	28
Knowledge transfer	33
Entrepreneurial fear of failure	50

IT integration	Rank
E-Government	49
Public-private partnerships	26
Cyber security	38
▷ Software piracy	56
▷ Government cyber security capacity	57
Privacy protection by law content	43

# SINGAPORE

## OVERALL PERFORMANCE (63 countries)



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	02	02	02	05	04
Knowledge	01	03	02	04	05
Technology	01	01	01	03	01
Future readiness	15	11	12	11	10

# SINGAPORE 2021

- ▶ 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

# SINGAPORE 2022

► Overall Top Strengths

▷ Overall Top Weaknesses

## KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	01	01	01	02	03
Training & education	01	04	07	13	09
Scientific concentration	19	22	10	11	11

Talent	Rank
Educational assessment PISA - Math	02
International experience	05
Foreign highly-skilled personnel	05
Management of cities	04
Digital/Technological skills	09
Net flow of international students	07

Training & education	Rank
Employee training	24
Total public expenditure on education	62
Higher education achievement	02
Pupil-teacher ratio (tertiary education)	25
Graduates in Sciences	04
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	20
Total R&D personnel per capita	14
Female researchers	42
R&D productivity by publication	39
Scientific and technical employment	27
High-tech patent grants	01
Robots in Education and R&D	29

## TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	02	02	01	05	01
Capital	08	08	11	14	11
Technological framework	01	01	01	02	02

Regulatory framework	Rank
Starting a business	03
Enforcing contracts	01
Immigration laws	43
Development & application of tech.	08
Scientific research legislation	04
Intellectual property rights	07

Capital	Rank
IT & media stock market capitalization	31
Funding for technological development	02
Banking and financial services	05
Country credit rating	01
Venture capital	06
Investment in Telecommunications	55

Technological framework	Rank
Communications technology	09
Mobile Broadband subscribers	19
Wireless broadband	12
Internet users	24
Internet bandwidth speed	01
High-tech exports (%)	04

## FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	20	19	20	11	17
Business agility	18	06	11	12	09
IT integration	03	04	03	07	08

Adaptive attitudes	Rank
E-Participation	06
Internet retailing	26
Tablet possession	20
Smartphone possession	26
Attitudes toward globalization	07

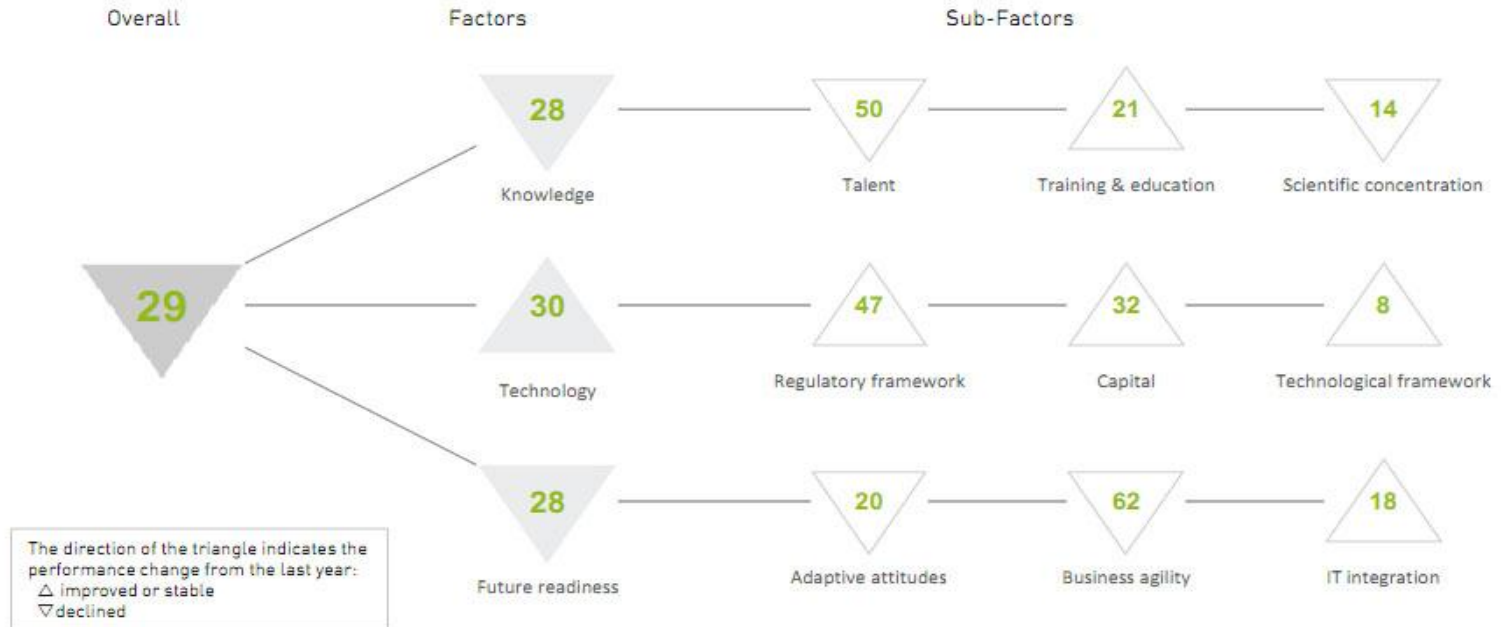
Business agility	Rank
Opportunities and threats	15
World robots distribution	14
Agility of companies	10
Use of big data and analytics	11
Knowledge transfer	06
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	11
Public-private partnerships	02
Cyber security	06
Software piracy	17
Government cyber security capacity	10
Privacy protection by law content	50



# JAPAN

## OVERALL PERFORMANCE [63 countries]



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	22	23	27	28	29
Knowledge	18	25	22	25	28
Technology	23	24	26	30	30
Future readiness	25	24	26	27	28

# JAPAN 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	41	36	46	46	47
Training & education	31	14	19	18	21
Scientific concentration	16	12	11	11	13

Talent	Rank
Educational assessment PISA - Math	5
▽ International experience	64
Foreign highly-skilled personnel	49
Management of cities	15
▽ Digital/Technological skills	62
Net flow of international students	26

Training & education	Rank
Employee training	27
Total public expenditure on education	57
Higher education achievement	8
▶ Pupil-teacher ratio (tertiary education)	1
Graduates in Sciences	44
Women with degrees	6

Scientific concentration	Rank
Total expenditure on R&D (%)	5
Total R&D personnel per capita	20
Female researchers	55
R&D productivity by publication	14
Scientific and technical employment	40
High-tech patent grants	5
▶ Robots in Education and R&D	4

## TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	37	40	42	44	48
Capital	33	33	37	33	37
Technological framework	6	4	2	5	8

Regulatory framework	Rank
Starting a business	44
Enforcing contracts	36
Immigration laws	62
Development & application of tech.	49
Scientific research legislation	47
Intellectual property rights	27

Capital	Rank
IT & media stock market capitalization	10
Funding for technological development	36
Banking and financial services	36
Country credit rating	28
Venture capital	36
Investment in Telecommunications	53

Technological framework	Rank
Communications technology	37
Mobile Broadband subscribers	11
▶ Wireless broadband	2
Internet users	14
Internet bandwidth speed	17
High-tech exports (%)	24

## FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	14	13	15	19	18
Business agility	57	55	41	56	53
IT integration	18	15	18	23	23

Adaptive attitudes	Rank
E-Participation	4
Internet retailing	15
Tablet possession	24
Smartphone possession	21
Attitudes toward globalization	46

Business agility	Rank
▽ Opportunities and threats	62
▶ World robots distribution	2
▽ Agility of companies	64
▽ Use of big data and analytics	63
Knowledge transfer	40
Entrepreneurial fear of failure	33

IT integration	Rank
E-Government	14
Public-private partnerships	42
Cyber security	44
▶ Software piracy	2

# JAPAN

## 2022

► Overall Top Strengths

▷ Overall Top Weaknesses

### KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	36	46	46	47	50
Training & education	14	19	18	21	21
Scientific concentration	12	11	11	13	14

Talent		Training & education		Scientific concentration	
	Rank		Rank		Rank
▶ Educational assessment PISA - Math	05	Employee training	30	Total expenditure on R&D (%)	07
▶ International experience	63	Total public expenditure on education	54	Total R&D personnel per capita	18
Foreign highly-skilled personnel	54	Higher education achievement	08	Female researchers	55
Management of cities	16	▶ Pupil-teacher ratio (tertiary education)	01	R&D productivity by publication	16
▶ Digital/Technological skills	62	Graduates in Sciences	42	Scientific and technical employment	39
Net flow of international students	25	Women with degrees	08	High-tech patent grants	06
				▶ Robots in Education and R&D	04

### TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	40	42	44	48	47
Capital	33	37	33	37	32
Technological framework	04	02	05	08	08

Regulatory framework		Capital		Technological framework	
	Rank		Rank		Rank
Starting a business	43	IT & media stock market capitalization	10	Communications technology	42
Enforcing contracts	35	Funding for technological development	41	Mobile Broadband subscribers	22
Immigration laws	61	Banking and financial services	35	▶ Wireless broadband	02
Development & application of tech.	41	Country credit rating	28	Internet users	19
Scientific research legislation	49	Venture capital	34	Internet bandwidth speed	19
Intellectual property rights	34	Investment in Telecommunications	32	High-tech exports (%)	24

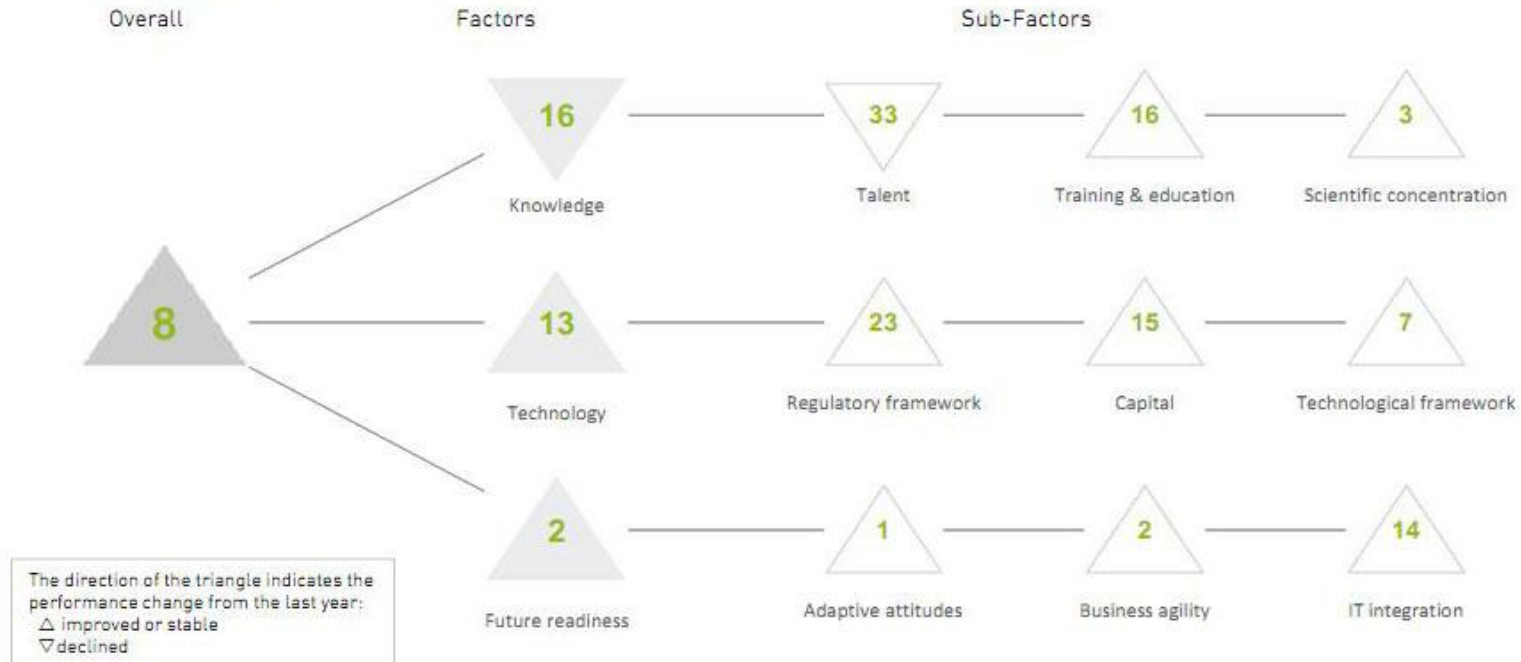
### FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	13	15	19	18	20
Business agility	55	41	56	53	62
IT integration	15	18	23	23	18

Adaptive attitudes		Business agility		IT integration	
	Rank		Rank		Rank
E-Participation	04	▶ Opportunities and threats	63	E-Government	14
Internet retailing	16	▶ World robots distribution	02	Public-private partnerships	41
Tablet possession	24	▶ Agility of companies	63	Cyber security	45
Smartphone possession	10	▶ Use of big data and analytics	63	▶ Software piracy	02
Attitudes toward globalization	48	Knowledge transfer	49	Government cyber security capacity	23
		Entrepreneurial fear of failure	35	Privacy protection by law content	11

# KOREA REP.

## OVERALL PERFORMANCE [63 countries]



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	14	10	08	12	08
Knowledge	11	11	10	15	16
Technology	17	17	12	13	13
Future readiness	17	04	03	05	02

# KOREA REP.

## 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

### KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	25	26	30	21	26
Training & education	13	8	5	11	16
Scientific concentration	9	7	6	4	3

Talent	Rank
Educational assessment PISA - Math	6
▷ International experience	52
▷ Foreign highly-skilled personnel	46
Management of cities	9
Digital/Technological skills	33
Net flow of international students	44

Training & education	Rank
Employee training	32
Total public expenditure on education	38
Higher education achievement	4
Pupil-teacher ratio (tertiary education)	33
Graduates in Sciences	11
Women with degrees	21

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	2
Total R&D personnel per capita	3
▷ Female researchers	53
R&D productivity by publication	27
Scientific and technical employment	33
High-tech patent grants	3
Robots in Education and R&D	12

### TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	28	27	26	26	23
Capital	41	44	29	25	16
Technological framework	2	2	7	3	7

Regulatory framework	Rank
Starting a business	19
▶ Enforcing contracts	2
Immigration laws	27
▷ Development & application of tech.	45
Scientific research legislation	30
Intellectual property rights	36

Capital	Rank
▶ IT & media stock market capitalization	2
Funding for technological development	34
Banking and financial services	42
Country credit rating	16
Venture capital	39
▷ Investment in Telecommunications	44

Technological framework	Rank
Communications technology	12
Mobile Broadband subscribers	10
Wireless broadband	21
Internet users	7
Internet bandwidth speed	12
High-tech exports (%)	7

### FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	10	3	4	1	2
Business agility	48	47	5	3	5
IT integration	23	20	21	15	16

Adaptive attitudes	Rank
▶ E-Participation	1
▶ Internet retailing	2
Tablet possession	22
Smartphone possession	16
Attitudes toward globalization	17

Business agility	Rank
Opportunities and threats	20
World robots distribution	3
Agility of companies	18
Use of big data and analytics	26
Knowledge transfer	25
Entrepreneurial fear of failure	16

IT integration	Rank
E-Government	2
Public-private partnerships	38
Cyber security	23
Software piracy	20

# KOREA REP.

## 2022

- ▶ Overall Top Strengths
- ▽ Overall Top Weaknesses

### KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	26	30	21	26	33
Training & education	08	05	11	16	16
Scientific concentration	07	06	04	03	03

Talent	Rank
Educational assessment PISA - Math	06
International experience	59
Foreign highly-skilled personnel	49
Management of cities	07
Digital/Technological skills	46
Net flow of international students	38

Training & education	Rank
Employee training	34
Total public expenditure on education	42
Higher education achievement	04
Pupil-teacher ratio (tertiary education)	30
Graduates in Sciences	11
Women with degrees	20

Scientific concentration	Rank
Total expenditure on R&D (%)	02
Total R&D personnel per capita	03
Female researchers	53
R&D productivity by publication	26
Scientific and technical employment	33
High-tech patent grants	04
Robots in Education and R&D	07

### TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	27	26	26	23	23
Capital	44	29	25	16	15
Technological framework	02	07	03	07	07

Regulatory framework	Rank
Starting a business	19
Enforcing contracts	02
Immigration laws	29
Development & application of tech.	48
Scientific research legislation	31
Intellectual property rights	37

Capital	Rank
IT & media stock market capitalization	04
Funding for technological development	30
Banking and financial services	47
Country credit rating	17
Venture capital	35
Investment in Telecommunications	15

Technological framework	Rank
Communications technology	12
Mobile Broadband subscribers	15
Wireless broadband	25
Internet users	08
Internet bandwidth speed	12
High-tech exports (%)	06

### FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	03	04	01	02	01
Business agility	47	05	03	05	02
IT integration	20	21	15	16	14

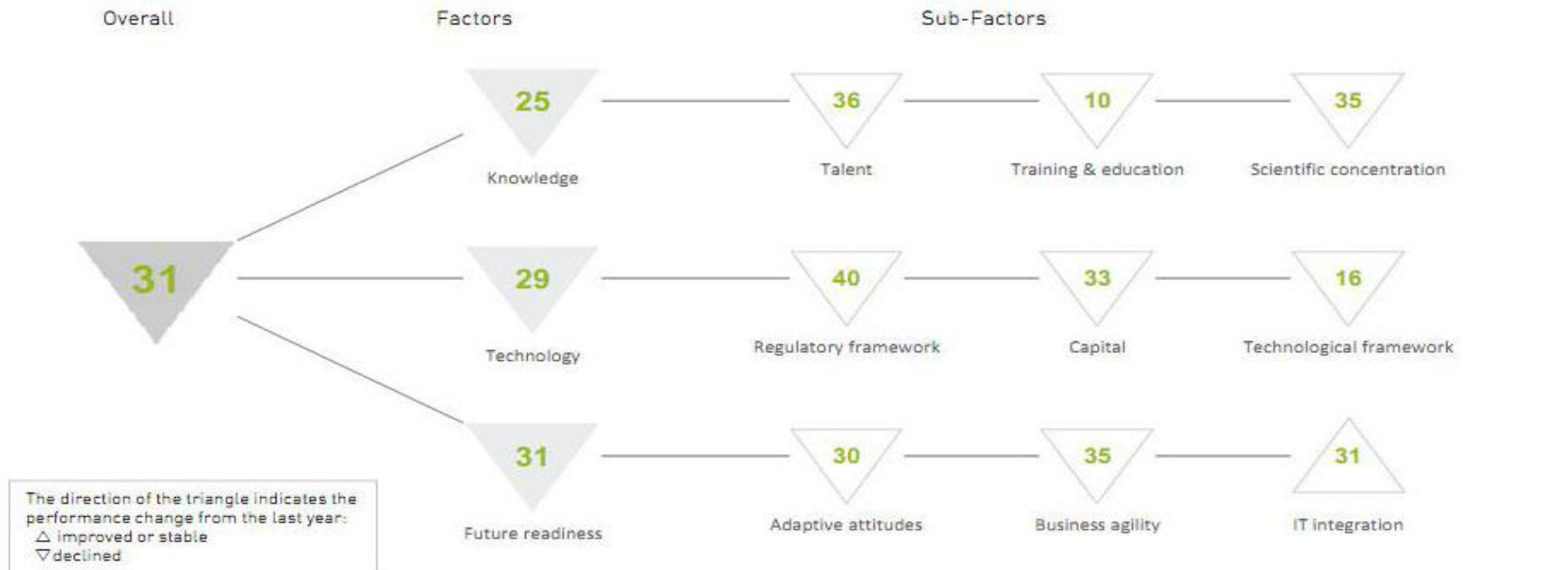
Adaptive attitudes	Rank
E-Participation	01
Internet retailing	01
Tablet possession	26
Smartphone possession	04
Attitudes toward globalization	11

Business agility	Rank
Opportunities and threats	35
World robots distribution	03
Agility of companies	16
Use of big data and analytics	34
Knowledge transfer	30
Entrepreneurial fear of failure	02

IT integration	Rank
E-Government	02
Public-private partnerships	46
Cyber security	28
Software piracy	20
Government cyber security capacity	06
Privacy protection by law content	33

# MALAYSIA

## OVERALL PERFORMANCE [63 countries]



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	27	26	26	27	31
Knowledge	17	19	19	22	25
Technology	22	19	20	26	29
Future readiness	29	28	32	29	31

# MALAYSIA

## 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

### KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	27	24	22	30	30
Training & education	3	10	11	8	9
Scientific concentration	26	30	27	26	32

Talent	Rank
▶ Educational assessment PISA - Math	43
International experience	30
Foreign highly-skilled personnel	23
Management of cities	23
Digital/Technological skills	28
Net flow of international students	27

Training & education	Rank
▶ Employee training	25
Total public expenditure on education	40
Higher education achievement	41
Pupil-teacher ratio (tertiary education)	28
▶ Graduates in Sciences	2
▶ Women with degrees	4

Scientific concentration	Rank
Total expenditure on R&D (%)	40
Total R&D personnel per capita	39
▶ Female researchers	7
R&D productivity by publication	19
▷ Scientific and technical employment	47
High-tech patent grants	32
Robots in Education and R&D	26

### TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	30	29	29	35	35
Capital	9	12	14	18	31
Technological framework	19	32	20	15	15

Regulatory framework	Rank
▷ Starting a business	52
Enforcing contracts	28
Immigration laws	41
Development & application of tech.	23
Scientific research legislation	26
Intellectual property rights	28

Capital	Rank
IT & media stock market capitalization	25
Funding for technological development	28
Banking and financial services	27
Country credit rating	40
Venture capital	28
Investment in Telecommunications	26

Technological framework	Rank
Communications technology	43
Mobile Broadband subscribers	26
Wireless broadband	20
Internet users	40
Internet bandwidth speed	35
▶ High-tech exports (%)	4

### FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	28	30	30	30	29
Business agility	12	15	17	30	27
IT integration	34	35	33	33	31

Adaptive attitudes	Rank
E-Participation	28
▷ Internet retailing	47
Tablet possession	28
Smartphone possession	26
Attitudes toward globalization	18

Business agility	Rank
Opportunities and threats	23
World robots distribution	22
Agility of companies	28
Use of big data and analytics	22
Knowledge transfer	26
Entrepreneurial fear of failure	37

IT integration	Rank
E-Government	41
▶ Public-private partnerships	17
Cyber security	27
▷ Software piracy	45



# MALAYSIA 2022

- ▶ Overall Top Strengths
- ▷ Overall Top Weaknesses

## KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	24	22	30	30	36
Training & education	10	11	08	09	10
Scientific concentration	30	27	26	32	35

Talent	Rank
Educational assessment PISA - Math	41
International experience	31
Foreign highly-skilled personnel	31
Management of cities	33
Digital/Technological skills	37
Net flow of international students	33

Training & education	Rank
Employee training	40
Total public expenditure on education	41
Higher education achievement	40
Pupil-teacher ratio (tertiary education)	26
▶ Graduates in Sciences	02
▶ Women with degrees	04

Scientific concentration	Rank
Total expenditure on R&D (%)	40
Total R&D personnel per capita	38
▶ Female researchers	07
R&D productivity by publication	22
▷ Scientific and technical employment	46
High-tech patent grants	45
Robots in Education and R&D	26

## TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	29	29	35	35	40
Capital	12	14	18	31	33
Technological framework	32	20	15	15	16

Regulatory framework	Rank
▷ Starting a business	51
Enforcing contracts	27
Immigration laws	46
Development & application of tech.	31
Scientific research legislation	34
Intellectual property rights	44

Capital	Rank
IT & media stock market capitalization	18
Funding for technological development	31
Banking and financial services	36
Country credit rating	38
Venture capital	33
Investment in Telecommunications	27

Technological framework	Rank
▷ Communications technology	49
Mobile Broadband subscribers	26
Wireless broadband	22
Internet users	26
Internet bandwidth speed	35
▶ High-tech exports (%)	05

## FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	30	30	30	29	30
Business agility	15	17	30	27	35
IT integration	35	33	33	31	31

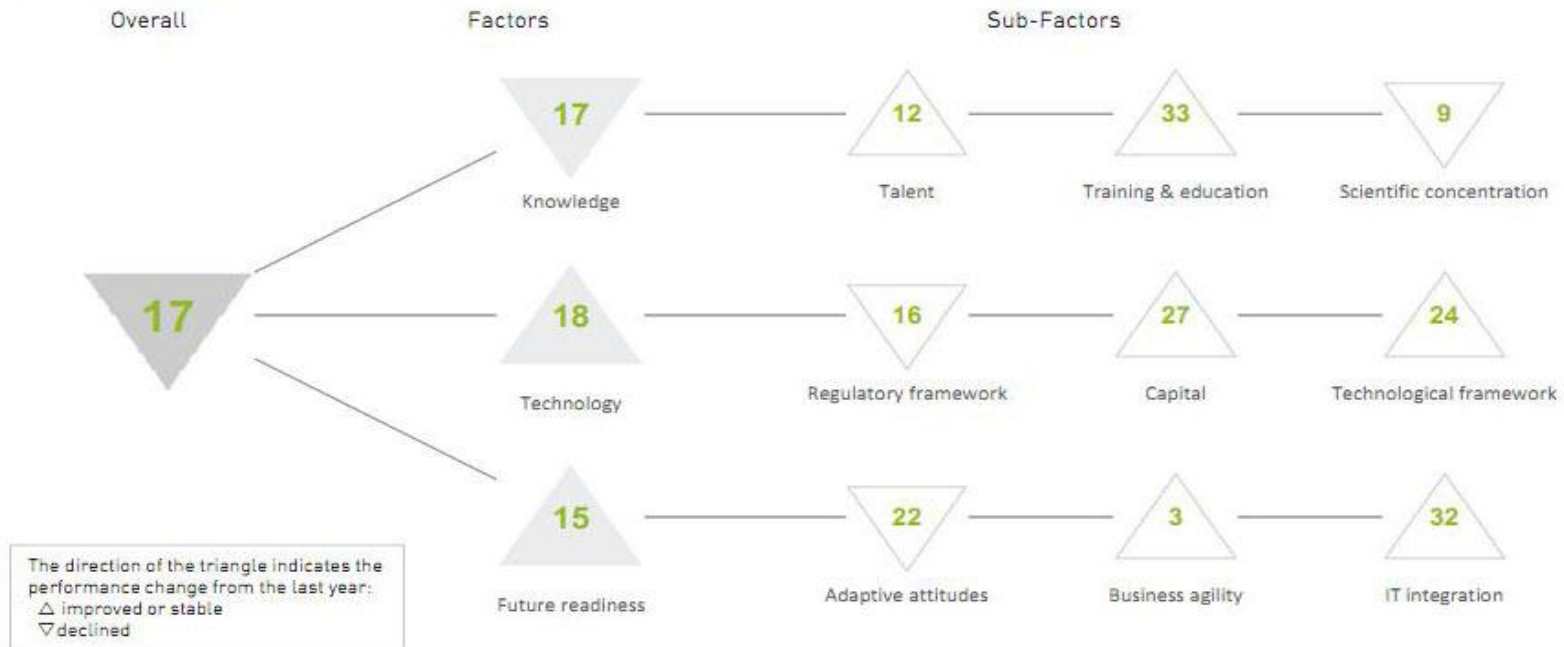
Adaptive attitudes	Rank
E-Participation	27
▷ Internet retailing	46
Tablet possession	30
Smartphone possession	08
Attitudes toward globalization	37

Business agility	Rank
Opportunities and threats	40
World robots distribution	22
Agility of companies	42
Use of big data and analytics	29
Knowledge transfer	27
Entrepreneurial fear of failure	26

IT integration	Rank
E-Government	41
Public-private partnerships	20
Cyber security	33
Software piracy	45
▶ Government cyber security capacity	05
▷ Privacy protection by law content	55

# CHINA

## OVERALL PERFORMANCE [63 countries]



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	30	22	16	15	17
Knowledge	30	18	08	06	17
Technology	34	26	27	20	18
Future readiness	28	21	18	17	15

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	23	18	19	13	12
Training & education	53	46	37	40	35
Scientific concentration	3	21	9	2	1

Talent	Rank
▶ Educational assessment PISA - Math	1
▽ International experience	44
Foreign highly-skilled personnel	31
Management of cities	11
Digital/Technological skills	16
▽ Net flow of international students	48

Training & education	Rank
Employee training	13
▶ Total public expenditure on education	52
Higher education achievement	16
Pupil-teacher ratio (tertiary education)	41
Graduates in Sciences	-
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	14
Total R&D personnel per capita	36
Female researchers	-
▶ R&D productivity by publication	1
▶ Scientific and technical employment	1
High-tech patent grants	8
▶ Robots in Education and R&D	1

## TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	32	26	20	18	15
Capital	22	30	32	31	27
Technological framework	47	40	32	32	28

Regulatory framework	Rank
Starting a business	16
Enforcing contracts	5
Immigration laws	31
Development & application of tech.	16
Scientific research legislation	22
Intellectual property rights	35

Capital	Rank
IT & media stock market capitalization	24
Funding for technological development	16
Banking and financial services	33
Country credit rating	26
Venture capital	25
Investment in Telecommunications	37

Technological framework	Rank
Communications technology	13
Mobile Broadband subscribers	24
Wireless broadband	23
▶ Internet users	57
Internet bandwidth speed	25
High-tech exports (%)	8

## FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	32	23	24	17	19
Business agility	24	19	1	4	3
IT integration	44	41	41	35	32

Adaptive attitudes	Rank
E-Participation	9
Internet retailing	22
Tablet possession	36
Smartphone possession	17
Attitudes toward globalization	11

Business agility	Rank
Opportunities and threats	31
▶ World robots distribution	1
Agility of companies	19
Use of big data and analytics	11
Knowledge transfer	23
Entrepreneurial fear of failure	36

IT integration	Rank
E-Government	40
Public-private partnerships	4
Cyber security	12
▶ Software piracy	56

# CHINA 2022

- ▶ Overall Top Strengths
- ▷ Overall Top Weaknesses

## KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	18	19	13	12	12
Training & education	46	37	40	35	33
Scientific concentration	21	09	02	01	09

Talent	Rank
▶ Educational assessment PISA - Math	01
International experience	47
Foreign highly-skilled personnel	35
Management of cities	08
Digital/Technological skills	12
Net flow of international students	46

Training & education	Rank
▶ Employee training	11
▷ Total public expenditure on education	53
Higher education achievement	16
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	36
▷ Female researchers	51
▶ R&D productivity by publication	01
Scientific and technical employment	49
High-tech patent grants	07
▶ Robots in Education and R&D	01

## TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	26	20	18	15	16
Capital	30	32	31	27	27
Technological framework	40	32	32	28	24

Regulatory framework	Rank
Starting a business	16
Enforcing contracts	05
Immigration laws	36
Development & application of tech.	16
Scientific research legislation	19
Intellectual property rights	36

Capital	Rank
IT & media stock market capitalization	24
Funding for technological development	17
Banking and financial services	40
Country credit rating	26
Venture capital	31
Investment in Telecommunications	34

Technological framework	Rank
Communications technology	11
Mobile Broadband subscribers	05
Wireless broadband	20
▷ Internet users	53
Internet bandwidth speed	33
High-tech exports (%)	08

## FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	23	24	17	19	22
Business agility	19	01	04	03	03
IT integration	41	41	35	32	32

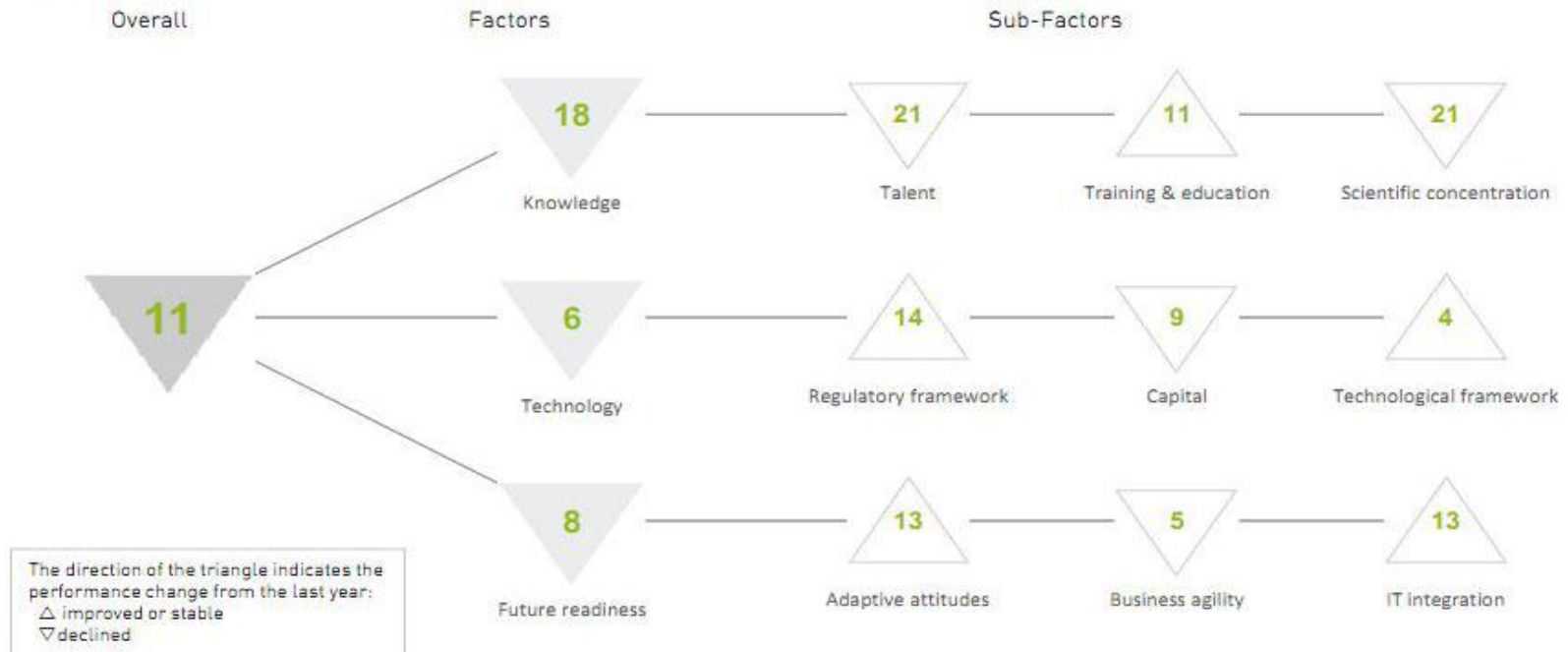
Adaptive attitudes	Rank
E-Participation	09
Internet retailing	25
Tablet possession	38
Smartphone possession	43
Attitudes toward globalization	12

Business agility	Rank
▶ Opportunities and threats	13
World robots distribution	01
Agility of companies	22
Use of big data and analytics	05
Knowledge transfer	20
Entrepreneurial fear of failure	25

IT integration	Rank
E-Government	40
Public-private partnerships	06
Cyber security	10
▷ Software piracy	56
▶ Government cyber security capacity	03
▷ Privacy protection by law content	59

# TAIWAN, CHINA

## OVERALL PERFORMANCE [63 countries]



## OVERALL & FACTORS - 5 years

	2018	2019	2020	2021	2022
OVERALL	16	13	11	08	11
Knowledge	19	17	18	16	18
Technology	11	09	05	02	06
Future readiness	22	12	08	07	08

# TAIWAN, CHINA 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## KNOWLEDGE

Subfactors	2017	2018	2019	2020	2021
Talent	18	25	21	18	17
Training & education	28	25	20	21	12
Scientific concentration	17	13	15	18	19

Talent	Rank
Educational assessment PISA - Math	4
International experience	27
Foreign highly-skilled personnel	38
Management of cities	19
Digital/Technological skills	25
Net flow of international students	11

Training & education	Rank
Employee training	5
▶ Total public expenditure on education	51
▶ Higher education achievement	3
▷ Pupil-teacher ratio (tertiary education)	53
Graduates in Sciences	5
Women with degrees	18

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	3
▶ Total R&D personnel per capita	1
▷ Female researchers	52
R&D productivity by publication	36
▷ Scientific and technical employment	44
High-tech patent grants	17
Robots in Education and R&D	20

## TECHNOLOGY

Subfactors	2017	2018	2019	2020	2021
Regulatory framework	24	21	23	16	16
Capital	8	13	12	8	2
Technological framework	4	10	4	4	4

Regulatory framework	Rank
Starting a business	10
Enforcing contracts	11
Immigration laws	29
Development & application of tech.	20
Scientific research legislation	16
Intellectual property rights	21

Capital	Rank
▶ IT & media stock market capitalization	1
Funding for technological development	17
Banking and financial services	13
Country credit rating	21
Venture capital	12
▷ Investment in Telecommunications	47

Technological framework	Rank
Communications technology	24
▶ Mobile Broadband subscribers	1
Wireless broadband	13
Internet users	20
Internet bandwidth speed	19
High-tech exports (%)	5

## FUTURE READINESS

Subfactors	2017	2018	2019	2020	2021
Adaptive attitudes	19	28	14	14	13
Business agility	6	13	3	1	2
IT integration	22	23	24	17	15

Adaptive attitudes	Rank
E-Participation	-
Internet retailing	23
Tablet possession	25
Smartphone possession	3
Attitudes toward globalization	4

Business agility	Rank
Opportunities and threats	5
World robots distribution	7
Agility of companies	3
Use of big data and analytics	4
Knowledge transfer	11
Entrepreneurial fear of failure	11

IT integration	Rank
E-Government	-
Public-private partnerships	15
Cyber security	10
Software piracy	25

# TAIWAN, CHINA

## 2022

- ▶ Overall Top Strengths
- ▷ Overall Top Weaknesses

### KNOWLEDGE

Sub-Factors	2018	2019	2020	2021	2022
Talent	25	21	18	17	21
Training & education	25	20	21	12	11
Scientific concentration	13	15	18	19	21

Talent	Rank	Training & education	Rank	Scientific concentration	Rank
Educational assessment PISA - Math	04	Employee training	06	Total expenditure on R&D (%)	03
International experience	27	▶ Total public expenditure on education	52	▶ Total R&D personnel per capita	01
Foreign highly-skilled personnel	43	Higher education achievement	03	▷ Female researchers	52
Management of cities	18	▷ Pupil-teacher ratio (tertiary education)	50	R&D productivity by publication	33
Digital/Technological skills	33	Graduates in Sciences	05	▷ Scientific and technical employment	45
Net flow of international students	11	Women with degrees	18	High-tech patent grants	20
				Robots in Education and R&D	19

### TECHNOLOGY

Sub-Factors	2018	2019	2020	2021	2022
Regulatory framework	21	23	16	16	14
Capital	13	12	08	02	09
Technological framework	10	04	04	04	04

Regulatory framework	Rank	Capital	Rank	Technological framework	Rank
Starting a business	10	▶ IT & media stock market capitalization	01	Communications technology	22
Enforcing contracts	11	Funding for technological development	16	▶ Mobile Broadband subscribers	01
Immigration laws	34	Banking and financial services	10	Wireless broadband	13
Development & application of tech.	17	Country credit rating	16	Internet users	21
Scientific research legislation	10	Venture capital	13	Internet bandwidth speed	20
Intellectual property rights	19	▷ Investment in Telecommunications	57	▶ High-tech exports (%)	03

### FUTURE READINESS

Sub-Factors	2018	2019	2020	2021	2022
Adaptive attitudes	28	14	14	13	13
Business agility	13	03	01	02	05
IT integration	23	24	17	15	13

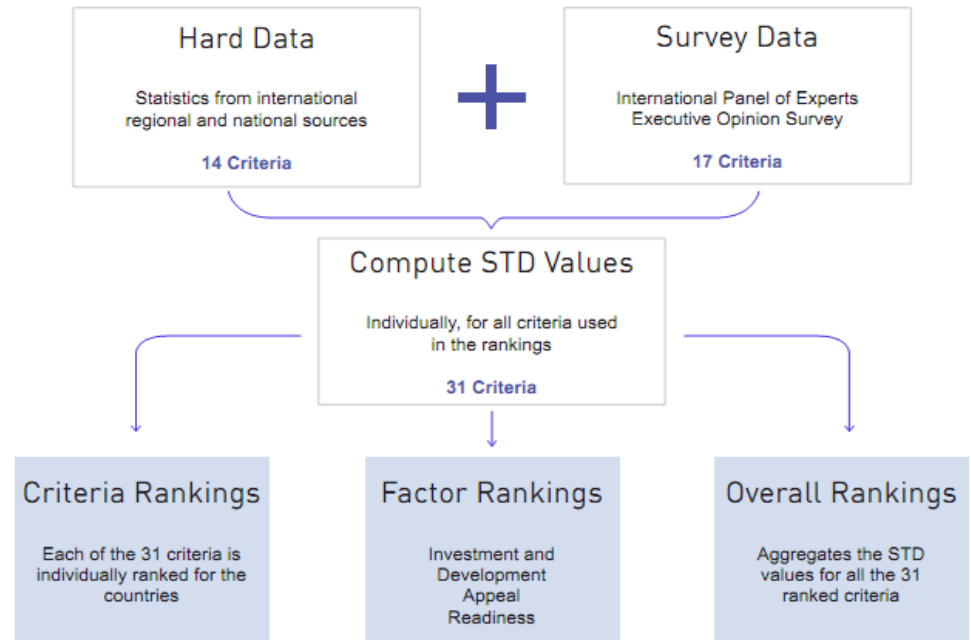
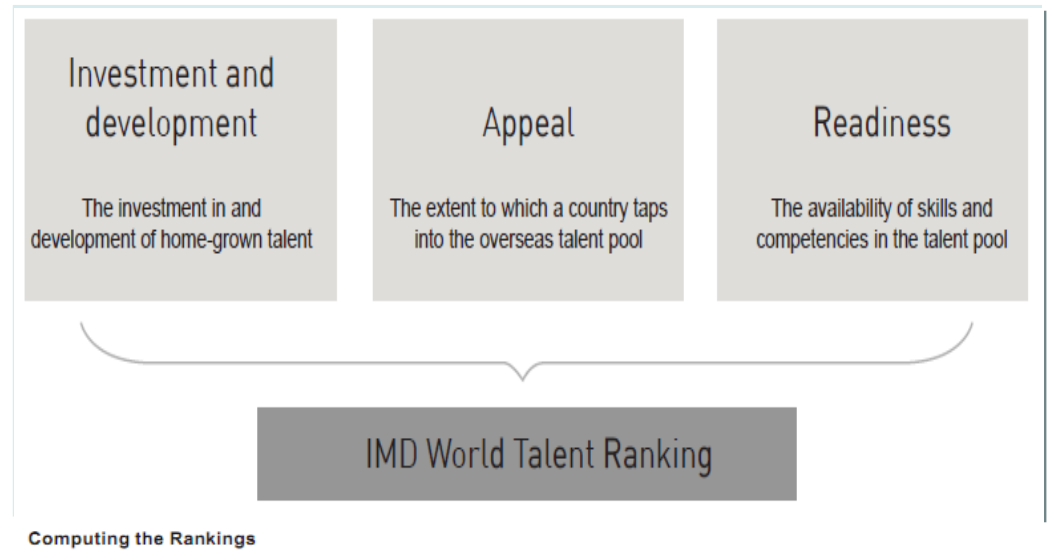
Adaptive attitudes	Rank	Business agility	Rank	IT integration	Rank
E-Participation	-	Opportunities and threats	05	E-Government	-
Internet retailing	22	World robots distribution	07	Public-private partnerships	13
Tablet possession	25	Agility of companies	03	Cyber security	09
Smartphone possession	05	▶ Use of big data and analytics	02	Software piracy	25
Attitudes toward globalization	05	Knowledge transfer	10	Government cyber security capacity	09
		Entrepreneurial fear of failure	18	Privacy protection by law content	40

# WORLD TALENT RANKING 2022

IMD / World Competitiveness Center

IMD WORLD  
TALENT  
RANKING

## 2022



ที่มา : IMD





# อันดับความสามารถด้านบุคลากร และอันดับของแต่ละปัจจัยหลักของประเทศต่าง ๆ ปี 2564



The IMD World Talent Ranking  
Assesses the extent to which nations develop, attract and retain talent for enterprises operating in those economies



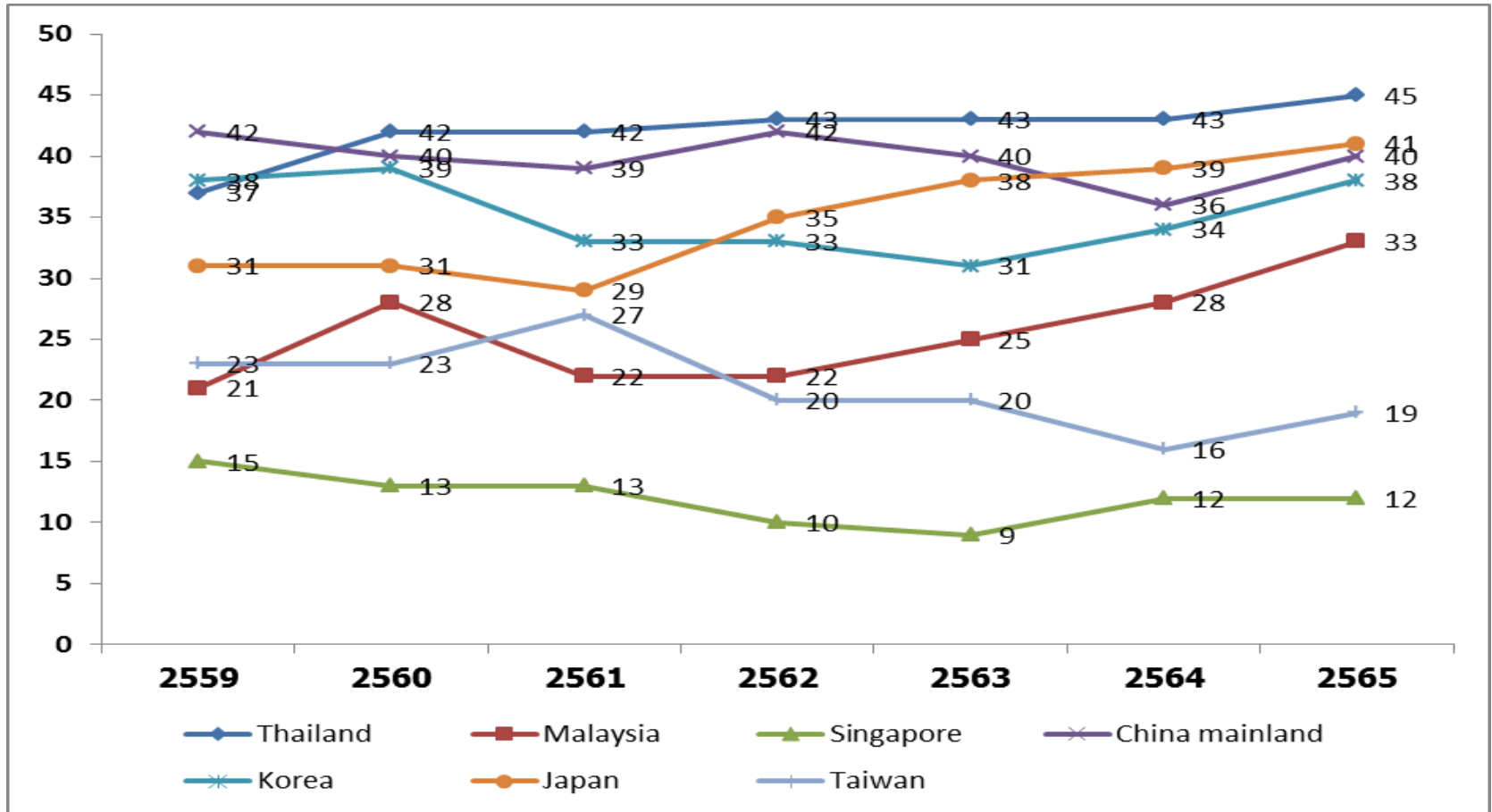
# อันดับความสามารถด้านบุคลากร และอันดับของแต่ละ ปัจจัยหลักของประเทศต่าง ๆ ปี 2565



The IMD World Talent Ranking  
Assesses the extent to which nations develop, attract and retain talent for enterprises operating in those economies



# การจัดอันดับความสามารถด้านบุคลากร ของประเทศต่าง ๆ โดยรวมปี 2559-2565



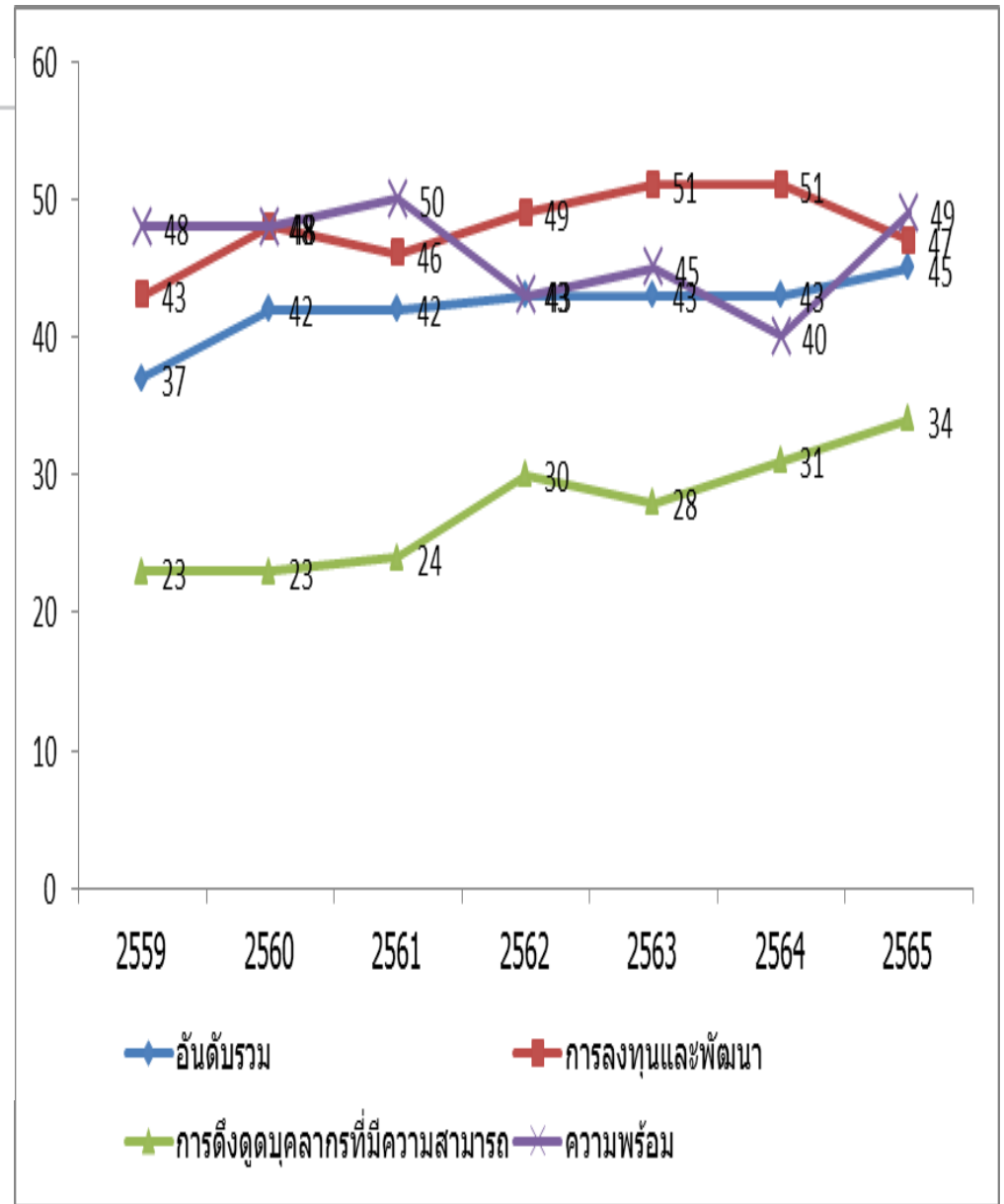
ที่มา : IMD

# THAILAND

OVERALL PERFORMANCE (63 countries)

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

- △ improved or stable
- ▽ declined



ที่มา : IMD 2022

# THAILAND 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
▷ Total public expenditure on education	Percentage of GDP	3.0 %	58
▷ Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,294 US\$	52
	Pupil-teacher ratio (primary education)	13.00 ratio	20
▷ Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	26.25 ratio	61
	Apprenticeships	are sufficiently implemented	5.56 Survey [0..10]
	Employee training	is a high priority in companies	6.45 Survey [0..10]
	Female labor force	Percentage of total labor force	45.66 %
▶ Health infrastructure	meets the needs of society	7.86 Survey [0..10]	16

## Appeal

		Value	2021 Rank
Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	82.60 index	47
Attracting and retaining talents	is a priority in companies	7.23 Survey [0..10]	25
Worker motivation	in companies is high	6.28 Survey [0..10]	22
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	5.73 Survey [0..10]	20
Quality of life	is high	6.54 Survey [0..10]	38
Foreign highly-skilled personnel	are attracted to your country's business environment	6.02 Survey [0..10]	22
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\$	193,546 US\$	22
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	1.77 %	10
	Justice	is fairly administered	5.70 Survey [0..10]
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	27.32 micrograms	54

## Readiness

		Value	2021 Rank
▶ Labor force growth	Percentage change	0.96 %	9
	Skilled labor	is readily available	6.19 Survey [0..10]
	Finance skills	are readily available	6.22 Survey [0..10]
	International experience	of senior managers is generally significant	5.87 Survey [0..10]
▶ Competent senior managers	are readily available	6.37 Survey [0..10]	19
	Primary and secondary education	meets the needs of a competitive economy	5.63 Survey [0..10]
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	27.86 %	19
	University education	meets the needs of a competitive economy	5.95 Survey [0..10]
	Management education	meets the needs of the business community	6.21 Survey [0..10]
	Language skills	are meeting the needs of enterprises	5.02 Survey [0..10]
▷ Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	0.38 number	54
	Educational assessment - PISA	PISA survey of 15-year olds	412 Average

# THAILAND 2022

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
▷ Total public expenditure on education	Percentage of GDP	3.7 %	50
▷ Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,078 US\$	54
	Pupil-teacher ratio (primary education)	14.00 ratio	29
▷ Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	21.59 ratio	57
	Apprenticeships	are sufficiently implemented	5.47 Survey [0..10] 27
▶ Employee training	is a high priority in companies	6.44 Survey [0..10]	20
	Female labor force	Percentage of total labor force	45.77 % 33
▶ Health infrastructure	meets the needs of society	7.39 Survey [0..10]	19

## APPEAL

		Value	2022 Rank
	Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	84.90 index 42
	Attracting and retaining talents	is a priority in companies	6.81 Survey [0..10] 32
	Worker motivation	in companies is high	6.30 Survey [0..10] 21
	Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	5.21 Survey [0..10] 28
	Quality of life	is high	6.36 Survey [0..10] 38
	Foreign highly-skilled personnel	are attracted to your country's business environment	5.90 Survey [0..10] 25
	Remuneration in services professions	Gross annual income including supplements such as bonuses, US\$	12,681 US\$ 45
	Remuneration of management	Total base salary plus bonuses and long-term incentives, US\$	193,546 US\$ 23
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	1.90 %	11
	Justice	is fairly administered	5.78 Survey [0..10] 34
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	27.32 micrograms	52

## READINESS

		Value	2022 Rank
	Labor force growth	Percentage change	0.40 % 37
▶ Skilled labor	is readily available	5.88 Survey [0..10]	21
	Finance skills	are readily available	5.82 Survey [0..10] 39
▶ International experience	of senior managers is generally significant	5.96 Survey [0..10]	19
	Competent senior managers	are readily available	6.04 Survey [0..10] 25
	Primary and secondary education	meets the needs of a competitive economy	5.56 Survey [0..10] 43
	Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	22.06 % 38
	University education	meets the needs of a competitive economy	5.78 Survey [0..10] 41
	Management education	meets the needs of the business community	6.22 Survey [0..10] 37
	Language skills	are meeting the needs of enterprises	4.97 Survey [0..10] 50
▷ Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	0.38 number	54
	Educational assessment - PISA	PISA survey of 15-year olds	412 Average 49

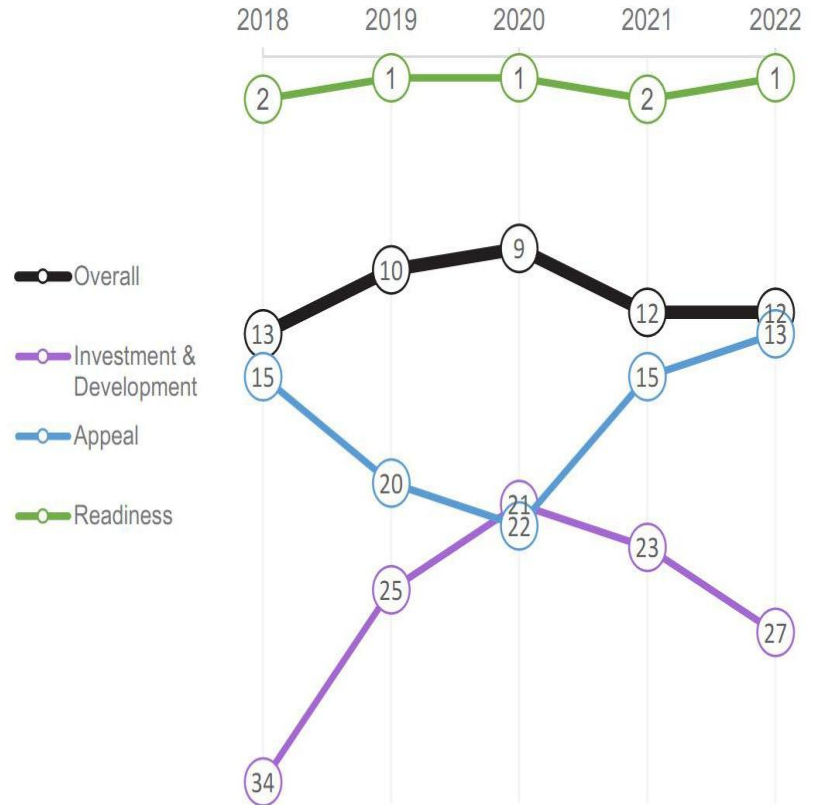
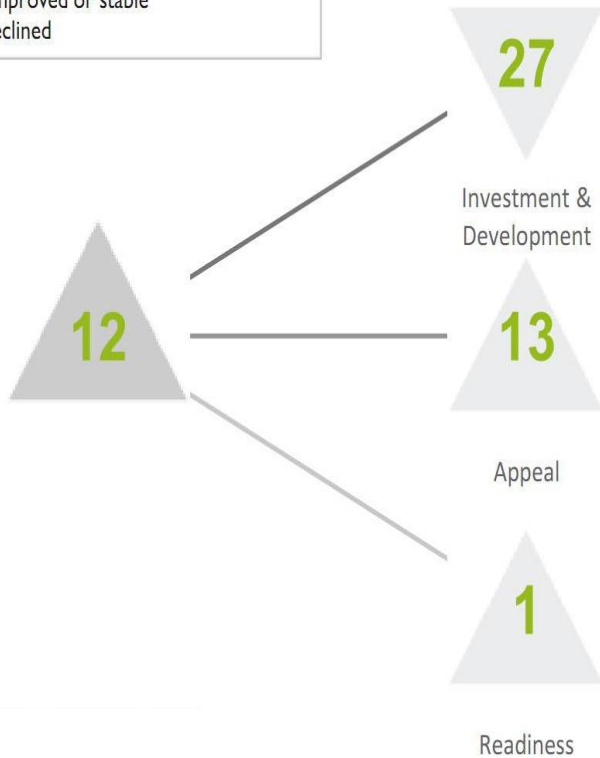
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# SINGAPORE

## OVERALL PERFORMANCE (63 countries)

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

- △ improved or stable
- ▽ declined



ที่มา : IMD 2022



# SINGAPORE 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
▷ Total public expenditure on education	Percentage of GDP	2.5 %	62
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	13,246 US\$	9
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	14.20 ratio	27
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	11.33 ratio	23
Apprenticeships	are sufficiently implemented	5.63 Survey [0..10]	20
Employee training	is a high priority in companies	6.35 Survey [0..10]	23
Female labor force	Percentage of total labor force	46.27 %	30
Health infrastructure	meets the needs of society	8.60 Survey [0..10]	5

## Appeal

		Value	2021 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	101.80 index	58
Attracting and retaining talents	is a priority in companies	7.69 Survey [0..10]	12
Worker motivation	in companies is high	6.45 Survey [0..10]	18
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	6.49 Survey [0..10]	9
Quality of life	is high	8.27 Survey [0..10]	18
▶ Foreign highly-skilled personnel	are attracted to your country's business environment	8.08 Survey [0..10]	3
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\$	298,777 US\$	4
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	2.42 %	14
Justice	is fairly administered	8.16 Survey [0..10]	8
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	19.00 micrograms	42

## Readiness

		Value	2021 Rank
Labor force growth	Percentage change	-0.76 %	41
Skilled labor	is readily available	6.33 Survey [0..10]	20
Finance skills	are readily available	7.48 Survey [0..10]	11
International experience	of senior managers is generally significant	6.85 Survey [0..10]	8
Competent senior managers	are readily available	6.64 Survey [0..10]	13
▶ Primary and secondary education	meets the needs of a competitive economy	8.40 Survey [0..10]	4
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	35.40 %	4
University education	meets the needs of a competitive economy	8.35 Survey [0..10]	6
Management education	meets the needs of the business community	7.94 Survey [0..10]	8
Language skills	are meeting the needs of enterprises	8.49 Survey [0..10]	7
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	9.30 number	5
▶ Educational assessment - PISA	PISA survey of 15-year olds	556 Average	2

# SINGAPORE 2022

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
▷ Total public expenditure on education	Percentage of GDP	2.6 %	62
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	10,929 US\$	16
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	13.92 ratio	28
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	11.48 ratio	24
Apprenticeships	are sufficiently implemented	5.86 Survey [0..10]	13
Employee training	is a high priority in companies	6.36 Survey [0..10]	24
Female labor force	Percentage of total labor force	46.80 %	25
Health infrastructure	meets the needs of society	8.18 Survey [0..10]	8

## APPEAL

		Value	2022 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing [New York City = 100]	108.40 index	56
Attracting and retaining talents	is a priority in companies	7.36 Survey [0..10]	24
Worker motivation	in companies is high	6.11 Survey [0..10]	26
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	6.86 Survey [0..10]	8
Quality of life	is high	8.25 Survey [0..10]	14
Foreign highly-skilled personnel	are attracted to your country's business environment	7.61 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\$	298,777 US\$	4
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	2.68 %	18
Justice	is fairly administered	8.14 Survey [0..10]	7
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	19.00 micrograms	40

## READINESS

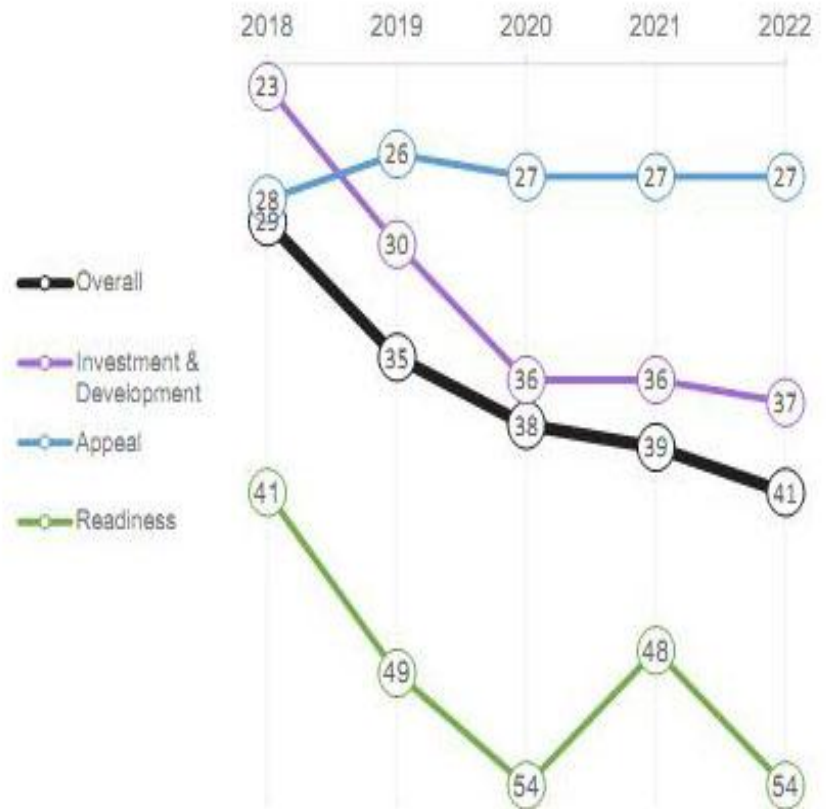
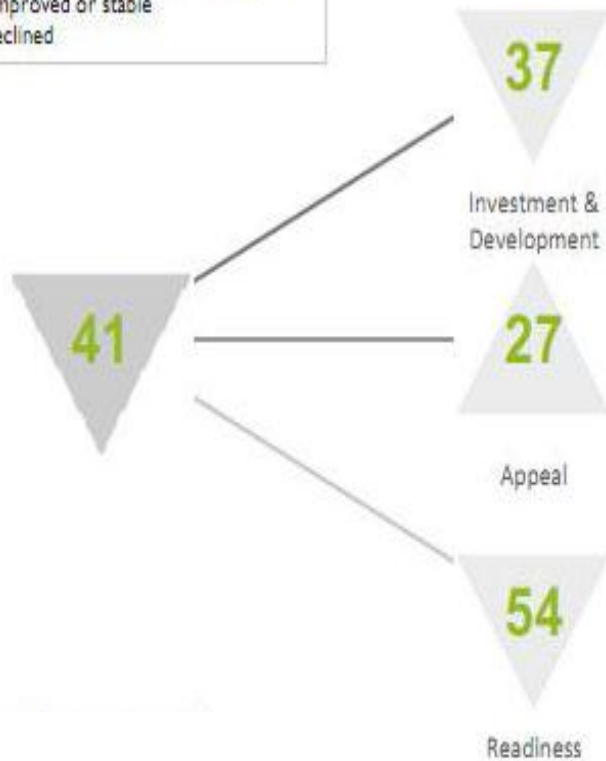
		Value	2022 Rank
▷ Labor force growth	Percentage change	-2.86 %	60
Skilled labor	is readily available	6.50 Survey [0..10]	8
Finance skills	are readily available	6.93 Survey [0..10]	12
International experience	of senior managers is generally significant	7.14 Survey [0..10]	5
Competent senior managers	are readily available	6.82 Survey [0..10]	8
▶ Primary and secondary education	meets the needs of a competitive economy	8.43 Survey [0..10]	4
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	36.27 %	3
University education	meets the needs of a competitive economy	7.93 Survey [0..10]	10
Management education	meets the needs of the business community	7.75 Survey [0..10]	7
Language skills	are meeting the needs of enterprises	8.25 Survey [0..10]	10
▶ Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	9.67 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



ที่มา : IMD

# JAPAN 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
▽ Total public expenditure on education	Percentage of GDP	3.1 %	56
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	7,704 US\$	24
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	15.90 ratio	37
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	12.15 ratio	34
Apprenticeships	are sufficiently implemented	5.41 Survey [0..10]	27
Employee training	is a high priority in companies	6.27 Survey [0..10]	27
Female labor force	Percentage of total labor force	44.32 %	43
Health infrastructure	meets the needs of society	6.69 Survey [0..10]	31

## Appeal

		Value	2021 Rank
▽ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	113.20 index	60
▶ Attracting and retaining talents	is a priority in companies	8.55 Survey [0..10]	1
Worker motivation	in companies is high	6.04 Survey [0..10]	28
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	3.84 Survey [0..10]	48
Quality of life	is high	7.43 Survey [0..10]	28
Foreign highly-skilled personnel	are attracted to your country's business environment	3.82 Survey [0..10]	49
▶ 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\$	269,256 US\$	7
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	5.97 %	37
▶ Justice	is fairly administered	7.06 Survey [0..10]	18
Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	13.65 micrograms	26

## Readiness

		Value	2021 Rank
Labor force growth	Percentage change	-0.27 %	31
Skilled labor	is readily available	4.93 Survey [0..10]	46
Finance skills	are readily available	5.86 Survey [0..10]	45
▽ International experience	of senior managers is generally significant	2.61 Survey [0..10]	64
▽ Competent senior managers	are readily available	3.52 Survey [0..10]	58
Primary and secondary education	meets the needs of a competitive economy	6.42 Survey [0..10]	31
Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	21.77 %	44
University education	meets the needs of a competitive economy	4.64 Survey [0..10]	54
Management education	meets the needs of the business community	4.82 Survey [0..10]	55
▽ Language skills	are meeting the needs of enterprises	3.19 Survey [0..10]	62
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	1.61 number	44
▶ Educational assessment - PISA	PISA survey of 15-year olds	520 Average	5

# JAPAN 2022

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
Total public expenditure on education	Percentage of GDP	3.4 %	54
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	7,984 US\$	25
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	15.62 ratio	37
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	12.02 ratio	33
Apprenticeships	are sufficiently implemented	5.62 Survey [0..10]	22
Employee training	is a high priority in companies	6.22 Survey [0..10]	30
Female labor force	Percentage of total labor force	44.59 %	38
Health infrastructure	meets the needs of society	6.49 Survey [0..10]	31

## APPEAL

		Value	2022 Rank
▽ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	116.90 index	59
▶ Attracting and retaining talents	is a priority in companies	8.13 Survey [0..10]	4
Worker motivation	in companies is high	5.84 Survey [0..10]	32
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.13 Survey [0..10]	43
Quality of life	is high	7.35 Survey [0..10]	30
Foreign highly-skilled personnel	are attracted to your country's business environment	3.64 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\$	269,256 US\$	8
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	6.01 %	36
▶ Justice	is fairly administered	7.64 Survey [0..10]	14
Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	13.65 micrograms	25

## READINESS

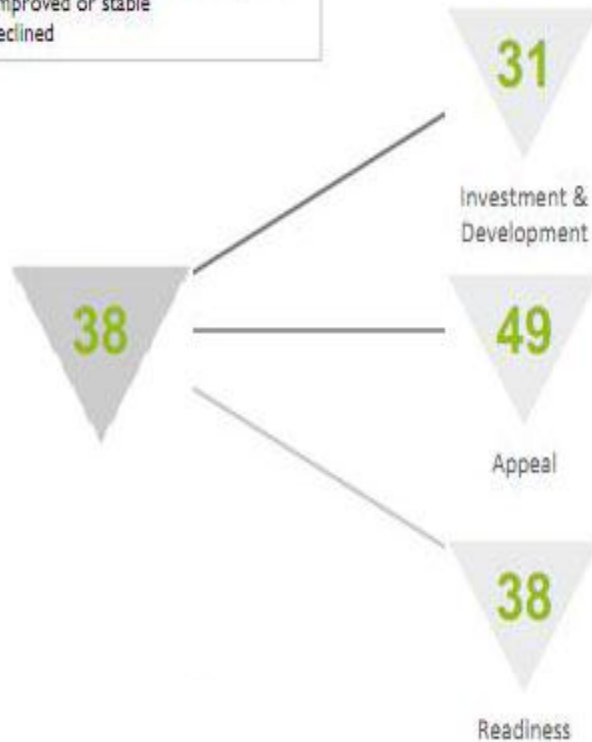
		Value	2022 Rank
Labor force growth	Percentage change	0.07 %	42
Skilled labor	is readily available	5.03 Survey [0..10]	36
Finance skills	are readily available	5.62 Survey [0..10]	43
▽ International experience	of senior managers is generally significant	3.01 Survey [0..10]	63
▽ Competent senior managers	are readily available	3.50 Survey [0..10]	61
Primary and secondary education	meets the needs of a competitive economy	6.11 Survey [0..10]	36
Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	21.77 %	39
University education	meets the needs of a competitive economy	4.38 Survey [0..10]	59
▽ Management education	meets the needs of the business community	4.18 Survey [0..10]	60
▽ Language skills	are meeting the needs of enterprises	3.11 Survey [0..10]	62
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	1.61 number	46
▶ Educational assessment - PISA	PISA survey of 15-year olds	520 Average	5

# KOREA REP.

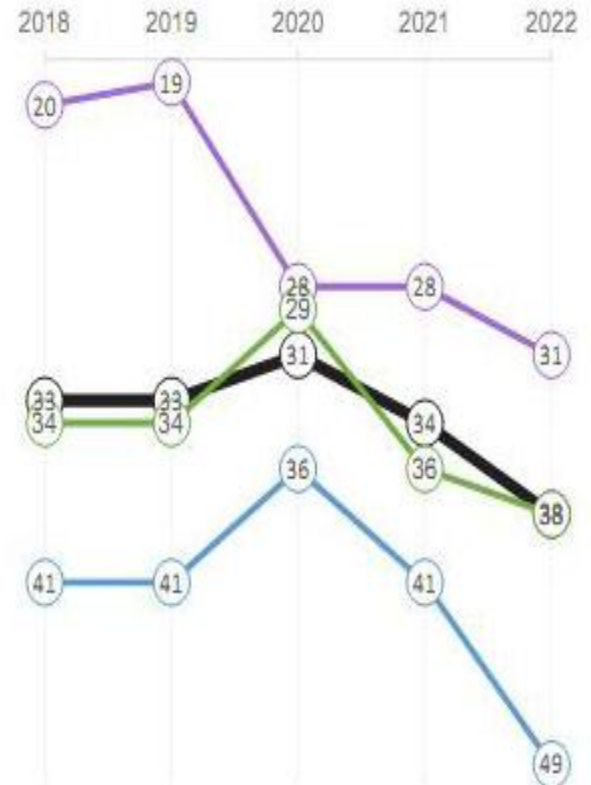
## OVERALL PERFORMANCE (63 countries)

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

- △ improved or stable
- ▽ declined



- Overall
- Investment & Development
- Appeal
- Readiness



ที่มา : IMD

# KOREA REP. 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
Total public expenditure on education	Percentage of GDP	4.5 %	35
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	7,722 US\$	23
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	16.62 ratio	43
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	12.10 ratio	31
▶ Apprenticeships	are sufficiently implemented	6.00 Survey [0..10]	12
Employee training	is a high priority in companies	6.11 Survey [0..10]	32
Female labor force	Percentage of total labor force	42.86 %	47
▶ Health infrastructure	meets the needs of society	8.15 Survey [0..10]	12

## Appeal

		Value	2021 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	95.90 index	55
▶ Attracting and retaining talents	is a priority in companies	8.00 Survey [0..10]	6
Worker motivation	in companies is high	5.34 Survey [0..10]	43
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	5.28 Survey [0..10]	24
Quality of life	is high	6.44 Survey [0..10]	39
Foreign highly-skilled personnel	are attracted to your country's business environment	4.42 Survey [0..10]	46
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\$	237,687 US\$	15
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	4.78 %	30
Justice	is fairly administered	4.59 Survey [0..10]	43
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	27.45 micrograms	55

## Readiness

		Value	2021 Rank
Labor force growth	Percentage change	-0.62 %	39
Skilled labor	is readily available	4.95 Survey [0..10]	45
Finance skills	are readily available	5.78 Survey [0..10]	46
▷ International experience	of senior managers is generally significant	4.66 Survey [0..10]	52
▷ Competent senior managers	are readily available	4.24 Survey [0..10]	53
Primary and secondary education	meets the needs of a competitive economy	5.85 Survey [0..10]	38
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	29.61 %	12
▷ University education	meets the needs of a competitive economy	5.23 Survey [0..10]	47
Management education	meets the needs of the business community	5.72 Survey [0..10]	46
Language skills	are meeting the needs of enterprises	6.17 Survey [0..10]	35
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	1.91 number	40
▶ Educational assessment - PISA	PISA survey of 15-year olds	520 Average	6

# KOREA REP. 2022

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
Total public expenditure on education	Percentage of GDP	4.7 %	38
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	7,950 US\$	26
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	16.31 ratio	41
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	11.89 ratio	31
Apprenticeships	are sufficiently implemented	5.64 Survey [0..10]	21
Employee training	is a high priority in companies	6.10 Survey [0..10]	34
Female labor force	Percentage of total labor force	43.04 %	44
▶ Health infrastructure	meets the needs of society	7.66 Survey [0..10]	14

## APPEAL

		Value	2022 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	104.60 Index	55
▶ Attracting and retaining talents	is a priority in companies	7.54 Survey [0..10]	18
▷ Worker motivation	in companies is high	4.94 Survey [0..10]	52
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.81 Survey [0..10]	33
Quality of life	is high	6.44 Survey [0..10]	36
Foreign highly-skilled personnel	are attracted to your country's business environment	4.15 Survey [0..10]	49
Remuneration in services professions	Gross annual income including supplements such as bonuses, US\$	24,963 US\$	29
▶ Remuneration of management	Total base salary plus bonuses and long-term incentives, US\$	237,687 US\$	16
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	5.24 %	31
Justice	is fairly administered	4.98 Survey [0..10]	42
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	27.45 micrograms	53

## READINESS

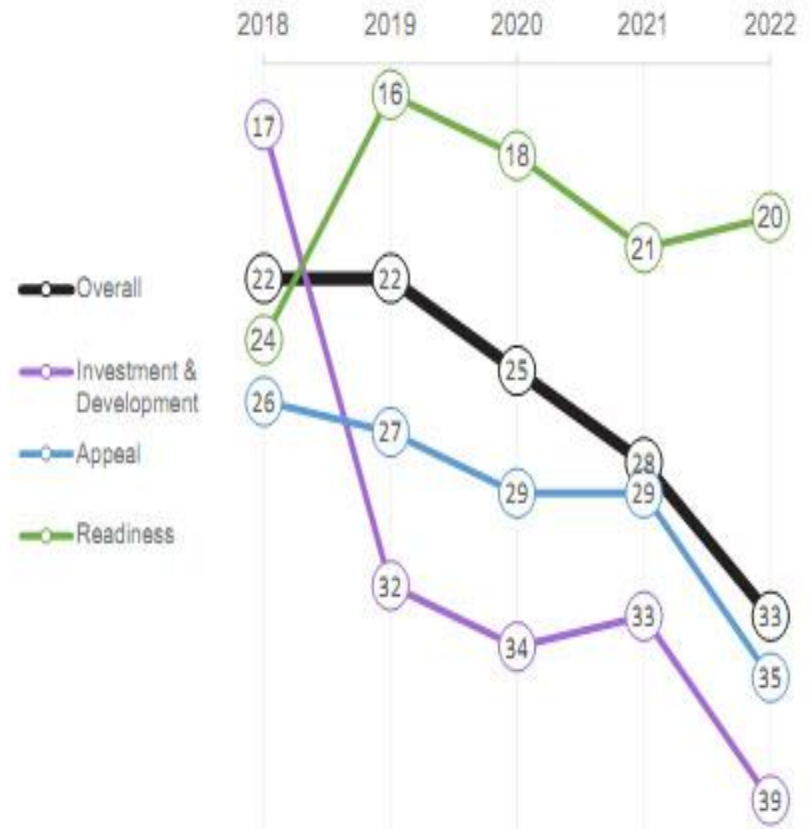
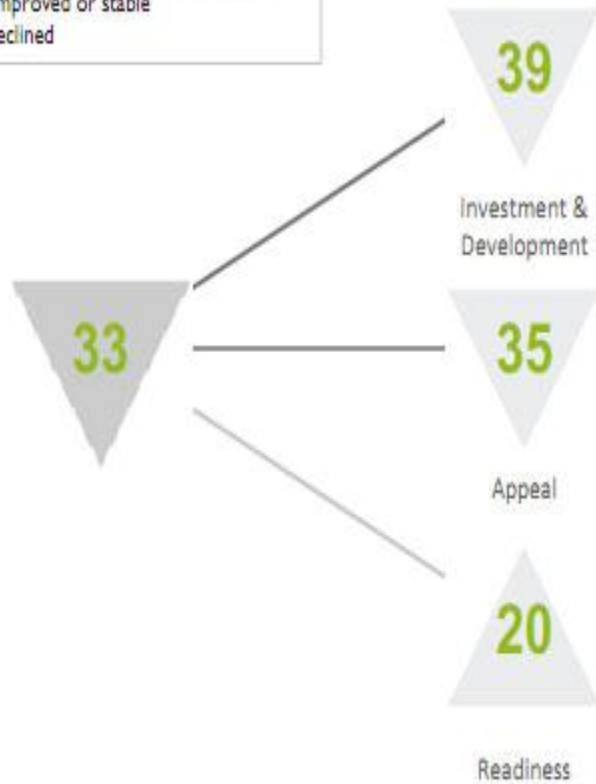
		Value	2022 Rank
Labor force growth	Percentage change	1.06 %	29
Skilled labor	is readily available	4.58 Survey [0..10]	43
Finance skills	are readily available	5.60 Survey [0..10]	44
▷ International experience	of senior managers is generally significant	4.32 Survey [0..10]	59
▷ Competent senior managers	are readily available	3.85 Survey [0..10]	56
Primary and secondary education	meets the needs of a competitive economy	6.06 Survey [0..10]	37
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	30.18 %	9
University education	meets the needs of a competitive economy	5.21 Survey [0..10]	46
Management education	meets the needs of the business community	5.60 Survey [0..10]	46
Language skills	are meeting the needs of enterprises	5.60 Survey [0..10]	45
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	2.15 number	40
▶ 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



ที่มา : IMD 2022

# MALAYSIA 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

<b>Investment &amp; Development</b>		Value	2021 Rank
Total public expenditure on education	Percentage of GDP	4.2 %	40
▽ Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,963 US\$	47
▶ Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	12.00 ratio	13
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	11.00 ratio	20
Apprenticeships	are sufficiently implemented	5.60 Survey [0..10]	21
Employee training	is a high priority in companies	6.31 Survey [0..10]	25
▽ Female labor force	Percentage of total labor force	39.02 %	53
Health infrastructure	meets the needs of society	7.43 Survey [0..10]	22

<b>Appeal</b>		Value	2021 Rank
▶ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	63.10 index	16
Attracting and retaining talents	is a priority in companies	6.41 Survey [0..10]	40
Worker motivation	in companies is high	5.76 Survey [0..10]	31
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	5.23 Survey [0..10]	26
Quality of life	is high	6.59 Survey [0..10]	37
Foreign highly-skilled personnel	are attracted to your country's business environment	5.87 Survey [0..10]	23
▽ 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\$	117,688 US\$	42
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	2.56 %	17
Justice	is fairly administered	5.41 Survey [0..10]	35
Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	16.55 micrograms	34

<b>Readiness</b>		Value	2021 Rank
▶ Labor force growth	Percentage change	0.55 %	16
Skilled labor	is readily available	6.14 Survey [0..10]	25
Finance skills	are readily available	6.29 Survey [0..10]	33
International experience	of senior managers is generally significant	5.69 Survey [0..10]	30
Competent senior managers	are readily available	5.89 Survey [0..10]	28
Primary and secondary education	meets the needs of a competitive economy	6.11 Survey [0..10]	34
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	39.17 %	2
University education	meets the needs of a competitive economy	6.33 Survey [0..10]	33
Management education	meets the needs of the business community	6.49 Survey [0..10]	31
Language skills	are meeting the needs of enterprises	6.66 Survey [0..10]	28
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	2.52 number	32
▽ Educational assessment - PISA	PISA survey of 15-year olds	431 Average	45

# MALAYSIA 2022

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
Total public expenditure on education	Percentage of GDP	4.5 %	43
▷ Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,932 US\$	47
▶ Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	12.03 ratio	12
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	11.04 ratio	20
Apprenticeships	are sufficiently implemented	5.21 Survey [0..10]	33
Employee training	is a high priority in companies	5.83 Survey [0..10]	40
▷ Female labor force	Percentage of total labor force	39.02 %	54
Health infrastructure	meets the needs of society	6.71 Survey [0..10]	28

## APPEAL

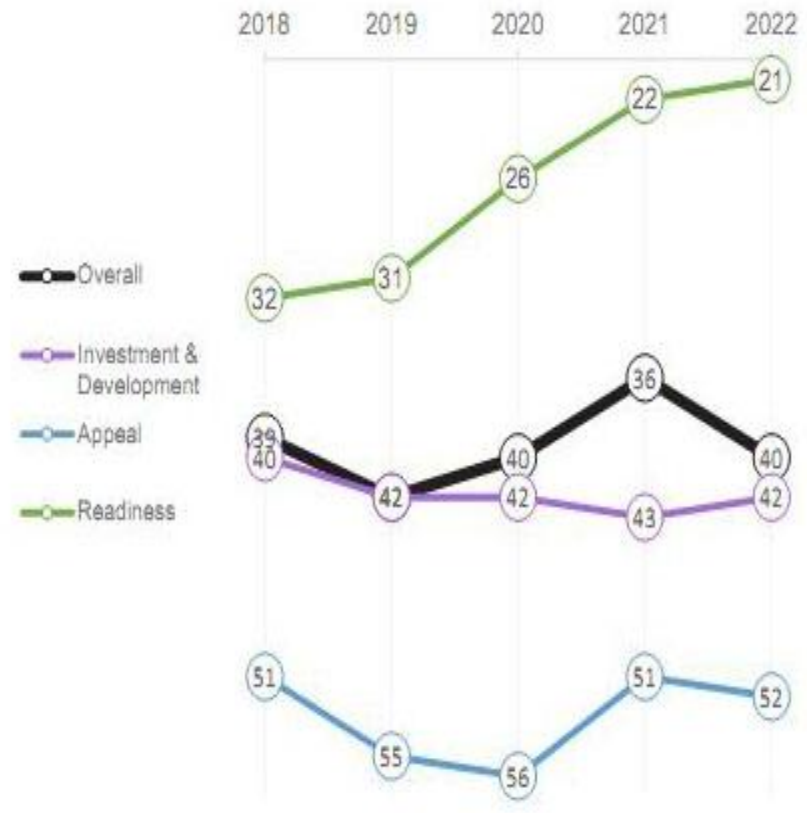
		Value	2022 Rank
▶ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	65.00 Index	14
▷ Attracting and retaining talents	is a priority in companies	6.22 Survey [0..10]	46
Worker motivation	in companies is high	5.31 Survey [0..10]	40
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.87 Survey [0..10]	32
▷ Quality of life	is high	5.62 Survey [0..10]	44
Foreign highly-skilled personnel	are attracted to your country's business environment	5.52 Survey [0..10]	31
Remuneration in services professions	Gross annual income including supplements such as bonuses, US\$	13,564 US\$	42
Remuneration of management	Total base salary plus bonuses and long-term incentives, US\$	117,688 US\$	43
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	2.75 %	20
Justice	is fairly administered	5.07 Survey [0..10]	39
Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	16.55 micrograms	32

## READINESS

		Value	2022 Rank
▶ Labor force growth	Percentage change	3.03 %	12
Skilled labor	is readily available	5.74 Survey [0..10]	29
Finance skills	are readily available	5.89 Survey [0..10]	38
International experience	of senior managers is generally significant	5.62 Survey [0..10]	31
Competent senior managers	are readily available	5.83 Survey [0..10]	29
Primary and secondary education	meets the needs of a competitive economy	5.67 Survey [0..10]	42
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	38.90 %	2
University education	meets the needs of a competitive economy	5.88 Survey [0..10]	40
Management education	meets the needs of the business community	5.87 Survey [0..10]	43
Language skills	are meeting the needs of enterprises	6.27 Survey [0..10]	35
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	2.74 number	32
▷ Educational assessment - PISA	PISA survey of 15-year olds	431 Average	43

# CHINA

## OVERALL PERFORMANCE (63 countries)



ที่มา : IMD 2022

# CHINA MAINLAND 2021

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
▷ Total public expenditure on education	Percentage of GDP	3.5 %	51
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,767 US\$	48
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	16.39 ratio	41
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	14.18 ratio	46
Apprenticeships	are sufficiently implemented	5.57 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	6.71 Survey [0..10]	30

## Appeal

		Value	2021 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	98.80 index	56
Attracting and retaining talents	is a priority in companies	7.07 Survey [0..10]	31
Worker motivation	in companies is high	6.72 Survey [0..10]	14
Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.68 Survey [0..10]	31
Quality of life	is high	7.09 Survey [0..10]	31
Foreign highly-skilled personnel	are attracted to your country's business environment	5.52 Survey [0..10]	31
▷ 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\$	152,385 US\$	35
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	1.05 %	5
Justice	is fairly administered	6.37 Survey [0..10]	26
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	47.73 micrograms	61

## Readiness

		Value	2021 Rank
▶ Labor force growth	Percentage change	0.72 %	14
Skilled labor	is readily available	6.19 Survey [0..10]	23
Finance skills	are readily available	6.69 Survey [0..10]	24
International experience	of senior managers is generally significant	4.91 Survey [0..10]	44
Competent senior managers	are readily available	6.00 Survey [0..10]	26
▶ Primary and secondary education	meets the needs of a competitive economy	8.00 Survey [0..10]	7
Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	- %	-
University education	meets the needs of a competitive economy	7.27 Survey [0..10]	21
Management education	meets the needs of the business community	7.09 Survey [0..10]	21
Language skills	are meeting the needs of enterprises	6.30 Survey [0..10]	34
▷ Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	0.14 number	56
▶ Educational assessment - PISA	PISA survey of 15-year olds	579 Average	1

# CHINA MAINLAND 2022

- ▶ Overall top strengths
- ▷ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
▷ Total public expenditure on education	Percentage of GDP	3.6 %	53
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	1,799 US\$	50
Pupil-teacher ratio [primary education]	Ratio of students to teaching staff	16.28 ratio	40
Pupil-teacher ratio [secondary education]	Ratio of students to teaching staff	13.42 ratio	46
Apprenticeships	are sufficiently implemented	5.51 Survey [0..10]	25
Employee training	is a high priority in companies	7.01 Survey [0..10]	11
Female labor force	Percentage of total labor force	44.53 %	39
Health infrastructure	meets the needs of society	6.51 Survey [0..10]	30

## APPEAL

		Value	2022 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing [New York City = 100]	108.90 index	57
Attracting and retaining talents	is a priority in companies	7.03 Survey [0..10]	29
▶ Worker motivation	in companies is high	7.18 Survey [0..10]	10
Brain drain	[well-educated and skilled people] does not hinder competitiveness in your economy	4.78 Survey [0..10]	34
Quality of life	is high	6.95 Survey [0..10]	33
Foreign highly-skilled personnel	are attracted to your country's business environment	5.35 Survey [0..10]	35
Remuneration in services professions	Gross annual income including supplements such as bonuses, US\$	11,684 US\$	49
Remuneration of management	Total base salary plus bonuses and long-term incentives, US\$	152,385 US\$	36
▶ Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	1.14 %	6
Justice	is fairly administered	6.07 Survey [0..10]	30
▷ Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	47.73 micrograms	59

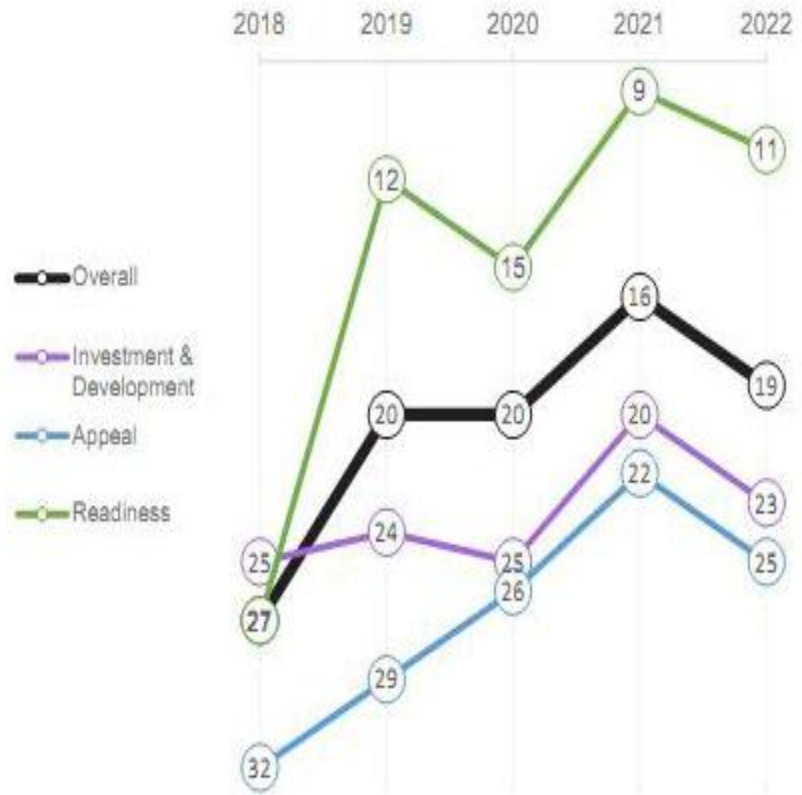
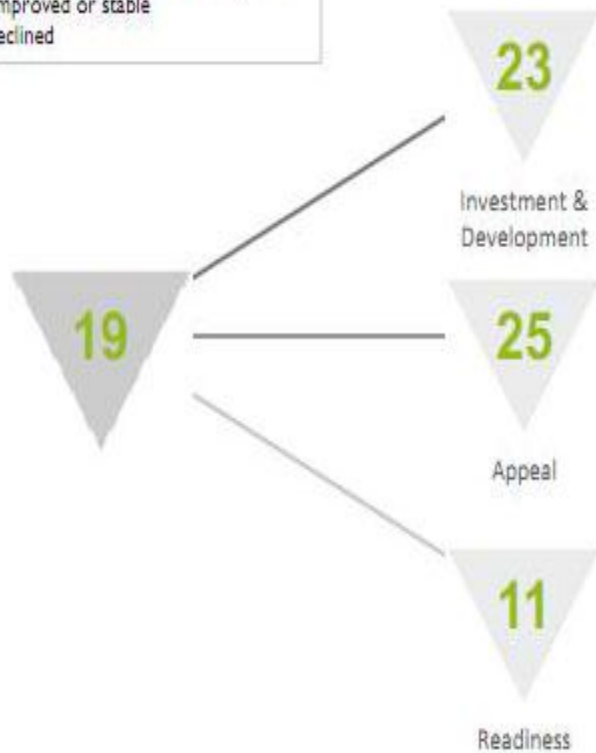
## READINESS

		Value	2022 Rank
▷ Labor force growth	Percentage change	-0.75 %	51
▶ Skilled labor	is readily available	6.49 Survey [0..10]	9
Finance skills	are readily available	7.09 Survey [0..10]	10
International experience	of senior managers is generally significant	4.94 Survey [0..10]	47
Competent senior managers	are readily available	6.00 Survey [0..10]	26
▶ Primary and secondary education	meets the needs of a competitive economy	8.20 Survey [0..10]	7
Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	- %	-
University education	meets the needs of a competitive economy	7.38 Survey [0..10]	18
Management education	meets the needs of the business community	6.90 Survey [0..10]	23
Language skills	are meeting the needs of enterprises	6.23 Survey [0..10]	37
▷ Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	0.16 number	56
▶ 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



ที่มา : IMD

# TAIWAN, CHINA 2021

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## Investment & Development

		Value	2021 Rank
▷ Total public expenditure on education	Percentage of GDP	3.6 %	50
▷ Total public exp. on education per student	Spending per enrolled pupil/student, all levels	5,154 US\$	33
	Pupil-teacher ratio (primary education)	12.10 ratio	15
	Pupil-teacher ratio (secondary education)	12.40 ratio	36
▶ Apprenticeships	are sufficiently implemented	6.26 Survey [0..10]	7
▶ Employee training	is a high priority in companies	7.40 Survey [0..10]	5
	Female labor force	44.52 %	42
	Health infrastructure	8.49 Survey [0..10]	8

## Appeal

		Value	2021 Rank
▷ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	84.40 index	49
	Attracting and retaining talents	7.16 Survey [0..10]	27
▶ Worker motivation	in companies is high	7.55 Survey [0..10]	5
▷ Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.47 Survey [0..10]	35
	Quality of life	7.72 Survey [0..10]	24
▷ Foreign highly-skilled personnel	are attracted to your country's business environment	4.98 Survey [0..10]	38
	Remuneration in services professions	26,500 US\$	27
	Remuneration of management	183,102 US\$	23
	Collected personal income tax	2.65 %	19
	Justice	6.42 Survey [0..10]	25
	Exposure to particle pollution	16.20 micrograms	33

## Readiness

		Value	2021 Rank
	Labor force growth	0.15 %	24
	Skilled labor	6.51 Survey [0..10]	13
	Finance skills	7.15 Survey [0..10]	15
	International experience	5.84 Survey [0..10]	27
	Competent senior managers	6.06 Survey [0..10]	25
	Primary and secondary education	7.44 Survey [0..10]	18
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	32.27 %	5
	University education	7.33 Survey [0..10]	20
	Management education	7.36 Survey [0..10]	16
	Language skills	6.49 Survey [0..10]	31
	Student mobility inbound	5.43 number	14
▶ Educational assessment - PISA	PISA survey of 15-year olds	516 Average	8



# TAIWAN, CHINA 2022

- ▶ Overall top strengths
- ▽ Overall top weaknesses

## INVESTMENT & DEVELOPMENT

		Value	2022 Rank
▽ Total public expenditure on education	Percentage of GDP	3.6 %	52
Total public exp. on education per student	Spending per enrolled pupil/student, all levels	5,722 US\$	34
Pupil-teacher ratio (primary education)	Ratio of students to teaching staff	12.10 ratio	15
Pupil-teacher ratio (secondary education)	Ratio of students to teaching staff	12.10 ratio	34
▶ Apprenticeships	are sufficiently implemented	6.35 Survey [0..10]	7
▶ Employee training	is a high priority in companies	7.32 Survey [0..10]	6
Female labor force	Percentage of total labor force	44.67 %	37
▶ Health infrastructure	meets the needs of society	8.58 Survey [0..10]	4

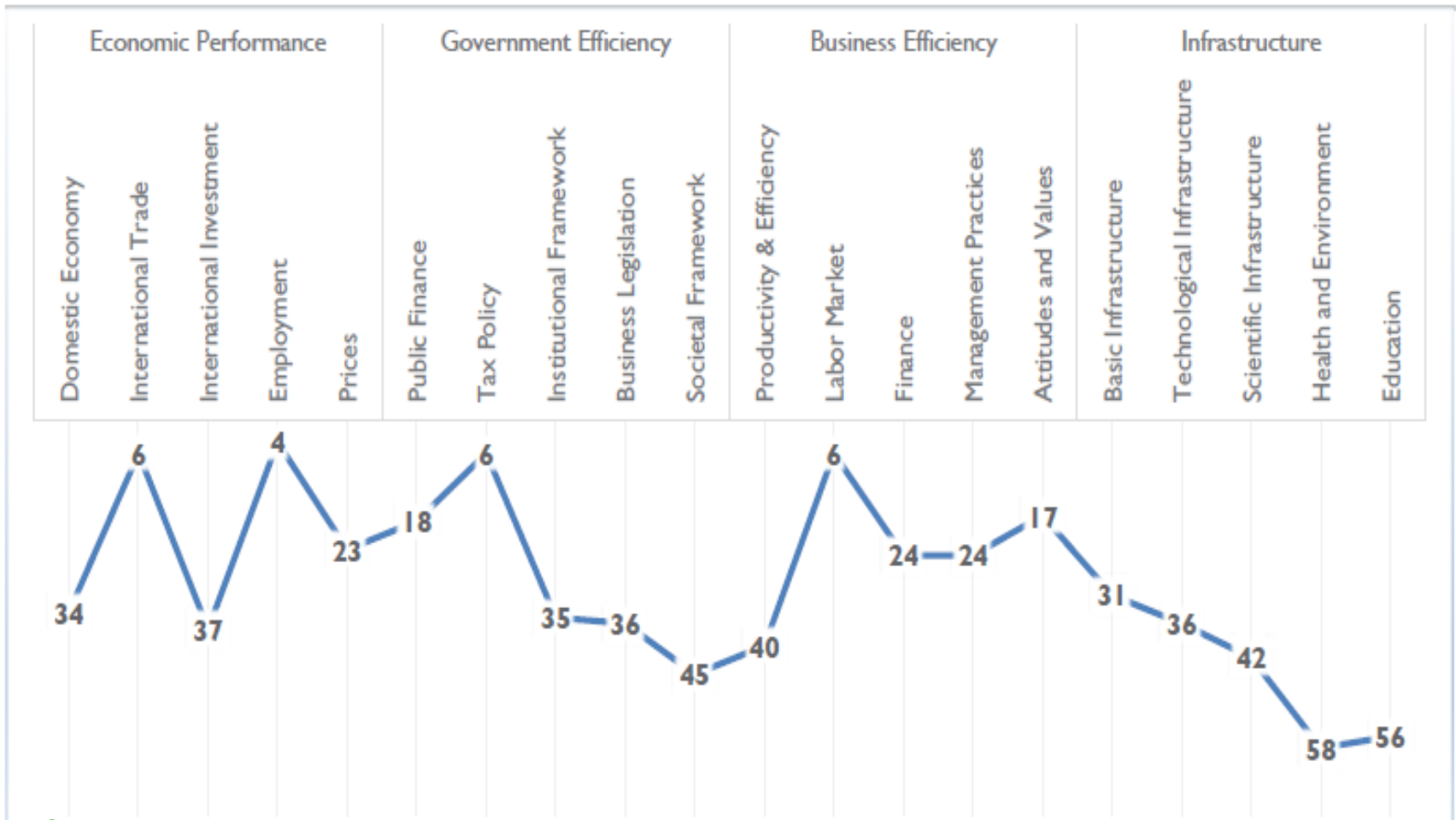
## APPEAL

		Value	2022 Rank
▽ Cost-of-living index	Index of a basket of goods & services in the main city, including housing (New York City = 100)	92.10 index	50
Attracting and retaining talents	is a priority in companies	7.06 Survey [0..10]	27
▶ Worker motivation	in companies is high	7.54 Survey [0..10]	5
▽ Brain drain	(well-educated and skilled people) does not hinder competitiveness in your economy	4.20 Survey [0..10]	40
Quality of life	is high	7.72 Survey [0..10]	28
▽ Foreign highly-skilled personnel	are attracted to your country's business environment	4.88 Survey [0..10]	43
Remuneration in services professions	Gross annual income including supplements such as bonuses, US\$	26,500 US\$	28
Remuneration of management	Total base salary plus bonuses and long-term incentives, US\$	183,102 US\$	24
Collected personal income tax	On profits, income and capital gains, as a percentage of GDP	2.55 %	17
Justice	is fairly administered	6.53 Survey [0..10]	25
Exposure to particle pollution	Mean population exposure to PM2.5, Micrograms per cubic metre	16.20 micrograms	31

## READINESS

		Value	2022 Rank
▽ Labor force growth	Percentage change	-0.38 %	46
Skilled labor	is readily available	6.05 Survey [0..10]	19
Finance skills	are readily available	6.86 Survey [0..10]	14
International experience	of senior managers is generally significant	5.70 Survey [0..10]	27
Competent senior managers	are readily available	6.17 Survey [0..10]	21
Primary and secondary education	meets the needs of a competitive economy	8.00 Survey [0..10]	8
▶ Graduates in Sciences	% of graduates in ICT, Engineering, Math & Natural Sciences	32.36 %	7
University education	meets the needs of a competitive economy	7.60 Survey [0..10]	14
Management education	meets the needs of the business community	7.45 Survey [0..10]	10
Language skills	are meeting the needs of enterprises	6.43 Survey [0..10]	31
Student mobility inbound	Foreign tertiary-level students per 1000 inhabitants	3.86 number	26
Educational assessment - PISA	PISA survey of 15-year olds	516 Average	8

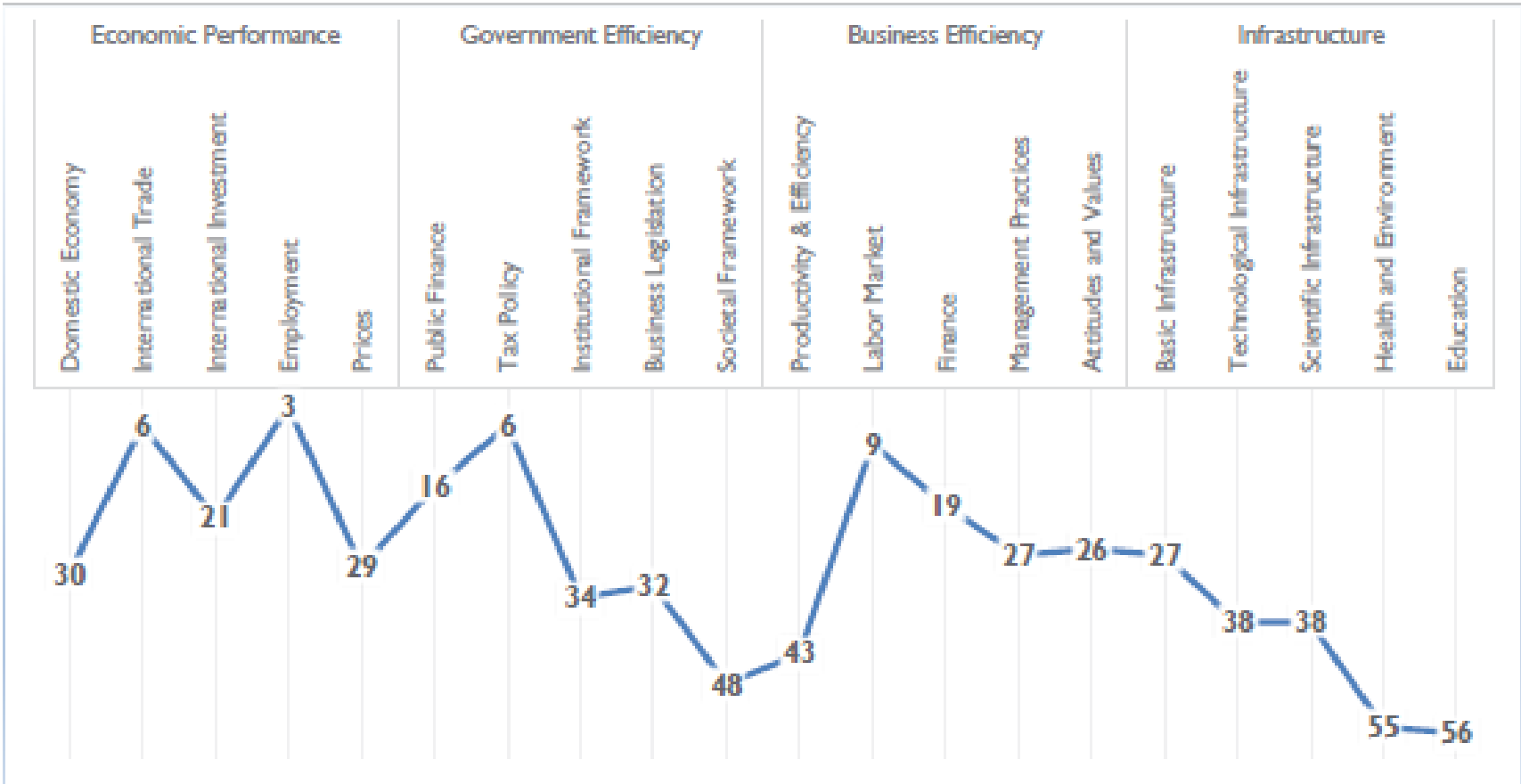
# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2561 จำแนกตามปัจจัยหลักในแต่ละหมวด



ที่มา : IMD

# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2562 จำแนกตามปัจจัยหลักในแต่ละหมวด

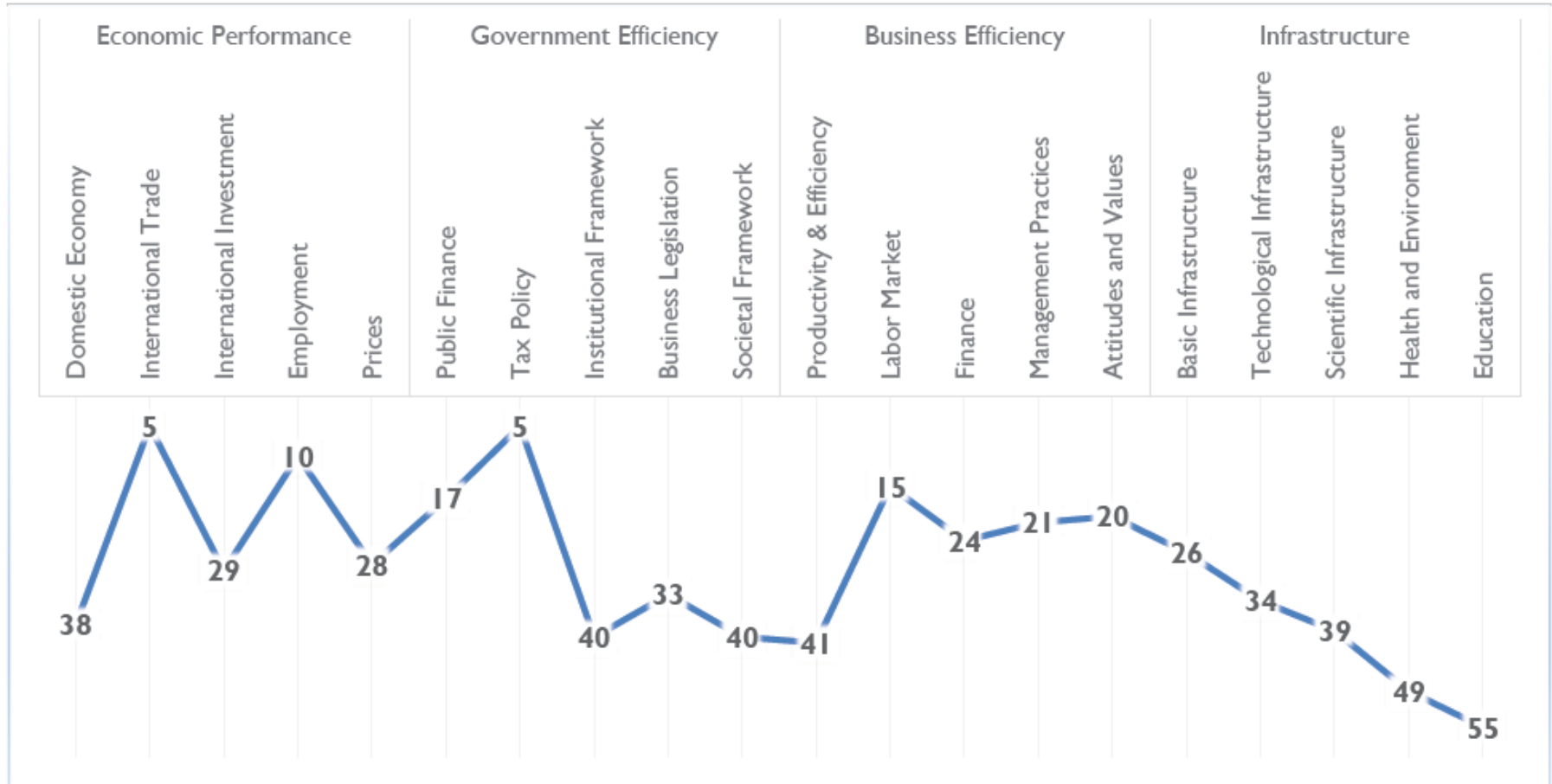
## COMPETITIVENESS LANDSCAPE



ที่มา : IMD

# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2563 จำแนกตามปัจจัยหลักในแต่ละหมวด

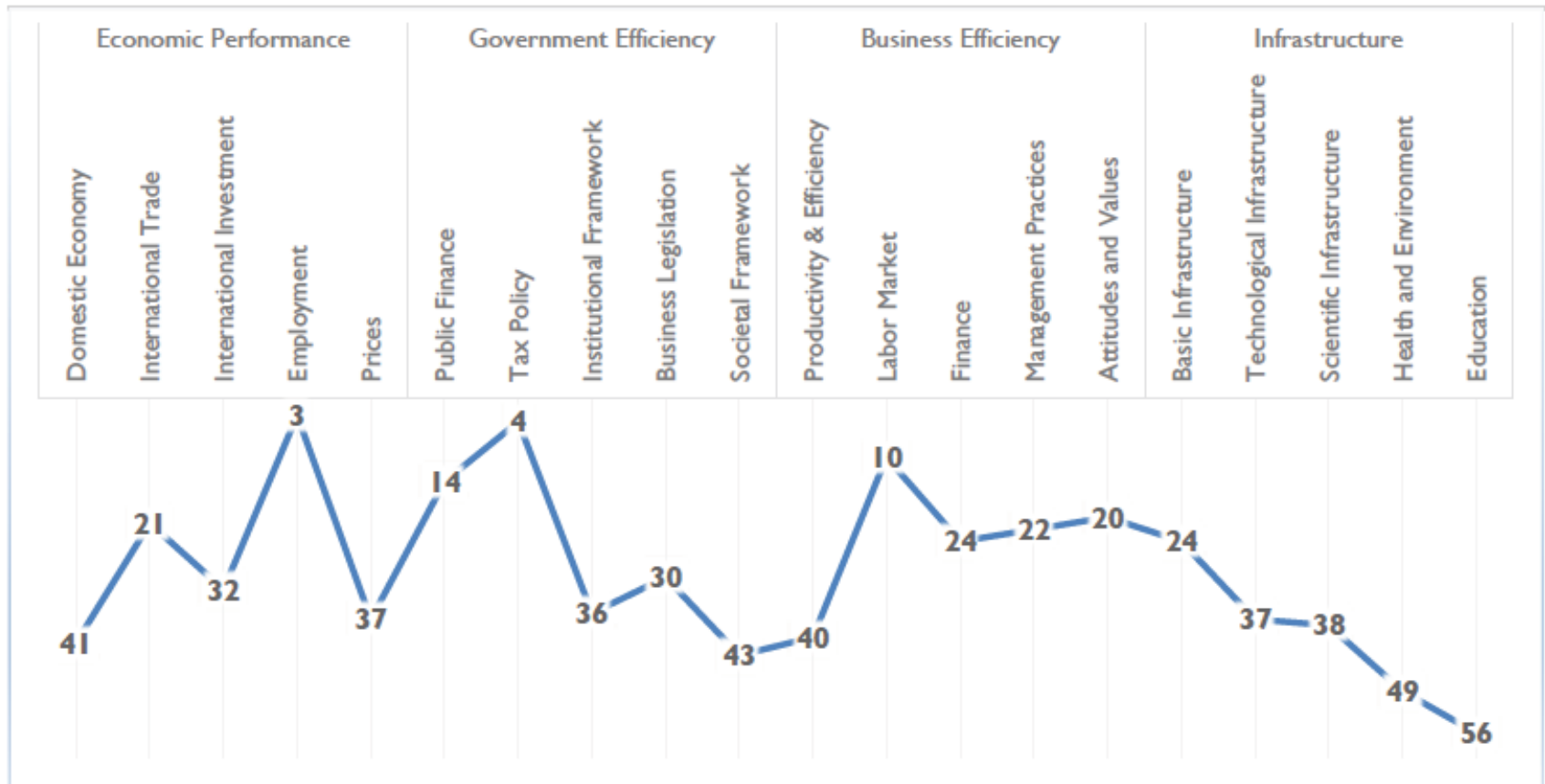
## COMPETITIVENESS LANDSCAPE



ที่มา : IMD

# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2564 จำแนกตามปัจจัยหลักในแต่ละหมวด

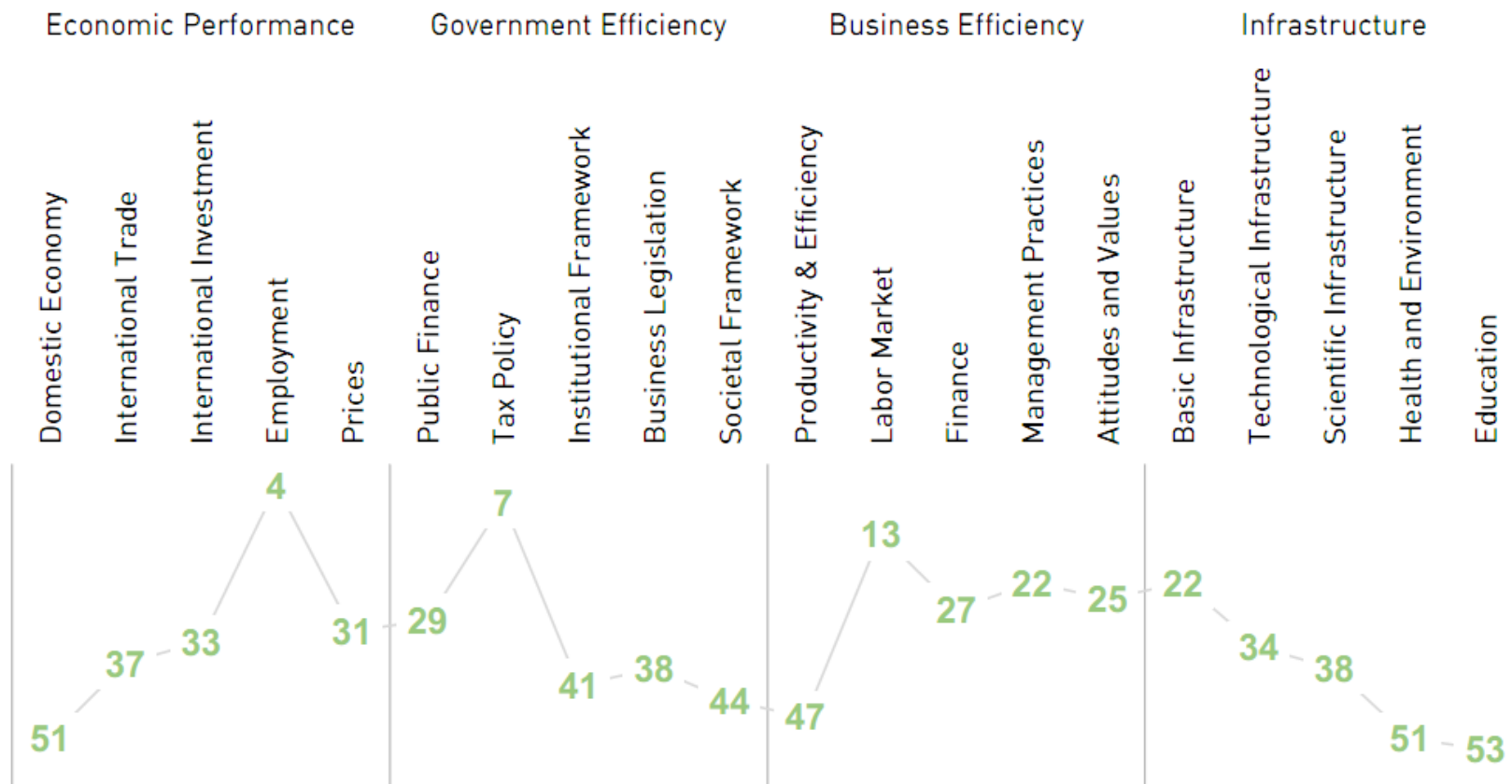
## COMPETITIVENESS LANDSCAPE



ที่มา : IMD

# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2565 จำแนกตามปัจจัยหลักในแต่ละหมวด

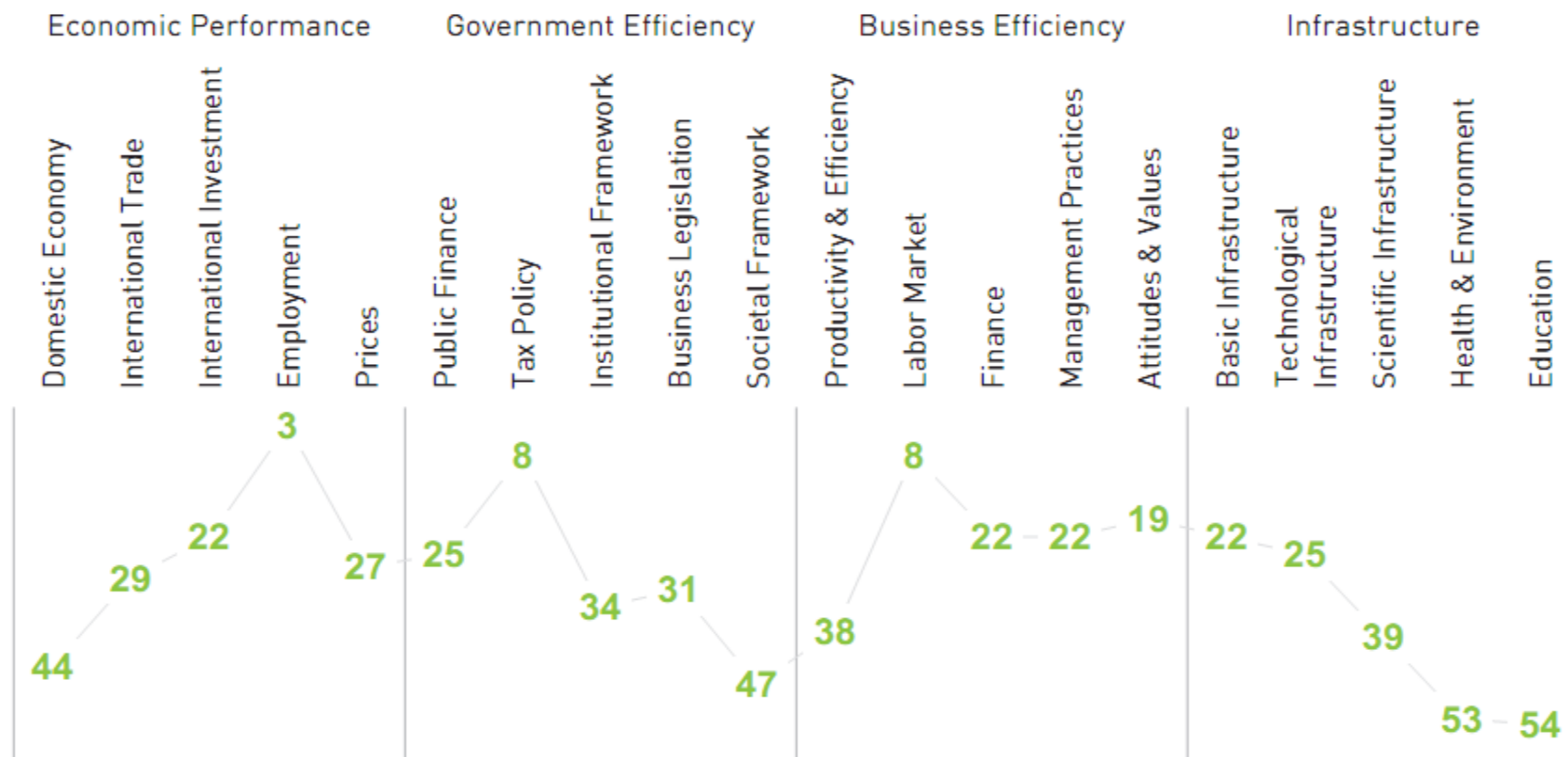
## COMPETITIVENESS LANDSCAPE



ที่มา : IMD 2022

# อันดับความสามารถในการแข่งขันของประเทศไทย ในปี 2566 จำแนกตามปัจจัยหลักในแต่ละหมวด

## COMPETITIVENESS LANDSCAPE



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## 4.1 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] Dependent Population	Percentage of total population
4.1.09 Dependency ratio	Population under 15 & over 64 years old, divided by active population (15-64 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



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## 4.1 Basic Infrastructure

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4.1.19 [B] Total final energy consumption per capita	MTOE per capita
4.1.20 Electricity costs for industrial clients	US\$ per kwh

# 2022

## 4.2 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 US\$
4.2.04 [S] Communications technology	Communications technology (voice and data) meets business requirements
4.2.05 Secure internet servers	Worldwide share/ Source: Computer Industry Almanac
4.2.06 Internet users	Number of internet users per 1000 people/ Source: Computer Industry Almanac
4.2.07 Broadband subscribers	Number of subscribers per 1000 inhabitants
4.2.08 Internet bandwidth speed	Average speed (Mbps)
4.2.09 [S] Digital/Technological skills	Digital/technological skills are readily available
4.2.10 [S] Qualified engineers	Qualified engineers are available in your labor market
4.2.11 [S] Public-private partnerships	Public and private sector ventures are supporting technological development
4.2.12 [S] Development and application of technology	Development and application of technology are supported by the legal environment
4.2.13 [S] Funding for technological development	Funding for technological development is readily available
4.2.14 High-tech exports (\$)	US\$ millions
4.2.15 High-tech exports (%)	Percentage of manufactured exports
4.2.16 ICT Service Exports (%)	Percentage of Service Exports
4.2.17 [S] Cyber security	Cyber security is being adequately addressed by corporations

# 2023

## 4.2 Technological Infrastructure

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## 4.3 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, & economics since 1950
4.3.14 Nobel prizes per capita	Awarded in physics, chemistry, etc 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 Patents 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

## 4.3 Scientific Infrastructure

4.3.01 Total expenditure on R&D (\$)	US\$ millions
4.3.02 Total expenditure on R&D (%)	Percentage of GDP
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## 4.4 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 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: HDR
4.4.12 Energy intensity	Total energy consumed for each 1000 US\$ of GDP in MTOE
4.4.13 Safely treated waste water	Percentage of waste water
4.4.14 Water use efficiency	US\$ per cubic metre
4.4.15 [B] CO2 emissions	Metric tons of carbon dioxide
4.4.16 CO2 emissions intensity	CO2 industrial emissions 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 hectare 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

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## 4.4 Health and Environment

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4.4.02 [B] Total health expenditure per capita	US\$ per capita
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## 4.5 Education

4.5.01 Total public expenditure on education	Percentage of GDP
4.5.02 [B] Total public exp. on education per capita	US\$ per capita
4.5.03 Total public expenditure 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	% 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 Educational assessment - PISA	PISA survey of 15-year olds
4.5.12 [B] 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

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## 4.5 Education

4.5.01 Total public expenditure on education	Percentage of GDP
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# 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 ของประเทศไทย ปี 2565

## STRENGTHS

## WEAKNESSES

Infrastructure	Rank	Infrastructure	Rank
4.2.01 Investment in Telecommunications	7	4.2.16 ICT service exports	60
4.1.09 Dependency ratio	8	4.4.12 Energy intensity	60
4.2.15 High-tech exports (%)	11	4.5.06 Secondary school enrollment	59
4.2.08 Internet bandwidth speed	14	4.4.13 Safely treated waste water	58
4.2.04 Communication technology	15	4.4.09 Medical assistance	58
4.2.03 Mobile Telephone costs	17	4.4.01 Total health expenditure	58
4.4.04 Health infrastructure	19	4.5.05 Pupil-teacher ratio (secondary education)	57
4.1.15 Energy infrastructure	19	4.4.14 Water use efficiency	57
4.4.18 Renewable energy (%)	20	4.2.07 Broadband subscribers	56
4.4.25 Sustainable development	20	4.3.18 Number of patents in force	56

# INFRASTRUCTURE ของประเทศไทย ปี 2566

## INFRASTRUCTURE

STRENGTHS	Rank	WEAKNESSES	Rank
4.2.08 Internet bandwidth speed	05	4.4.09 Medical assistance	61
4.2.01 Investment in Telecommunications	05	4.2.16 ICT service exports	60
4.4.04 Health infrastructure	08	4.4.13 Safely treated waste water	59
4.2.15 High-tech exports (%)	11	4.4.12 Energy intensity	59
4.1.09 Dependency ratio	12	4.5.05 Pupil-teacher ratio (secondary education)	58
4.2.03 Mobile telephone costs	15	4.5.06 Secondary school enrollment	58
4.1.15 Energy infrastructure	15	4.4.14 Water use efficiency	57
4.4.25 Sustainable development	15	4.4.01 Total health expenditure	57
4.2.04 Communications technology	15	4.4.17 Exposure to particle pollution	56
4.2.11 Public-private partnerships	18	4.3.18 Number of patents in force	56

# 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 ของประเทศไทยปี 2565

## STRENGTHS

Infrastructure	Rank
4.2.07 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
4.3.16 Patent applications per capita	4
4.4.25 Sustainable development	4
4.3.05 Business expenditure on R&D (%)	5
4.5.12 Students who are not low achievers -PISA	5
4.3.02 Total expenditure on R&D (%)	7
4.4.01 Total health expenditure	7

## WEAKNESSES

Infrastructure	Rank
4.1.09 Dependency ratio	63
4.2.09 Digital/Technological skills	62
4.5.19 Language skills	62
4.2.03 Mobile Telephone costs	60
4.5.16 Management education	60
4.5.15 University education	59
4.2.10 Qualified engineers	56
4.2.16 ICT service exports	56
4.5.01 Total public expenditure on education	53
4.1.07 Population - growth	52

# INFRASTRUCTURE ของประเทศไทยปี 2566

## INFRASTRUCTURE

STRENGTHS	Rank	WEAKNESSES	Rank
4.4.23 Environment-related technologies	02	4.1.09 Dependency ratio	64
4.2.07 Broadband subscribers	02	4.2.09 Digital/Technological skills	63
4.4.25 Sustainable development	02	4.5.19 Language skills	60
4.4.06 Life expectancy at birth	02	4.5.16 Management education	60
4.3.18 Number of patents in force	04	4.2.03 Mobile telephone costs	59
4.3.16 Patent applications per capita	04	4.1.07 Population - growth	57
4.3.05 Business expenditure on R&D (%)	05	4.5.15 University education	56
4.5.12 Students who are not low achievers - PISA	05	4.2.10 Qualified engineers	54
4.1.04 Access to water	05	4.5.01 Total public expenditure on education	53
4.1.13 Quality of air transportation	05	4.1.20 Electricity costs for industrial clients	51

# INFRASTRUCTURE ของประเทศเกาหลีปี 2564

## STRENGTHS

Infrastructure	Rank
4.3.10 Researchers in R&D per capita	1
4.3.05 Business expenditure on R&D (%)	2
4.3.02 Total expenditure on R&D (%)	2
4.3.16 Patent applications per capita	2
4.3.07 Total R&D personnel per capita	3
4.3.19 Medium- and high-tech value added	4
4.5.07 Higher education achievement	4
4.3.18 Number of patents in force	4
4.1.09 Dependency ratio	4
4.4.23 Environment-related technologies	5

## WEAKNESSES

Infrastructure	Rank
4.4.18 Renewable energy (%)	57
4.2.03 Mobile Telephone costs	57
4.4.24 Environmental agreements	56
4.4.17 Exposure to particle pollution	55
4.4.19 Forest area growth	51
4.5.15 University education	47
4.5.16 Management education	46
4.2.13 Development and application of technology	45
4.2.01 Investment in Telecommunications	44
4.1.07 Population - growth	42



# INFRASTRUCTURE ของประเทศเกาหลีปี 2565

## STRENGTHS

Infrastructure	Rank
4.3.10 Researchers in R&D per capita	1
4.3.05 Business expenditure on R&D (%)	2
4.3.02 Total expenditure on R&D (%)	2
4.3.16 Patent applications per capita	2
4.3.07 Total R&D personnel per capita	3
4.4.05 Universal health coverage index	3
4.4.23 Environment-related technologies	4
4.5.07 Higher education achievement	4
4.3.18 Number of patents in force	4
4.4.06 Life expectancy at birth	4

## WEAKNESSES

Infrastructure	Rank
4.4.24 Environmental agreements	55
4.4.18 Renewable energy (%)	55
4.2.03 Mobile Telephone costs	54
4.4.17 Exposure to particle pollution	53
4.4.27 Environmental laws	50
4.1.07 Population - growth	50
4.2.12 Development and application of technology	48
4.4.19 Forest area growth	48
4.5.15 University education	46
4.5.16 Management education	46

# INFRASTRUCTURE ของประเทศไทยปี 2566

## INFRASTRUCTURE

### STRENGTHS

	Rank
4.3.10 Researchers in R&D per capita	01
4.3.05 Business expenditure on R&D (%)	02
4.3.02 Total expenditure on R&D (%)	02
4.3.16 Patent applications per capita	02
4.3.18 Number of patents in force	03
4.4.05 Universal health coverage index	03
4.4.23 Environment-related technologies	04
4.3.19 Medium- and high-tech value added	04
4.3.07 Total R&D personnel per capita	04
4.5.07 Higher education achievement	04

### WEAKNESSES

	Rank
4.4.24 Environmental agreements	58
4.2.03 Mobile telephone costs	56
4.4.18 Renewable energies (%)	55
4.4.17 Exposure to particle pollution	53
4.1.07 Population - growth	53
4.2.12 Development & application of tech.	52
4.4.26 Pollution problems	50
4.5.16 Management education	49
4.5.15 University education	49
4.4.19 Forest area growth	49

# INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2564

## STRENGTHS

## WEAKNESSES

Infrastructure	Rank	Infrastructure	Rank
4.5.13 Students who are not low achievers -PISA	1	4.4.17 Exposure to particle pollution	61
4.4.23 Environment-related technologies	3	4.2.07 Internet users	58
4.4.19 Forest area growth	3	4.5.09 Student mobility inbound	56
4.5.17 University education index	3	4.4.11 Human development index	56
4.2.12 Public-private partnerships	4	4.5.01 Total public expenditure on education	52
4.5.14 Primary and secondary education	7	4.4.12 Energy intensity	52
4.1.09 Dependency ratio	8	4.5.03 Total public exp. on education per student	50
4.2.16 High-tech exports (%)	8	4.4.09 Medical assistance	50
4.1.05 Management of cities	11	4.2.06 Computers per capita	49
4.2.17 ICT service exports	12	4.4.01 Total health expenditure	49

# INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2565

## STRENGTHS

Infrastructure	Rank
4.5.13 Students who are not low achievers -PISA	1
4.4.23 Environment-related technologies	3
4.5.17 University education index	3
4.4.19 Forest area growth	3
4.2.10 Qualified engineers	4
4.2.11 Public-private partnerships	6
4.5.14 Primary and secondary education	7
4.1.05 Management of cities	8
4.2.15 High-tech exports (%)	8
4.1.15 Energy infrastructure	9

## WEAKNESSES

Infrastructure	Rank
4.4.17 Exposure to particle pollution	59
4.5.09 Student mobility inbound	55
4.4.11 Human development index	55
4.4.12 Energy intensity	54
4.2.06 Internet users	53
4.5.01 Total public expenditure on education	52
4.2.05 Secure internet servers	51
4.5.03 Total public exp. on education per student	50
4.4.01 Total health expenditure	50
4.4.09 Medical assistance	46

# INFRASTRUCTURE ของสาธารณรัฐประชาชนจีน ปี 2566

## INFRASTRUCTURE

### STRENGTHS

Rank

4.5.12 Students who are not low achievers - PISA	01
4.4.23 Environment-related technologies	03
4.5.17 University education index	03
4.4.19 Forest area growth	03
4.2.10 Qualified engineers	04
4.5.14 Primary and secondary education	05
4.1.05 Management of cities	07
4.4.24 Environmental agreements	07
4.2.02 Mobile broadband subscribers	08
4.1.15 Energy infrastructure	08

### WEAKNESSES

Rank

4.4.17 Exposure to particle pollution	58
4.5.09 Student mobility inbound	56
4.5.08 Women with degrees	54
4.2.06 Internet users	54
4.5.01 Total public expenditure on education	54
4.4.11 Human development index	52
4.2.05 Secure internet servers	51
4.4.01 Total health expenditure	51
4.4.12 Energy intensity	50
4.5.03 Total public exp. on education per student	49

# 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 ของประเทศมาเลเซีย ปี 2565

## STRENGTHS

Infrastructure	Rank
4.3.11 Graduates in Science	2
4.5.08 Women with degrees	4
4.2.15 High-tech exports (%)	5
4.1.09 Dependency ratio	11
4.1.20 Electricity costs for industrial clients	13
4.5.04 Pupil-teacher ratio (primary education)	14
4.4.24 Environmental agreements	17
4.2.11 Public-private partnerships	20
4.2.03 Mobile Telephone costs	21
4.5.05 Pupil-teacher ratio (secondary education)	21

## WEAKNESSES

Infrastructure	Rank
4.5.06 Secondary school enrollment	60
4.4.12 Energy intensity	59
4.4.01 Total health expenditure	57
4.4.19 Forest area growth	57
4.4.09 Medical assistance	54
4.2.07 Broadband subscribers	52
4.4.18 Renewable energy (%)	52
4.5.03 Total public exp. on education per student	49
4.4.11 Human development index	49
4.2.04 Communication technology	49

# INFRASTRUCTURE ของประเทศมาเลเซีย ปี 2566

## INFRASTRUCTURE

STRENGTHS	Rank	WEAKNESSES	Rank
4.3.11 Graduates in Sciences	02	4.4.01 Total health expenditure	60
4.5.08 Women with degrees	04	4.5.06 Secondary school enrollment	59
4.2.15 High-tech exports (%)	05	4.4.19 Forest area growth	58
4.1.09 Dependency ratio	07	4.4.12 Energy intensity	57
4.4.24 Environmental agreements	10	4.2.07 Broadband subscribers	54
4.1.20 Electricity costs for industrial clients	16	4.4.18 Renewable energies (%)	53
4.2.16 ICT service exports	16	4.4.09 Medical assistance	50
4.1.05 Management of cities	16	4.4.11 Human development index	49
4.4.27 Environmental laws	18	4.5.03 Total public exp. on education per student	48
4.5.04 Pupil-teacher ratio (primary education)	19	4.3.16 Patent applications per capita	46



# 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

# INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2565

## STRENGTHS

Infrastructure	Rank
4.3.19 Medium- and high-tech value added	1
4.2.08 Internet bandwidth speed	1
4.4.13 Safely treated waste water	1
4.5.07 Higher education achievement	2
4.2.11 Public-private partnerships	2
4.5.12 Students who are not low achievers -PISA	2
4.2.13 Funding for technological development	2
4.5.06 Secondary school enrollment	2
4.4.06 Life expectancy at birth	3
4.2.15 High-tech exports (%)	4

## WEAKNESSES

Infrastructure	Rank
4.1.07 Population growth	63
4.4.19 Forest area growth	61
4.5.01 Total public expenditure on education	61
4.4.18 Renewable energy (%)	58
4.1.20 Electricity costs for industrial clients	55
4.2.01 Investment in Telecommunications	55
4.4.01 Total health expenditure	54
4.2.06 Internet users	41
4.4.17 Exposure to particle pollution	40
4.2.03 Mobile Telephone costs	39

# INFRASTRUCTURE ของประเทศสิงคโปร์ปี 2566

## INFRASTRUCTURE

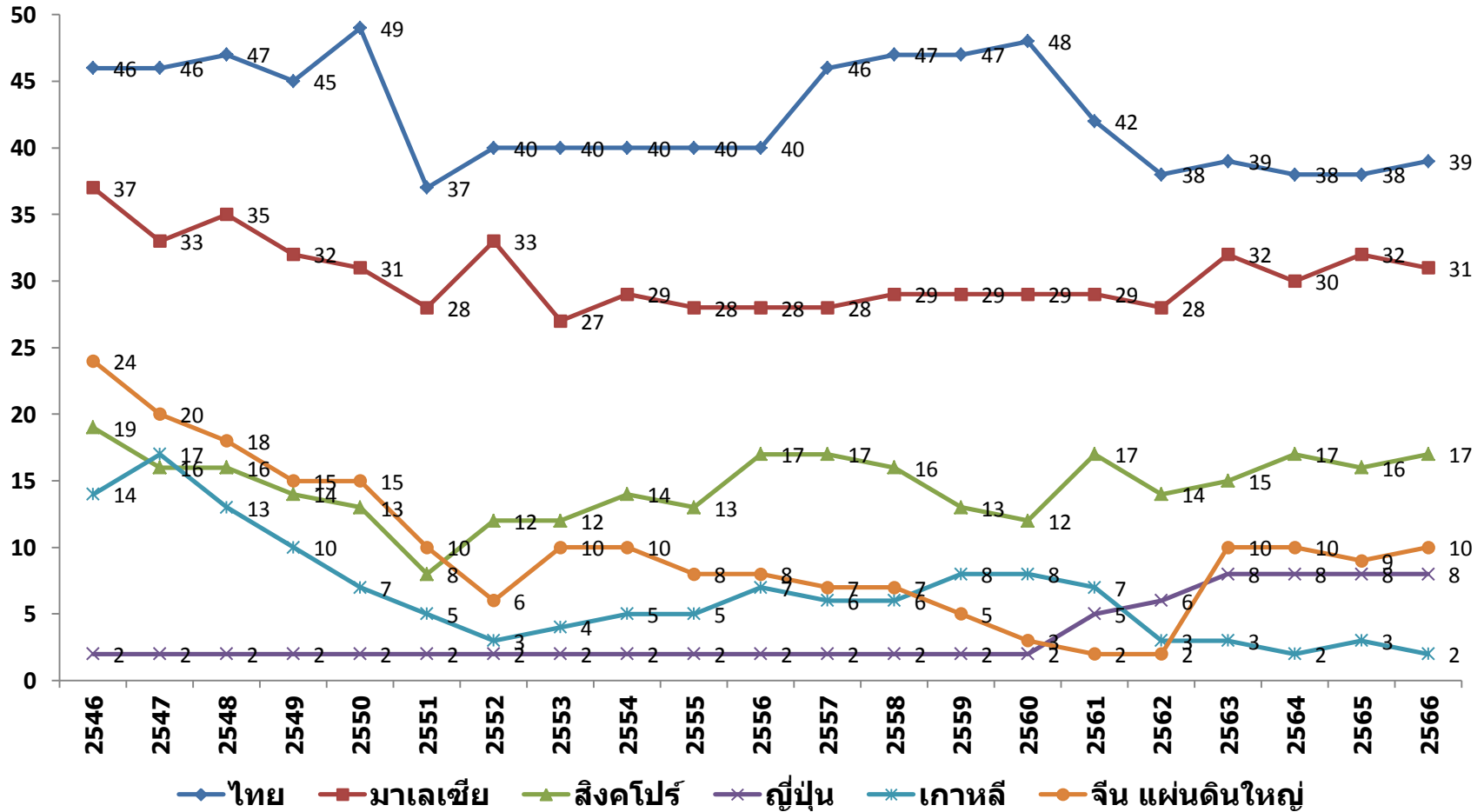
STRENGTHS	Rank	WEAKNESSES	Rank
4.3.19 Medium- and high-tech value added	01	4.4.19 Forest area growth	62
4.2.08 Internet bandwidth speed	01	4.5.01 Total public expenditure on education	62
4.4.13 Safely treated waste water	01	4.2.01 Investment in Telecommunications	58
4.5.07 Higher education achievement	02	4.4.18 Renewable energies (%)	58
4.5.12 Students who are not low achievers - PISA	02	4.1.20 Electricity costs for industrial clients	55
4.2.15 High-tech exports (%)	03	4.4.01 Total health expenditure	49
4.3.11 Graduates in Sciences	03	4.2.16 ICT service exports	43
4.1.07 Population - growth	04	4.2.03 Mobile telephone costs	38
4.5.09 Student mobility inbound	04	4.5.17 University education index	38
4.2.05 Secure internet servers	04	4.4.23 Environment-related technologies	25

**อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐานทาง  
วิทยาศาสตร์ และโครงสร้างพื้นฐานทางเทคโนโลยี  
ของประเทศไทย ปี 2546 -2566**

ปี	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556
วิทยาศาสตร์	46	46	47	45	49	37	40	40	40	40	40
เทคโนโลยี	41	38	37	41	48	43	36	48	52	50	47
จำนวน ประเทศ	51	51	51	53	55	55	57	58	59	59	60
ปี	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	
วิทยาศาสตร์	46	47	47	48	42	38	34	38	38	39	
เทคโนโลยี	41	44	42	36	36	38	39	37	34	25	
จำนวน ประเทศ	60	61	61	63	63	63	63	64	63	64	

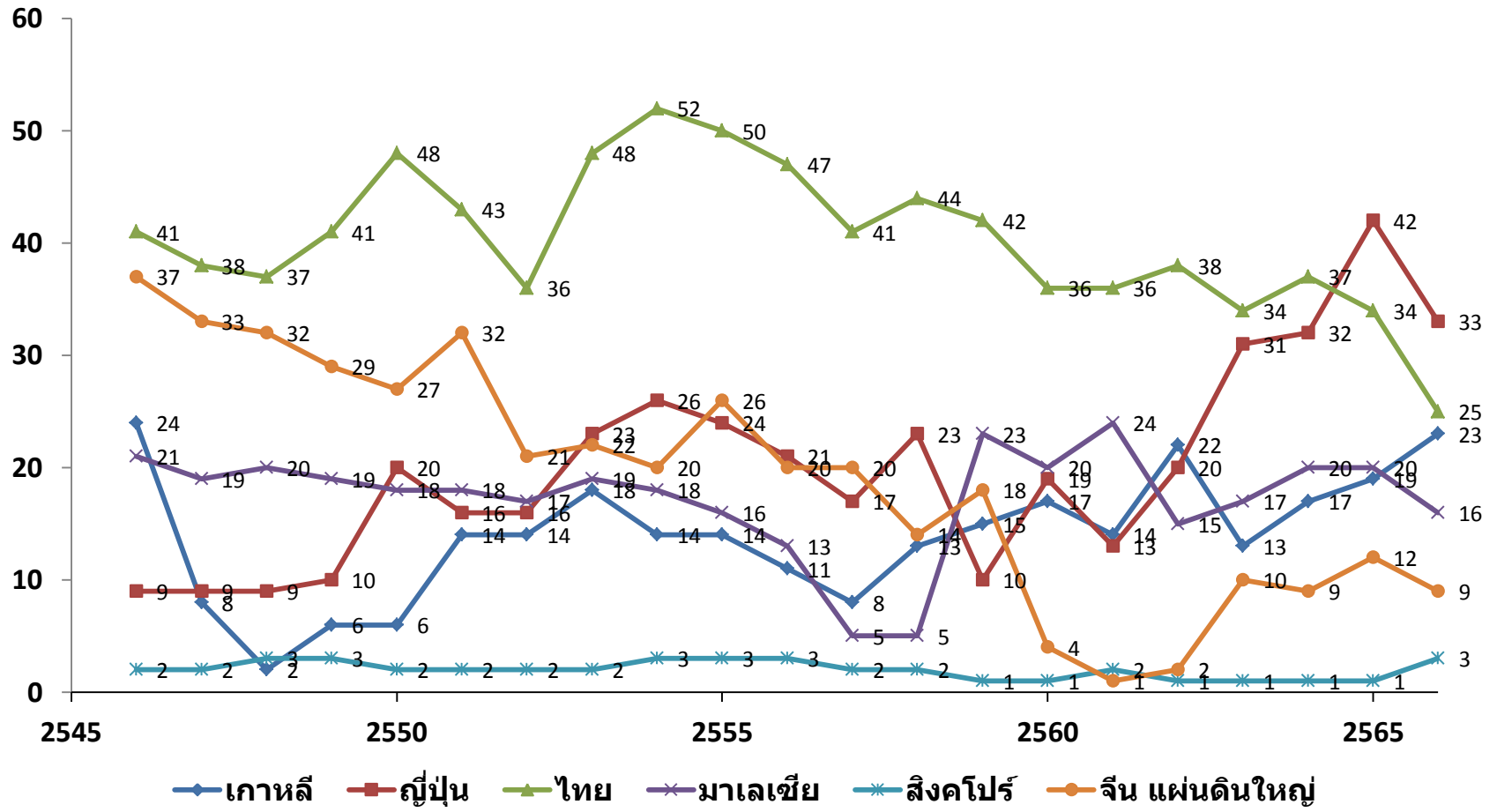
ที่มา : IMD

# อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐาน ทางวิทยาศาสตร์ของประเทศต่างๆ โดยรวมปี 2546 - 2566



ที่มา : IMD

# อันดับความสามารถในการแข่งขันด้านโครงสร้างพื้นฐาน ทางเทคโนโลยีของประเทศต่าง ๆ โดยรวม ปี 2546-2566

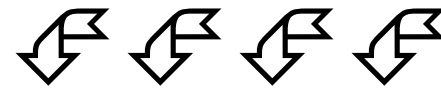
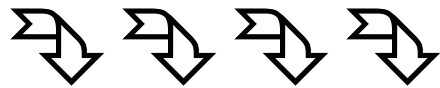


ที่มา : IMD

# เทคโนโลยีกับการพัฒนาประเทศ

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ความสำคัญของเทคโนโลยีต่อการพัฒนาประเทศ



ผู้ใดครองเทคโนโลยี

ผู้นั้นครองเศรษฐกิจ

ผู้ใดครองเทคโนโลยี

ผู้นั้นครองอำนาจ