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IMD WORLD COMPETITIVENESS CENTER

IMD WORLD DIGITAL COMPETITIVENESS RANKING 2020

Preface

We are pleased and proud to present the *IMD World Digital Competitiveness Ranking (WDCR)* for 2020. The fourth edition of this ranking comes at a very challenging time for the world. Since the beginning of the year, every aspect of our lives has been affected by the pandemic. Technology has been incorporated to address the pandemic in different dimensions from communication to monitoring, assessing and, hopefully in the non-distant future, finding a cure for the virus.

WDCR measures the capacity and readiness of 63 economies to adopt and explore digital technologies for economic and social transformation. The ranking relies on three factors: Knowledge, which captures the intangible infrastructure necessary for the learning and discovery dimensions of technology; Technology, which quantifies the landscape of developing digital technologies; and Future Readiness, that examines the level of preparedness of an economy to assume its digital transformation.

For most countries the responses of our survey were acquired during the first wave of COVID-19. To be clear, the questions we ask do not refer specifically to issues related to the pandemic. Still, if technology is the most important tool in our battle against the pandemic, some of the trends we identify have an added significance.

And the trends follow past observations. The role of knowledge generation and talent development in combination with effective regulation and infrastructure, continue to drive digital competitiveness. Furthermore, the flexibility and adaptability of not only enterprises but of individuals as well sustain the digital progress of countries.

An undertaking like the *IMD World Digital Competitiveness Ranking* could not have been accomplished without the support and assistance of many stakeholders. Our *Partner Institutes*, the *IMD Alumni* community and our *Panel of Experts* from all the countries generously offer data and insights that are crucial for completing such a project. We are fortunate and honored for their continuous collaboration. Yet, this year, they miraculously managed to make us feel that it was business as usual and not a uniquely complicated and difficult environment. The reason you have this publication in your hands now is, to a great extent, due to our stakeholders. We are humbled and thankful!

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The IMD World Competitiveness Center

For more than thirty years, the IMD World Competitiveness Center has pioneered research on how countries and companies compete to lay the foundations for sustainable value creation. The competitiveness of nations is probably one of the most significant developments in modern management and IMD is committed to leading the field. The World Competitiveness Center conducts its mission in cooperation with a network of 57 Partner Institutes worldwide to provide the government, business and academic communities with the following services:

- Competitiveness Special Reports
- Competitiveness Prognostic Reports
- Workshops/Mega Dives on competitiveness
- IMD World Competitiveness Yearbook
- IMD World Digital Competitiveness Ranking
- IMD World Talent Ranking

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We also have the privilege of collaborating with a unique network of Partner Institutes, and other organizations, which guarantees the relevance of the data gathered.

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Partner Institutes

We would like to express our deep appreciation for the contribution of our Partner Institutes, enabling an extensive coverage of competitiveness in their home countries. The following Institutes and people supplied data from national sources and helped distribute the survey questionnaires:

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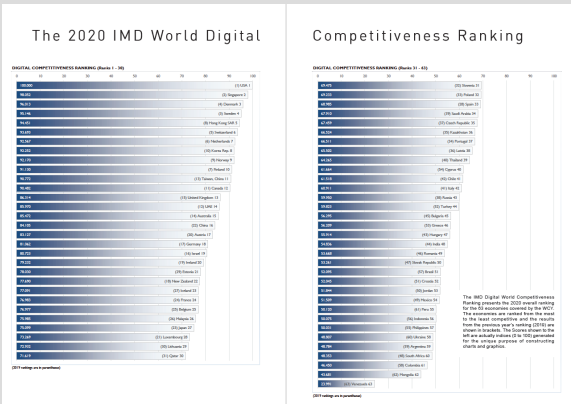
User's Guide to the IMD World Digital Competitiveness Ranking

Overall and Breakdown Digital Rankings

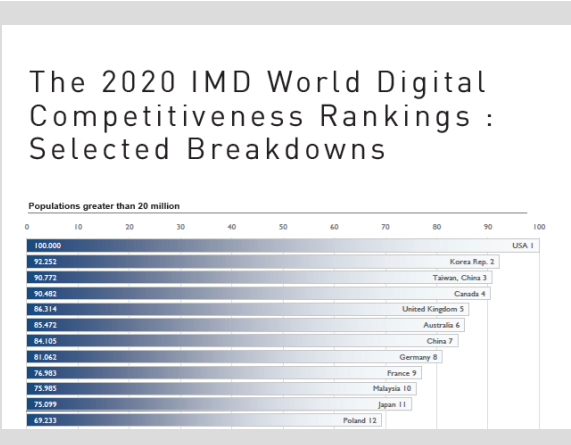
The IMD World Digital Competitiveness Ranking

The IMD World Digital Competitiveness Ranking presents the 2020 overall rankings for the 63 economies covered by the WCY. The rankings are calculated on the basis of the 52 ranked criteria: 32 Hard and 20 Survey data. The countries are ranked from the most to the least digital competitive and the results from the previous year's scoreboard (2019) are shown in brackets. The index value or "score" is also indicated for each country.



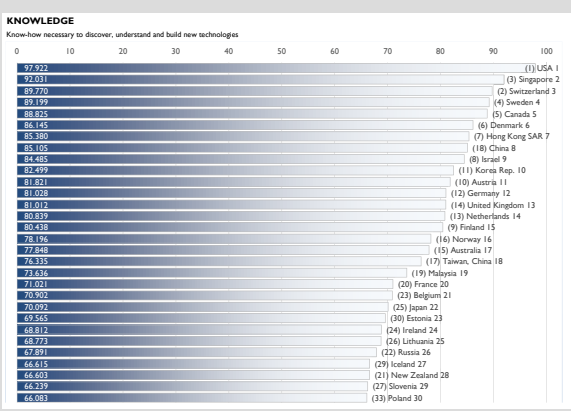
Selected breakdowns of the IMD World Digital Competitiveness Ranking

In addition to global digital rankings, other rankings are provided to show comparisons based on different perspectives. These digital rankings include countries split by population size (populations above and below 20 million), by GDP per capita to reflect different peer groups (above and below $20,000) and three regional rankings drawn from different geographical areas (Europe-Middle East-Africa, Asia-Pacific and the Americas).



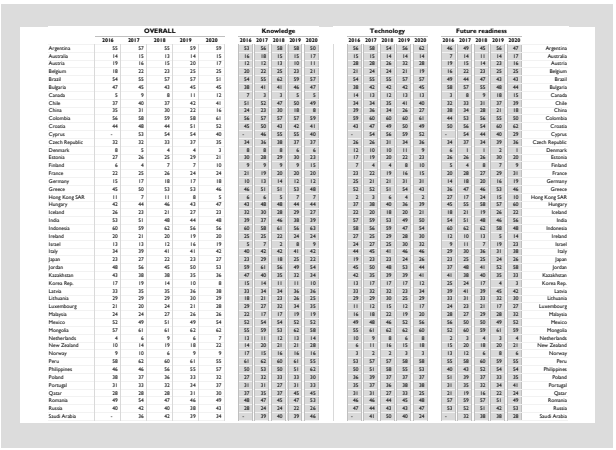
Digital Competitiveness Factor Rankings

The global rankings for each of the Digital Competitiveness Factors are then shown as individual ranking tables. Again, the economies are ranked from the most to the least digital competitive and the previous year's rankings (2019) are shown in brackets. Similar to the Overall Digital Ranking, the values or "scores" are indicated for each Factor. However, there is only one economy that has a score of 100 and one economy with a score of 0 across all four Factors.



Overall Ranking and Digital Competitiveness Factors

This section presents the overall rankings and the 5-year trends for each of the three Digital Competitiveness Factors: Knowledge, Technology and Future Readiness. Thus, the reader is able to analyze the digital evolution of an economy over the past few years relative to the others on a global basis.

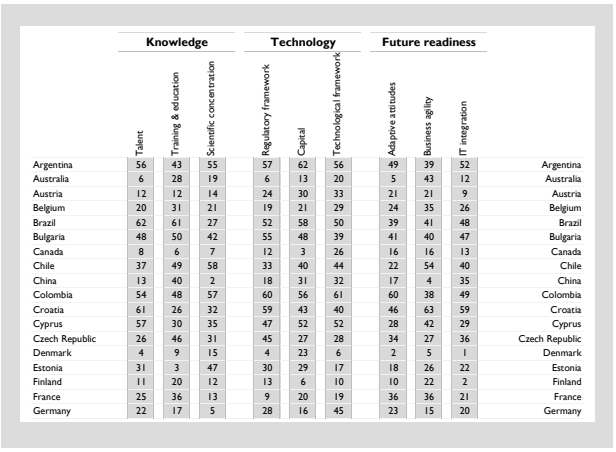


	OVERALL					Knowledge					Technology					Future readiness					
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	
Argentina	55	57	55	59	59	53	56	58	58	50	56	58	54	56	62	46	49	45	56	47	Argentina
Australia	14	15	13	14	15	16	18	15	15	17	15	15	14	14	14	7	14	11	14	17	Australia
Austria	19	16	15	20	17	12	12	13	10	11	28	28	26	33	28	19	15	14	23	16	Austria
Belgium	18	22	23	25	25	20	22	25	23	21	21	24	24	21	19	16	22	23	25	25	Belgium
Brazil	54	59	57	57	51	54	55	62	59	57	54	55	55	57	52	49	44	47	43	43	Brazil
Bulgaria	47	45	43	45	45	38	41	41	46	47	38	42	42	42	45	58	57	55	48	44	Bulgaria
Canada	5	9	8	11	12	7	3	3	5	5	14	13	13	13	13	3	8	9	18	15	Canada
Chile	37	40	37	42	41	51	52	47	50	49	34	34	35	41	40	32	33	31	37	39	Chile
China	35	31	30	22	16	24	23	20	18	8	39	36	34	36	27	38	34	28	21	18	China
Colombia	56	58	59	58	61	56	57	57	57	59	59	60	60	60	61	44	53	56	55	50	Colombia
Croatia	44	48	44	51	53	45	50	42	42	41	43	47	49	50	49	50	56	54	60	62	Croatia
Cyprus	-	53	54	54	40	-	46	55	55	40	-	54	56	59	52	-	54	44	40	29	Cyprus
Czech Republic	32	32	33	37	35	34	36	38	37	37	26	26	31	34	36	34	37	34	39	36	Czech Republic
Denmark	8	5	4	4	3	8	8	8	6	6	12	10	10	11	9	6	1	1	2	5	Denmark
Estonia	27	26	25	29	21	30	28	29	30	23	17	19	20	22	23	26	26	26	30	20	Estonia
Finland	6	4	7	7	10	9	9	9	9	15	7	4	4	8	10	5	6	8	7	9	Finland
France	22	25	26	24	24	21	19	20	20	20	23	22	19	16	15	20	28	27	29	31	France
Germany	15	17	18	17	18	10	13	14	12	12	25	21	21	21	21	14	18	20	16	19	Germany
Greece	45	50	53	53	46	46	51	51	53	48	52	52	51	54	43	36	47	46	53	46	Greece
Hong Kong SAR	11	8	11	8	5	6	6	6	7	7	3	3	6	4	3	27	17	24	15	10	Hong Kong SAR
Hungary	42	44	46	42	47	42	48	48	44	44	37	38	40	36	39	46	50	48	57	40	Hungary
Iceland	26	23	21	27	23	32	35	28	29	27	22	20	18	20	21	18	21	19	26	22	Iceland
India	53	51	48	44	48	39	37	46	38	39	57	59	53	49	50	64	51	62	46	56	India
Indonesia	60	59	62	56	56	60	58	61	56	63	58	56	59	47	54	60	62	62	58	48	Indonesia
Ireland	20	21	20	19	20	25	25	22	24	24	27	25	29	28	30	12	10	13	5	14	Ireland
Israel	13	13	12	16	19	5	7	2	8	9	24	27	25	30	32	9	11	7	19	33	Israel
Italy	24	29	41	41	42	40	42	42	41	42	44	45	41	46	46	29	30	36	31	38	Italy
Japan	23	27	22	23	27	23	29	18	25	22	19	23	23	24	26	23	35	25	24	26	Japan
Jordan	48	56	45	50	53	59	61	56	49	54	45	50	48	53	44	37	48	41	52	58	Jordan
Kazakhstan	40	38	38	35	36	47	49	35	32	34	42	35	39	39	40	33	40	40	33	37	Kazakhstan
Korea Rep.	17	19	14	10	8	15	14	11	11	10	13	17	17	17	12	35	24	17	4	3	Korea Rep.
Latvia	33	35	35	34	38	33	34	34	36	36	33	32	32	33	34	39	41	39	45	42	Latvia
Lithuania	29	29	29	30	29	18	21	23	26	25	29	29	30	25	29	33	31	33	32	30	Lithuania
Luxembourg	21	20	24	21	28	29	27	32	34	30	11	13	15	12	17	24	22	21	17	27	Luxembourg
Malaysia	24	24	27	26	26	22	17	17	19	19	16	18	22	19	20	28	27	29	28	32	Malaysia
Mexico	52	49	51	49	54	52	54	54	52	52	48	48	46	52	56	56	50	50	49	52	Mexico
Mongolia	57	61	61	62	62	55	59	53	62	58	55	61	62	62	60	52	60	59	61	59	Mongolia
Netherlands	4	6	9	6	7	13	11	12	13	14	10	9	8	6	8	2	3	4	3	4	Netherlands
New Zealand	10	14	19	18	22	14	20	21	21	28	6	11	16	15	18	15	20	18	20	21	New Zealand
Norway	9	10	6	9	9	17	15	16	16	16	3	2	2	3	3	13	12	6	8	6	Norway
Peru	58	62	60	61	55	61	62	60	61	55	53	57	57	58	58	55	58	60	59	55	Peru
Philippines	46	46	56	55	57	50	53	50	51	63	50	51	58	55	53	40	43	52	54	54	Philippines
Poland	38	37	36	33	33	27	33	33	33	30	36	39	37	37	37	51	39	37	33	35	Poland
Portugal	31	33	32	34	37	31	31	27	31	33	35	37	36	38	38	31	35	32	34	41	Portugal
Qatar	28	28	28	31	30	37	35	37	40	45	31	31	27	35	35	31	19	16	22	24	Qatar
Romania	49	54	47	46	49	48	47	45	47	53	46	46	44	45	48	57	59	57	51	49	Romania
Russia	40	42	40	38	43	28	24	24	22	26	47	44	43	43	47	53	52	51	42	53	Russia
Saudi Arabia	-	36	42	39	34	-	39	40	39	46	-	41	50	40	24	-	32	38	38	28	Saudi Arabia

Digital Sub-factor Rankings

A summary of the rankings for all nine sub-factors is presented for the 63 economies for 2020. It is possible, at a glance, to determine in what areas of digital competitiveness an economy excels or has particular weaknesses and to make comparisons between countries. These rankings provide a more detailed examination of specific aspects of the digital transformation and can be used to, for example, evaluate the technological framework of a country or support international investment decisions.

We view the rankings as a tool for managers or policy makers to use when they analyze the above questions. Of course, each company must take into consideration the logic of its own economic sector, economic forecasts and its own traditions as well as governments should consider the national identity and value system of their economy.



	Knowledge			Technology			Future readiness			
	Talent	Training & education	Scientific concentration	Regulatory framework	Capital	Technological framework	Adaptive attitudes	Business agility	IT integration	
Argentina	56	43	55	57	62	56	49	39	52	Argentina
Australia	6	28	19	6	13	20	5	43	12	Australia
Austria	12	12	14	24	30	33	21	21	9	Austria
Belgium	20	31	21	19	21	29	24	35	26	Belgium
Brazil	62	61	27	52	58	50	39	41	48	Brazil
Bulgaria	48	50	42	55	48	39	41	40	47	Bulgaria
Canada	8	6	7	12	3	26	16	16	13	Canada
Chile	37	49	58	33	40	44	22	54	40	Chile
China	13	40	2	18	31	32	17	4	35	China
Colombia	54	48	57	60	56	61	60	38	49	Colombia
Croatia	61	26	32	59	43	40	46	63	59	Croatia
Cyprus	57	30	35	47	52	52	28	42	29	Cyprus
Czech Republic	26	46	31	45	27	28	34	27	36	Czech Republic
Denmark	4	9	15	4	23	6	2	5	1	Denmark
Estonia	31	3	47	30	29	17	18	26	22	Estonia
Finland	11	20	12	13	6	10	10	22	2	Finland
France	25	36	13	9	20	19	36	36	21	France
Germany	22	17	5	28	16	45	23	15	20	Germany

Digital Competitiveness Country Profiles

Each two page profile analyses the performance of one of the 63 economies that are included in the IMD World Digital Competitiveness Ranking. The economies are presented in alphabetical order. The term economy signifies an economic entity and does not imply any political independence.

It is possible, in one glimpse, to evaluate the digital evolution of each economy over time and its relative strengths and weaknesses. However, each economy's particular situation is influenced by its development level, political restraints and social value system.

Page 1: Digital Competitiveness – Overall and factors trends

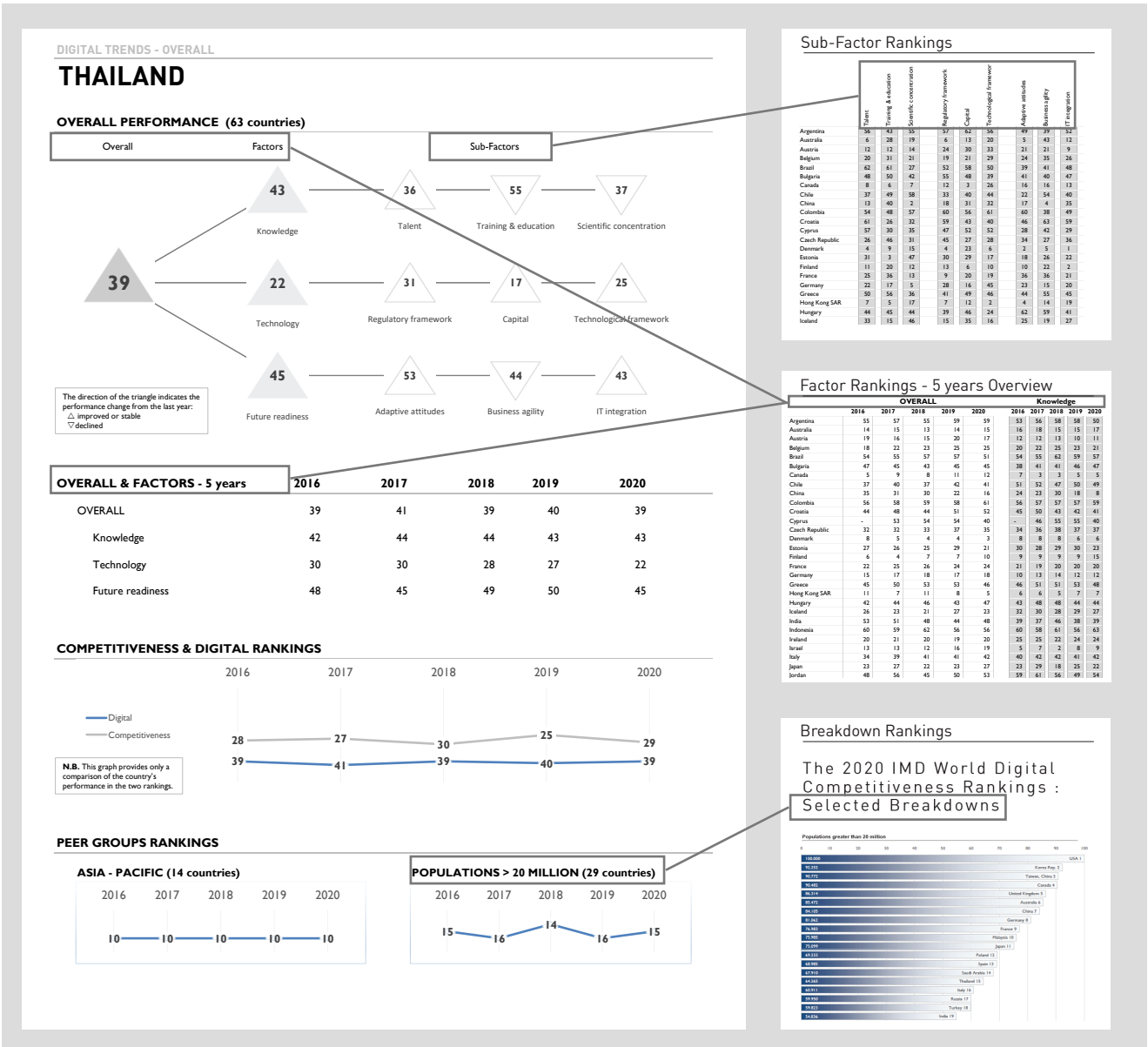
This page shows the overall, factors and sub-factors ranking performances of the country in 2020, their 5-years trends and a comparison of between competitiveness and digital competitiveness rankings. The following indicators are presented:

Overall Performance: Overall, factors and sub-factors digital ranking performances of the country in 2020. The direction of the triangles indicates whether there has been an improvement or a decline with respect to the previous year.

Overall & Factors – 5 years: The evolution of the overall and factors digital rankings in the past 5 years.

Competitiveness and Digital Rankings: Comparison of the country' performances in the World Competitiveness Ranking and World Digital Competitiveness Ranking in the last 5 years.

Peer Group Rankings: Based on geographical region and population size.



This page shows the country's performance over time for each of the nine sub-factors composing the three Digital Competitiveness Factors (Knowledge, Technology and Future Readiness) and their 52 criteria rankings for 2020.

Factors Breakdown: shows the 5-years evolution of the sub-factors rankings composing the three factors of Knowledge, Technology and Future Readiness.

Strengths and Weaknesses: this section highlights the economy's strongest and weakest criteria included in the World Digital Competitiveness Ranking. The triangles (►) identify the five top criteria in which the economy ranks best (strengths – filled triangle) and the five criteria in which its performance is the worst (weaknesses – empty triangle) compared to the other countries included in the WCY sample. The selection of indicators is determined by the standard deviation values (STD) of the country for that specific criteria. In other words, the criteria selected represent the highest STD values and the lowest STD values among the 52 indicators composing the World Digital Competitiveness Ranking and can thus be considered the digital competitive advantages and disadvantages of the economy.

The full criteria names can be found in the Appendix and the statistical tables are available for subscribers of the **IMD World Competitiveness Online**.

It is important to note that what constitutes a strength or weakness is relative to each economy's circumstances or development. Also, the ranking position of a country may not necessarily improve or decline as a consequence of its own evolution since it is always relative to the performance of the other economies. Therefore, an improvement may not be reflected by a higher ranking position if other economies have performed better for the criterion in question. The same can be said for any declines in performance – the economy's ranking position relative to the others may or may not fall, depending on how the other economies have performed.

FACTORS BREAKDOWN - STRENGTHS AND WEAKNESSES

THAILAND

► Overall top strengths
▷ Overall top weaknesses

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

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

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

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

Factor Rankings - 5 years Overview

	OVERALL					Knowledge				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Argentina	55	57	55	59	59	53	56	58	58	50
Australia	14	15	13	14	15	16	18	15	15	17
Austria	19	16	15	20	17	12	12	13	10	11
Belgium	18	22	23	25	25	20	22	25	23	21
Brazil	54	55	57	57	51	54	55	62	59	57
Bulgaria	47	45	43	45	45	38	41	41	46	47
Canada	5	9	8	11	12	7	3	3	5	5
Chile	37	40	37	42	41	51	52	47	50	49
China	35	31	30	22	16	24	23	30	18	8
Colombia	56	58	59	58	61	56	57	57	57	59
Croatia	44	48	44	51	52	45	50	43	42	41
Cyprus	-	53	54	54	40	-	46	55	55	40
Czech Republic	32	32	33	37	35	34	36	38	37	37
Denmark	8	5	4	4	3	8	8	8	6	6
Estonia	27	26	25	29	21	30	28	29	30	23
Finland	6	4	7	7	10	9	9	9	9	15
France	22	25	26	24	24	21	19	20	20	20
Germany	15	17	18	17	18	10	13	14	12	12
Greece	45	50	53	53	46	46	51	51	53	48
Hong Kong SAR	11	7	11	8	5	6	6	5	7	7
Hungary	42	44	46	43	47	43	48	48	44	44
Iceland	26	23	21	27	23	32	30	28	29	27
India	53	51	48	44	48	39	37	46	38	39
Indonesia	60	59	62	56	56	60	58	61	56	63
Ireland	20	21	20	19	20	25	25	22	24	24
Israel	13	13	12	16	19	5	7	2	8	9
Italy	34	39	41	41	42	40	42	42	41	42
Japan	23	27	22	23	27	23	29	18	25	22
Jordan	48	56	45	50	53	59	61	56	49	54
Kazakhstan	43	38	38	35	36	47	40	35	32	34
Korea Rep.	17	19	14	10	8	15	14	11	11	10
Latvia	33	35	35	36	38	33	34	34	36	36
Lithuania	29	29	29	30	29	18	21	23	26	25
Luxembourg	21	20	24	21	28	29	27	32	34	35
Malaysia	24	24	27	26	26	22	17	17	19	19
Mexico	52	49	51	49	54	52	54	54	52	52
Mongolia	57	61	61	62	62	55	59	53	62	58
Netherlands	4	6	9	6	7	13	11	12	13	14
New Zealand	10	14	19	18	22	14	20	21	21	28
Norway	9	10	6	9	9	17	15	16	16	16
Peru	58	62	60	61	55	61	62	60	61	55
Philippines	46	46	56	55	57	50	53	50	51	62
Poland	38	37	36	33	32	27	32	33	33	30
Portugal	31	33	32	34	37	31	31	27	31	33
Qatar	28	28	28	31	30	37	35	37	45	45
Romania	49	54	47	46	49	48	47	45	47	53

Sub-factor Rankings

	Talent	Training & education	Scientific concentration	Regulatory framework	Capital	Technological framework	Adaptive attitudes	Business agility	IT integration
Argentina	56	45	55	57	62	56	49	39	52
Australia	6	28	19	6	13	20	5	43	12
Austria	12	12	14	24	30	33	21	21	9
Belgium	20	31	21	19	21	29	24	35	26
Brazil	62	61	27	52	58	50	39	41	48
Bulgaria	48	50	42	55	48	39	41	40	47
Canada	8	6	7	12	3	26	16	16	13
Chile	37	49	58	33	40	44	22	54	40
China	13	40	2	18	31	32	17	4	35
Colombia	54	48	57	60	56	61	60	38	49
Croatia	61	26	32	59	43	40	46	63	59
Cyprus	57	30	35	47	52	52	28	42	29
Czech Republic	26	46	31	45	27	28	34	27	36
Denmark	4	9	15	4	23	6	2	5	1
Estonia	31	3	47	30	29	17	18	26	22
Finland	11	20	12	13	6	10	10	22	2
France	25	36	13	9	20	19	36	36	21
Germany	22	17	5	28	16	45	23	15	20
Greece	50	56	36	41	49	46	44	55	45
Hong Kong SAR	7	5	17	7	12	2	4	14	19
Hungary	44	45	44	39	46	24	62	59	41
Iceland	33	15	46	15	35	16	25	19	27
India	41	51	29	53	7	62	55	52	55
Indonesia	43	63	51	51	41	55	58	24	60
Ireland	19	35	25	14	45	30	12	9	25
Israel	38	1	3	32	26	36	26	29	14
Italy	42	58	22	48	54	43	42	23	39
Japan	46	18	11	44	33	5	19	56	23
Jordan	40	33	63	42	38	53	61	37	57
Kazakhstan	49	4	54	23	55	48	33	13	46
Korea Rep.	21	11	4	26	25	3	1	3	15
Latvia	27	27	49	37	50	13	51	45	37
Lithuania	23	16	40	27	42	18	47	18	32
Luxembourg	39	23	41	8	15	35	48	34	16
Malaysia	30	8	26	35	18	15	30	30	33
Mexico	45	57	43	50	53	54	52	50	53
Mongolia	60	41	61	58	60	60	40	61	61
Netherlands	3	29	16	11	2	12	6	7	5
New Zealand	17	37	34	21	24	21	13	46	18
Norway	16	10	23	2	9	9	7	8	6
Peru	58	39	59	49	37	59	54	47	58
Philippines	55	59	56	62	39	49	57	32	56

Trends in the IMD World Digital Competitiveness Ranking, 2020

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Introduction

The IMD World Competitiveness Center is publishing the fourth edition of the IMD World Digital Competitiveness Ranking (WDCR) that measures the capacity and readiness of 63 economies to adopt and explore digital technologies for economic and social transformation.

WDCR relies on three factors: Knowledge, which captures the intangible infrastructure necessary for the learning and discovery dimensions of technology; Technology, which quantifies the landscape of developing digital technologies; and Future Readiness, that examines the level of preparedness of an economy to assume its digital transformation.

In this edition of the WDCR, we introduce one new variable related to "Entrepreneurial fear of failure" as an additional criterion in the Business Agility sub-factor. The source of this variable is the Global Entrepreneurship Monitor (GEM).

In 2020, USA held the top position for the third consecutive year. Singapore held the 2nd spot, while Denmark overtook Sweden to claim 3rd place. Hong Kong climbed three ranks to 5th, and Switzerland dropped one place to claim the 6th spot.

2020 has been a challenging year for the world. Every aspect of our lives has been affected by COVID-19 and technology has been incorporated to address the pandemic in different dimensions from communication to monitoring, assessing and, hopefully in the non-distant future, finding a cure for the virus.

For most countries the responses of our survey were acquired during the first wave of COVID-19. To be clear, the questions we ask do not refer specifically to issues related to the pandemic. Still, if technology is the most important tool in our battle against the pandemic, some of the trends we identify have an added significance.

Figure 1:Changes in Digital competitiveness ranking between 2019 and 2020

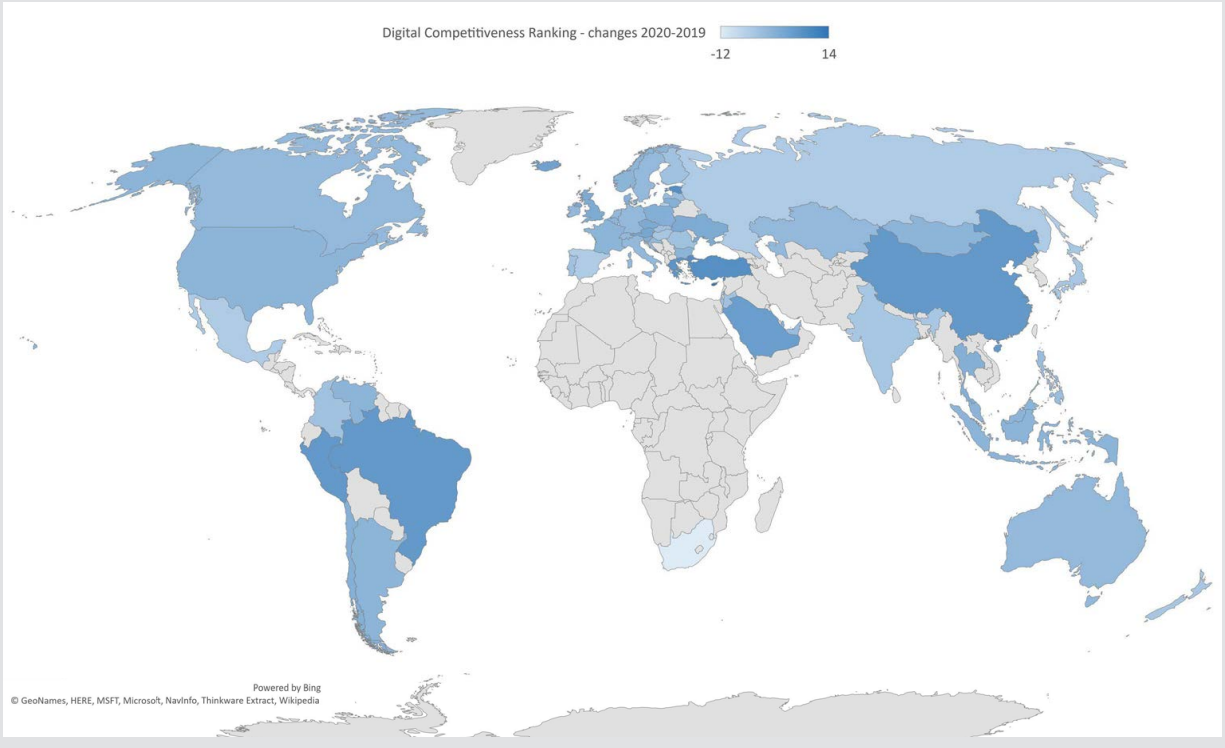
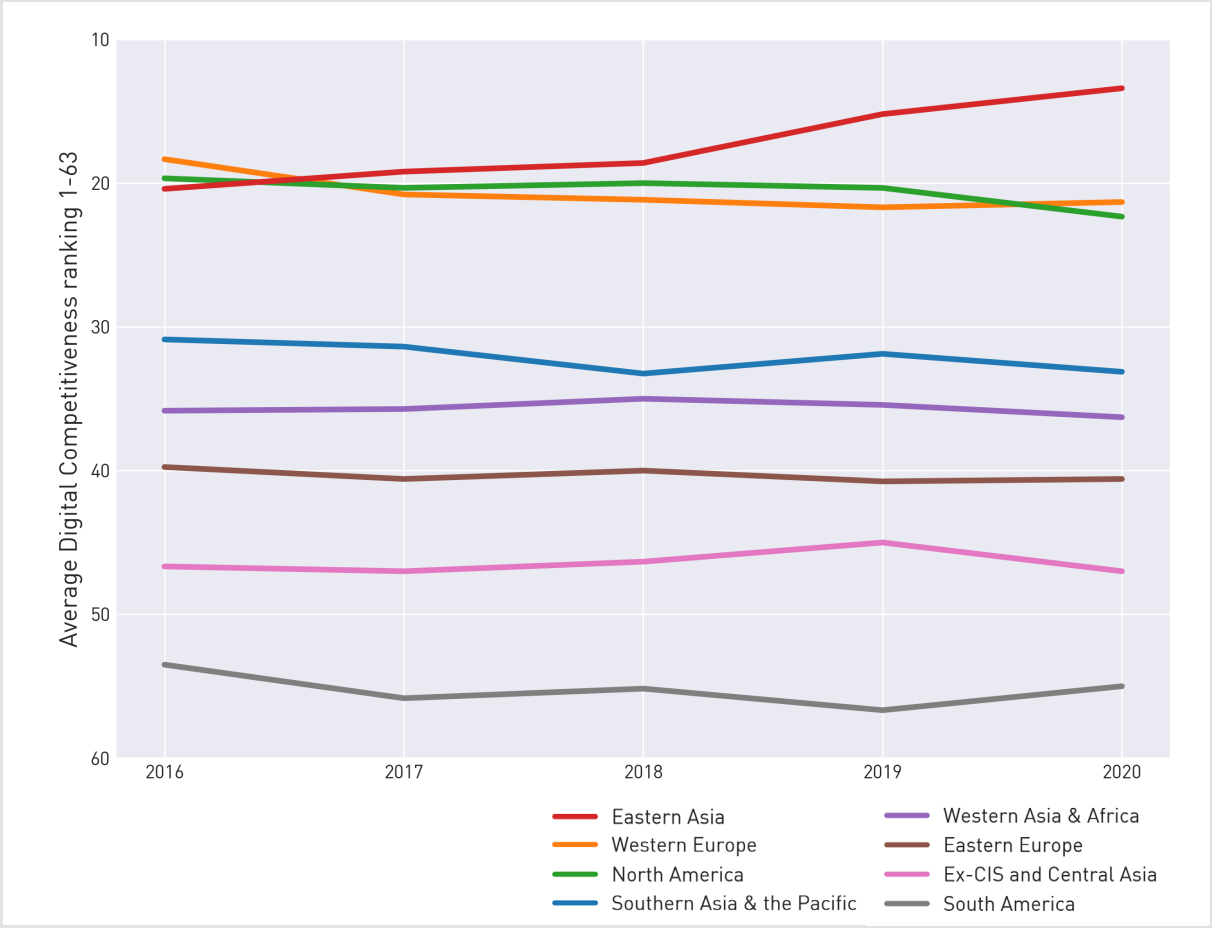


Figure 2: Trends in Digital Competitiveness by region



For 2020, economies that top our ranking focus on building their talent pool and thus strengthen the knowledge infrastructure necessary to develop and employ digital technology with Singapore, Switzerland, and the Netherlands holding the top three positions respectively.

In addition, most leading economies in our ranking provide an effective regulatory framework that enables the development and introduction of technologies. Singapore, Norway, UAE and Denmark capture the top four places in this sub-factor.

Finally, top performers in digital competitiveness also combine individual adaptability with business agility in their economies. The Republic of Korea, Denmark and the USA excel in the dimension of individual adaptive attitudes while Taiwan-China, the USA, the Republic of Korea and China capture the four highest places in the area of business agility.

In the following sections, we review the main facts for the top ten economies, we identify the characteristics of the largest increases and declines, as well as the challenges for the bottom ten economies in our ranking. We begin by outlining the trends in digital competitiveness at the sub-regional level.

Digital competitiveness regional trends: Overall ranking

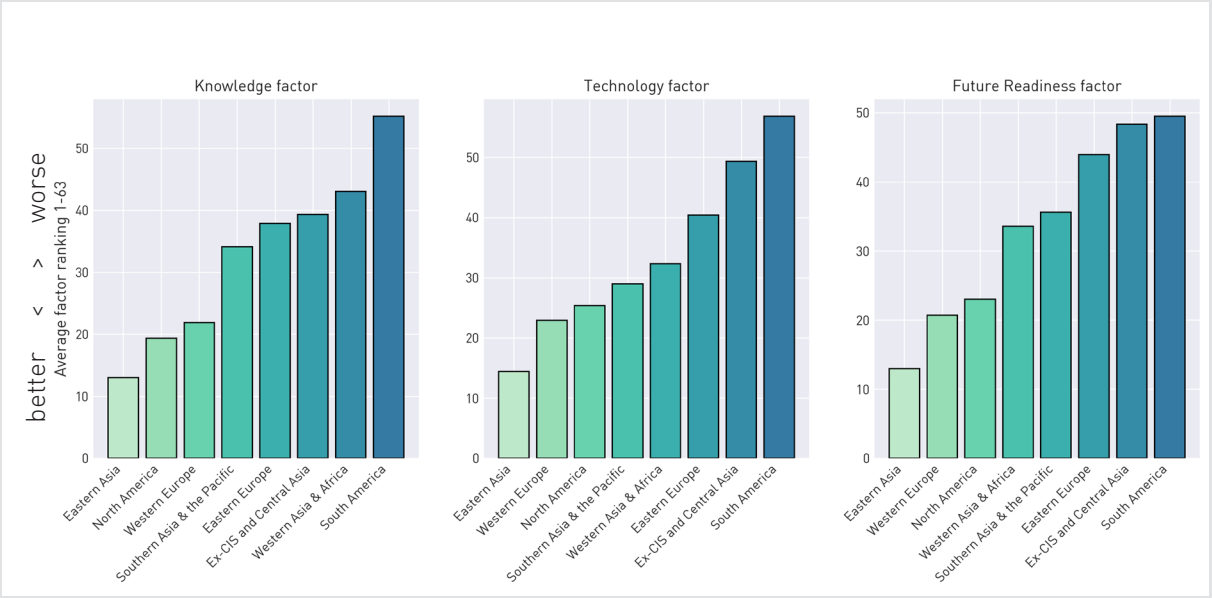
The WDCR studies 63 economies most of which have a high or middle level of income per capita. **Figure 1** provides a visualization of the changes in the ranking between 2019 and 2020. Of the economies in the study, 29, experienced a decline in the ranking. From the remaining, 23 advanced, while 11 remained in the position as last year.

The largest improvements in the ranking compared to 2019 have been experienced by Cyprus, Estonia, Turkey, Greece, Brazil and China. The largest declines have affected instead South Africa, Luxembourg, Russia, Mexico and Spain. Below, we discuss these trends in more details.

Figure 2 presents the sub-regional overall digital competitiveness ranking trend for the years 2016 to 2020. Only Eastern Asia and South America regions achieved an increase in their digital competitiveness rankings between 2019 and 2020; the other sub-regions remained stable or experienced a decline in their overall average positions.

Eastern Asia tops the regional rankings, steadily increasing since 2016 from an average ranking position of about 20th to about 15th in 2019 finally reaching an average of 13.4 in 2020. Western Europe remains stable at about 21st in 2020 but becomes the second most digital competitive region because of a small decline experienced

Figure 3: Digital competitiveness factors performance across regions in 2020



by North America (which drops from an average position of about 20th over the past four years to 22.3 in 2020). Southern Asia and the Pacific and Western Asia and Africa regions saw a decline in the 2019-2020 period reaching the 33rd and the 36th positions respectively.

The performance of Eastern European countries is stable in 2020 around an average 40th position. Ex-Cis and Central Asia economies declined from about 45th to 47th during the same period. Conversely, the South American region shows a slight improvement this year increasing its average position from 56th in 2019 to an average ranking of 55th in 2020.

In terms of the digital competitiveness factors (**Figure 3**), regional rankings are fairly similar to the overall digital competitiveness scores. However, a noticeable difference is present in the knowledge factor where North America and Ex-CIS and Central Asia economies perform better compared to the general score.

Top 10

The top 10 economies remain the same as last year. The USA continues to lead the IMD World Digital Competitiveness Ranking for the third consecutive year. Likewise, Singapore remains in the 2nd spot. While Denmark overtakes Sweden moving up one place (3rd and 4th respectively), Hong Kong SAR rises three ranks to 5th. Switzerland drops to 6th (from 5th) and similarly the Netherlands declines to 7th (from 6th). Korea Rep. moves up to 8th (from 10th), Norway remains at 9th and Finland rounds up the top 10 dropping 3 places from 7th.

The USA's performance is largely driven by the knowledge and future readiness factors. More specifically, it is sustained by factors related to scientific concentration (e.g., percentage of scientific and technical employment and the use of robots in education and R&D), capital (e.g., availability of venture capital), adaptive attitudes (e.g., e-participation) and business agility (e.g., world robots distribution or the percentage share of world robots).

Singapore achievements comes mainly on the back of its performance in the knowledge and technology factors. Particularly, Singapore tops the rankings in talent, and in the regulatory and technological frameworks. In training and education, employee training rises from the 28th place to the 16th. In addition, in scientific concentration, the scientific and technical employment indicator shows improvement.

Denmark exceeds in the future readiness factor. In the latter, it ranks 1st in IT integration, 2nd in adaptive attitudes and 5th in business agility. At the indicator level, Denmark ranks 1st in attitudes toward globalization and e-government, and 3rd in the effectives of companies' response to opportunities and threats, and in knowledge transfer between companies and universities.

At the factor level, Sweden reaches its highest ranking in knowledge which is driven by its performance in training and education (2nd). Among the indicators, Sweden ranks the highest in the development and application of technology and in country credit rating (1st in both), and it reaches the 2nd spot in the availability of digital/technological skills and in attitudes toward globalization.

Hong Kong's improvement in the overall digital competitiveness ranking is mainly the result of its performance in the technology factor and to a lesser extent in knowledge. In the former, Hong Kong ranks highest in the technological framework (2nd), and in the latter, in talent (7th). Its strengths include high-tech exports (as a percentage of manufactured exports) and the private sector's response to opportunities and threats ranking 1st in both, graduates in sciences (2nd) and high-tech patent grants (2nd).

The slight drop experienced by Switzerland this year is the result of declines in both the knowledge and technology factors. In knowledge, the most significant change is in scientific concentration in which Switzerland moves down from 7th to 9th, mainly as a result of a somewhat stagnant performance in the percentage of female researchers indicator (34th) and R&D productivity by publication (38th). In technology, Switzerland drops in the technological framework from 9th in 2019 to 14th which results from a significant drop in high-tech exports.

The Netherlands sees a slight decline in the overall digital competitiveness ranking as a result of drops across all factors. In the talent factor, its performance slumps in the management of cities, the availability of digital/technological skills, and total public expenditure on education. Within the technology factor, the Netherlands sees a decline in the effectiveness of immigration laws (whether or not they prevent companies from employing foreign labor) and the efficiency of the banking and financial services. Under the future readiness factor, e-participation, the agility of companies and their use of big data and analytics experience a downturn.

Conversely, Korea improves across all factors. Its strongest performance comes in the future readiness

Figure 4: Digital competitiveness ranking 2020 Top 10

Overall Rank		Knowledge	Technology	Future Readiness
1	USA	1	7	2
2	Singapore	2	1	12
3	Denmark	6	9	1
4	Sweden	4	6	7
5	Hong Kong SAR	7	2	10
6	Switzerland	3	11	5
7	Netherlands	14	8	4
8	Korea Rep.	10	12	3
9	Norway	16	3	6
10	Finland	15	10	9

factor (3rd), specifically in the adaptive attitudes (1st) and business agility (3rd) sub-factors. In adaptive attitudes, it ranks 1st in e-participation and internet retailing. In business agility, Korea benefits from a positive turn in executives' perceptions particularly in terms of how enterprises manage opportunities and threats, the agility of companies and their use of big data and analytics.

Norway's strengths are mainly in the technology factor (3rd). Under the regulatory framework sub-factor in which it ranks 2nd, Norway performs well in the enforcement of contracts (3rd) and in the effectiveness of immigration laws (7th). Other strengths include country credit rating (joint 1st), number of internet users (per 1000 people, 2nd) and tablet and smartphone possession (3rd and 4th, respectively).

Finland remains in the top 10 despite declining in several aspects including graduates in sciences, the effectiveness of immigration laws, IT & media stock market capitalization, e-participation and internet retailing. Nevertheless, Finland improves in the business agility sub-factor (from 27th to 22nd) as a result of gains in executives' perceptions about how companies react to opportunities and threats, and their use of big data and analytics.

Largest Improvements

Cyprus experiences the largest increase (from 54th to 40th) in this year's overall digital competitiveness ranking. This is the results of improvements across all factors increasing from 55th to 40th in knowledge, 59th to 52nd in technology and 40th to 29th in future readiness. The key drivers of such boost include increases in high-tech patent grants (percentage of all patents granted), investment in telecommunications (percentage of GDP), e-participation and e-government. Cyprus also benefits from a favourable turn in executive perceptions.

In the overall ranking, Turkey moves from the 52nd place to 44th. The move originates mainly from improvements in future readiness particularly in adaptive attitudes (e.g., rise from 35th to 22nd in e-participation) and business agility (e.g., moves from 58th to 42nd in the private sector's use of big data and analytics).

Estonia's improves from the 29th spot to the 21st which represents its highest position since the inception of the digital competitiveness ranking. Estonia performs well in knowledge (from 30th to 23rd) and future readiness (from 30th to 20th). The boost in the knowledge factor is largely the result of an advancement in talent (from 37th to 31st) and training and education (from 10th to 3rd). Estonia's performance in future readiness improves in adaptive attitudes (from 26th to 18th) and business agility (from 43rd to 26th).

Greece ranks 46th (up from 53rd) in the overall ranking. Within the technology factor (up to 43rd from 54th), Greece performs well in the regulatory framework sub-factor rising to 41st (from 52nd). Such a boost comes from improvements in, for example, the starting business indicator, in which Greece advances from 26th to 6th. In the future readiness factor (46th, up from 53rd), Greece advances in business agility (from 60th to 55th) and IT integration (from 50th to 45th).

Brazil improves from the 57th place to 51st rising from near the bottom of the ranking. To different degrees, Brazil's performance in scientific concentration, regulatory framework, capital and business agility improves. Specifically, business agility shows advancement in most of its components including knowledge transfer between private sector and universities (59th to 54th) and in the agility of companies (57th to 39th).

In the overall digital competitiveness ranking, China advances from the 22nd spot to the 16th. This improvement is driven by boost in talent (19th to 13th), scientific concentration (9th to 2nd) and adaptive attitudes (24th to 17th). In particular, China advances in measures of scientific and technical employment, high-tech patent grants, IT & media stock market capitalization, e-participation and e-government.

Largest Delines

South Africa drops from the 48th spot to the 60th which represents the largest decline in the overall ranking. To different degrees, South Africa underperforms in all digital factors with the steepest decline in future readiness from 44th to 57th. At the sub-factor level, it also declines in all but one with the talent (49th to 59th) and business agility (from 40th to 58th) sub-factors displaying the largest drop. In terms of talent, the decline is mainly due to limited access to foreign highly-skilled personnel and availability of digital/ technological skills. Business agility suffers, for example, from an ineffective private sector response to opportunities and threats, and its limited use of big data and analytics.

Luxembourg slumps from the 21st place to the 28th in the overall ranking. It sees a downturn in all digital factors with the largest decline in future readiness (17th to 27th). The latter decrease results from the deterioration in Luxembourg's performance in measures related to e-participation, business' response to opportunities and threats, limited use of big data and analytics by the private sector, e-government, and public and private sector ventures (whether they support technological development).

Spain declines to 33rd (down from 28th) largely as a result of a downturn on several measures of future readiness. These include e-participation, tablet and smartphone possession, knowledge transfer and cyber security. Similarly, Russia drops to 43rd (from 38th) mainly from a dip in the future readiness sub-factor. This is particularly so in terms of business agility (e.g., private sector's management of opportunities and threats) and IT integration (e.g., e-government and public-private partnerships).

Bottom 10

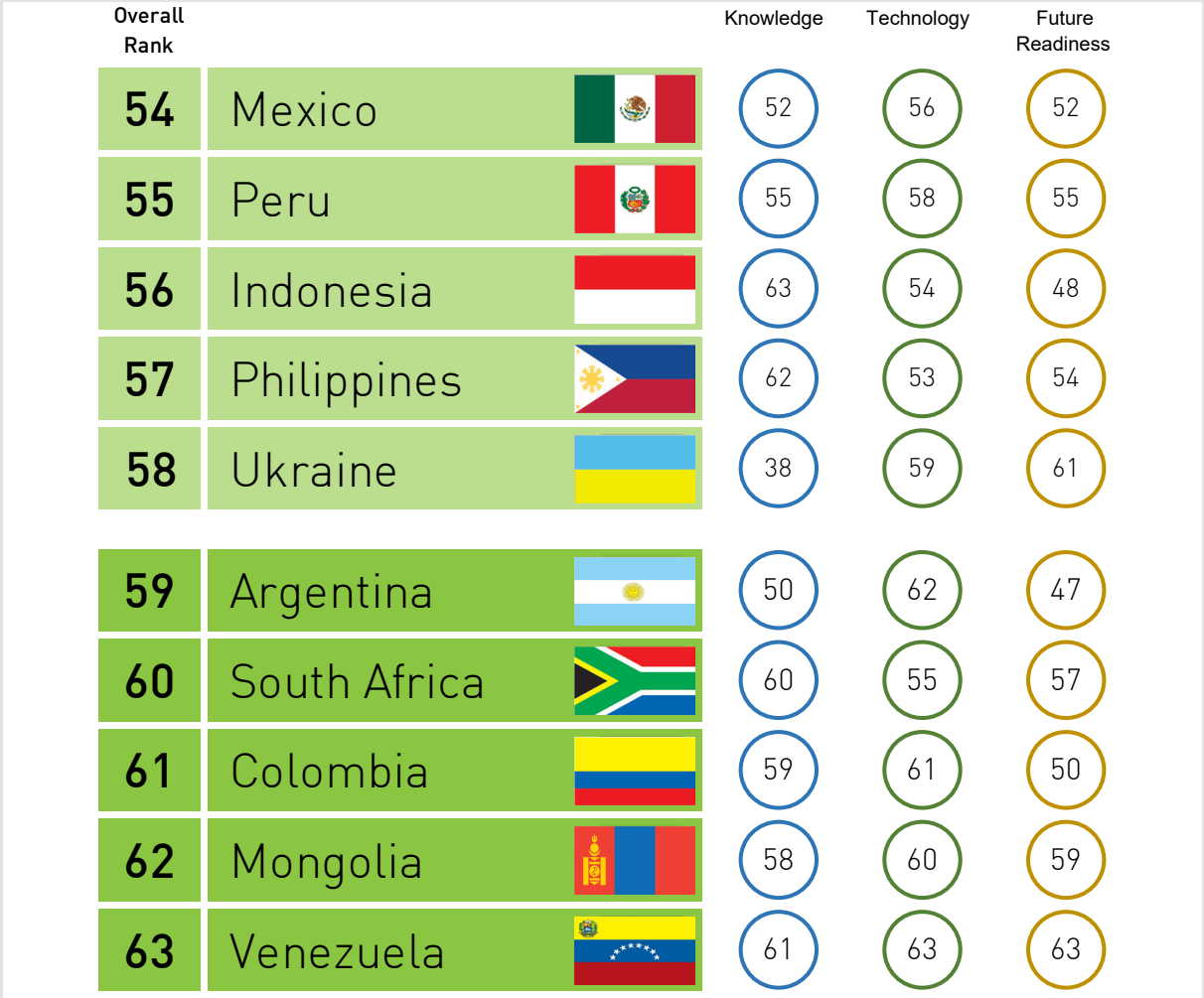
Mexico drops to the bottom 10 of the overall ranking declining from the 49th spot to the 54th. The downturn comes as measures of graduates in sciences, effectiveness of immigration laws, investment in telecommunications and e-participation experience a decrease.

Despite moving up from the 61st to the 55th spot, Peru remains in the bottom of the overall ranking. Peru shows a strong improvement in capital (45th to 37th) and business agility (59th to 47th) but remains somewhat stagnant in, for example, talent (58th), scientific concentration (59th) and technological framework (59th). In addition, Peru experiences a decline in adaptive attitudes (49th to 54th) mainly as a result of a drop in e-participation.

Indonesia remains in 56th despite improving in the future readiness factor, particularly in e-participation (58th to 45th) and internet retailing (58th to 50th). Such an improvement is counterbalanced by a drop in the technology factor in which the efficiency of the banking and financial services, the level of investment in telecommunication and wireless broadband (penetration rate, per 100 people) show a steep decline.

The Philippines slightly falls from 55th to 57th. The decline reflects the weakening of the talent and training and education sub-factors. The deterioration of these sub-factors is mainly driven by decreases in the availability of internationally experienced senior managers, attracting foreign highly-skilled personnel and employee training.

Figure 5: Digital competitiveness ranking 2020 Bottom 10



Ukraine improves, moving up two spots from 60th to 58th, which is driven by gains in talent, particularly in the availability of digital/technological skills (40th to 27th), e-participation (53rd to 39th) and agility of companies (47th to 33rd).

Argentina remains in the 59th spot. It experiences some improvements in the future readiness factor, especially in adaptive attitudes (57th to 49th) and business agility (48th to 39th). However, Argentina declines in talent (51st to 56th), scientific concentration (50th to 55th), regulatory framework (49th to 57th) and capital (51st to 62nd).

As discussed previously, South Africa ranks 60th (down from 48th) which represents the largest decline in this year's overall digital competitiveness ranking.

Despite strong advancements in business agility, Colombia drops from 58th place to 61st. The decline originates largely in a downturn in the technological framework and adaptive attitudes sub-factors. In addition, Colombia experiences stagnation in several other aspects including talent, training and education, regulatory framework and capital.

Mongolia remains in the 62nd place and Venezuela in the 63rd of the overall digital competitiveness ranking.

Concluding Remarks

The Digital technologies remain at the core of strengthening the competitiveness of an economy. In particular, the role of knowledge generation and talent development in combination with effective regulation and infrastructure, continue to drive digital competitiveness.

Furthermore, the flexibility and adaptability of not only enterprises but of individuals sustain the digital progress of countries. This is particularly so in the current pandemic context in which flexibility and adaptability to upcoming digital technologies will enable societies to overcome the crisis.

Appendices

Figure 6: Digital competitiveness ranking 2019 and 2020

Country / Economy	2020	Change	2019
USA	1	— (0)	1
Singapore	2	— (0)	2
Denmark	3	▲ (+1)	4
Sweden	4	▼ (-1)	3
Hong Kong SAR	5	▲ (+3)	8
Switzerland	6	▼ (-1)	5
Netherlands	7	▼ (-1)	6
Korea Rep.	8	▲ (+2)	10
Norway	9	— (0)	9
Finland	10	▼ (-3)	7
Taiwan, China	11	▲ (+2)	13
Canada	12	▼ (-1)	11
United Kingdom	13	▲ (+2)	15
UAE	14	▼ (-2)	12
Australia	15	▼ (-1)	14
China	16	▲ (+6)	22
Austria	17	▲ (+3)	20
Germany	18	▼ (-1)	17
Israel	19	▼ (-3)	16
Ireland	20	▼ (-1)	19
Estonia	21	▲ (+8)	29
New Zealand	22	▼ (-4)	18
Iceland	23	▲ (+4)	27
France	24	— (0)	24
Belgium	25	— (0)	25
Malaysia	26	— (0)	26
Japan	27	▼ (-4)	23
Luxembourg	28	▼ (-7)	21
Lithuania	29	▲ (+1)	30
Qatar	30	▲ (+1)	31
Slovenia	31	▲ (+1)	32
Poland	32	▲ (+1)	33

Country / Economy	2020	Change	2019
Spain	33	▼ (-5)	28
Saudi Arabia	34	▲ (+5)	39
Czech Republic	35	▲ (+2)	37
Kazakhstan	36	▼ (-1)	35
Portugal	37	▼ (-3)	34
Latvia	38	▼ (-2)	36
Thailand	39	▲ (+1)	40
Cyprus	40	▲ (+14)	54
Chile	41	▲ (+1)	42
Italy	42	▼ (-1)	41
Russia	43	▼ (-5)	38
Turkey	44	▲ (+8)	52
Bulgaria	45	— (0)	45
Greece	46	▲ (+7)	53
Hungary	47	▼ (-4)	43
India	48	▼ (-4)	44
Romania	49	▼ (-3)	46
Slovak Republic	50	▼ (-3)	47
Brazil	51	▲ (+6)	57
Croatia	52	▼ (-1)	51
Jordan	53	▼ (-3)	50
Mexico	54	▼ (-5)	49
Peru	55	▲ (+6)	61
Indonesia	56	— (0)	56
Philippines	57	▼ (-2)	55
Ukraine	58	▲ (+2)	60
Argentina	59	— (0)	59
South Africa	60	▼ (-12)	48
Colombia	61	▼ (-3)	58
Mongolia	62	— (0)	62
Venezuela	63	— (0)	63

Figure 7: Digital competitiveness ranking 2018, 2019 and 2020

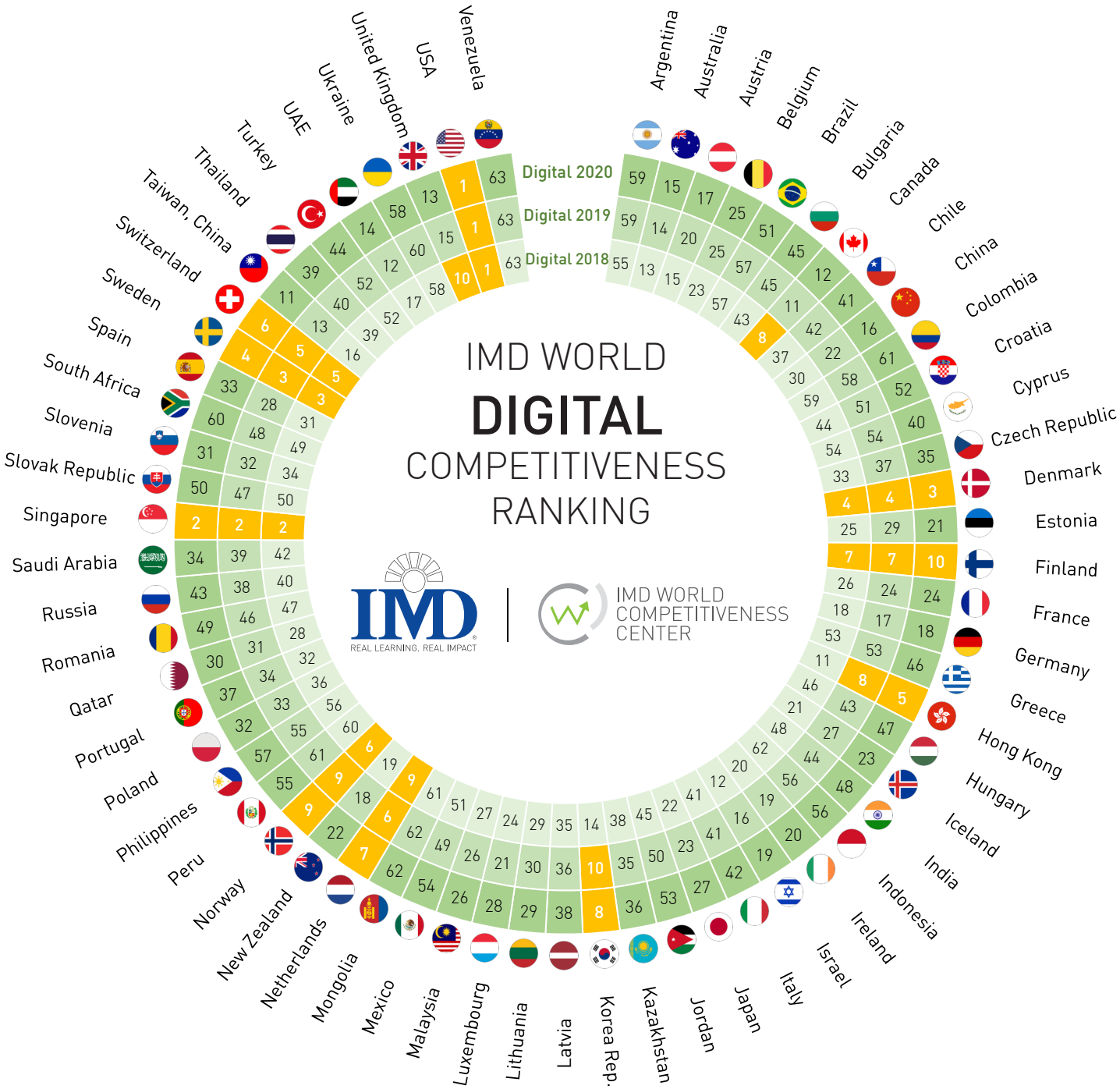


Figure 8: Composition of sub-regions and regions

Western Europe	▪ Austria ▪ Belgium ▪ Cyprus ▪ Denmark ▪ Finland ▪ France ▪ Germany ▪ Greece ▪ Iceland ▪ Ireland	▪ Italy ▪ Luxembourg ▪ Netherlands ▪ Norway ▪ Portugal ▪ Spain ▪ Sweden ▪ Switzerland ▪ United Kingdom	Europe, Middle East & Africa
Eastern Europe	▪ Bulgaria ▪ Czech Republic ▪ Estonia ▪ Croatia ▪ Hungary ▪ Lithuania	▪ Latvia ▪ Poland ▪ Romania ▪ Slovenia ▪ Slovak Republic ▪ Ukraine	
Western Asia & Africa	▪ Israel ▪ Jordan ▪ Qatar ▪ Saudi Arabia	▪ South Africa ▪ Turkey ▪ UAE	
Ex-CIS & Central Asia	▪ Kazakhstan ▪ Mongolia	▪ Russia	
Eastern Asia	▪ China Mainland ▪ Hong Kong SAR ▪ Japan	▪ Korea Rep. ▪ Taiwan	Asia & Pacific
Southern Asia & The Pacific	▪ Australia ▪ India ▪ Indonesia ▪ Malaysia	▪ New Zealand ▪ Philippines ▪ Singapore ▪ Thailand	
North America	▪ Canada ▪ Mexico	▪ USA	The Americas
South America	▪ Argentina ▪ Brazil ▪ Chile	▪ Colombia ▪ Peru ▪ Venezuela	

IMD WORLD DIGITAL COMPETITIVENESS RANKING 2020

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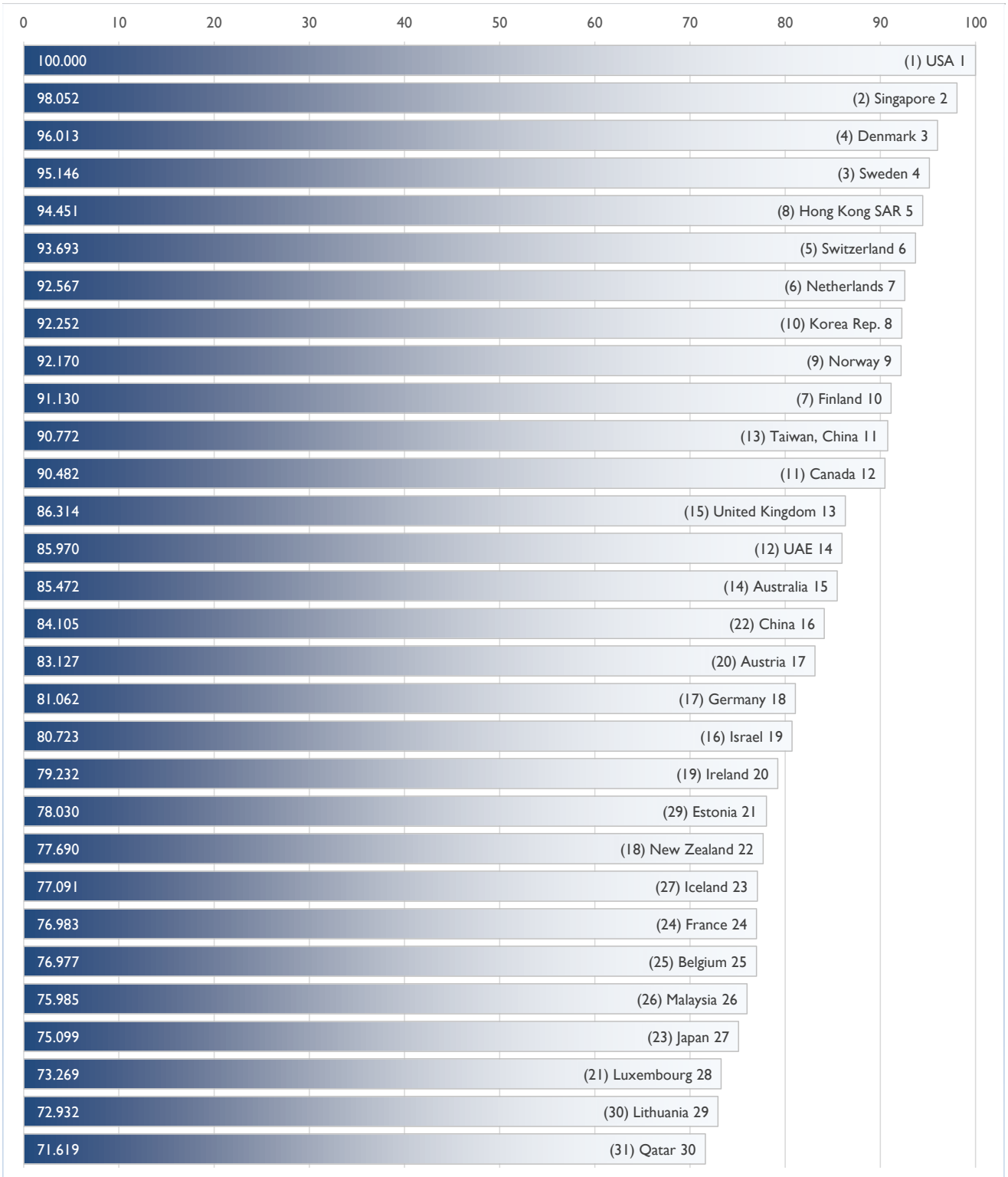
The 2020 IMD World Digital

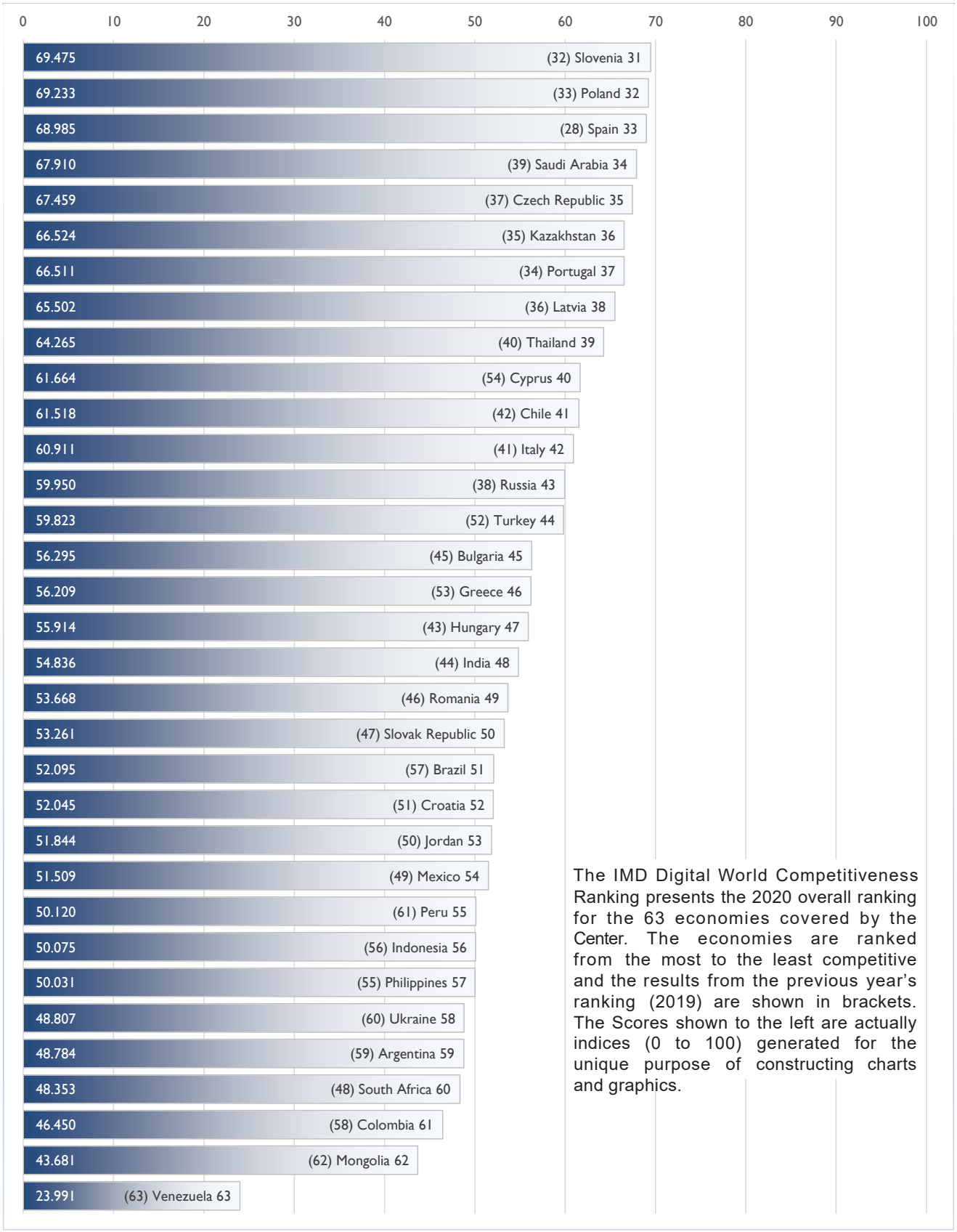
DIGITAL COMPETITIVENESS RANKING (Ranks 1 - 30)



(2019 rankings are in parentheses)

Competitiveness Ranking

DIGITAL COMPETITIVENESS RANKING (Ranks 31 - 63)



The IMD Digital World Competitiveness Ranking presents the 2020 overall ranking for the 63 economies covered by the Center. The economies are ranked from the most to the least competitive and the results from the previous year's ranking (2019) are shown in brackets. The Scores shown to the left are actually indices (0 to 100) generated for the unique purpose of constructing charts and graphics.

(2019 rankings are in parentheses)

Methodology in a Nutshell

1. The IMD World Digital Competitiveness (WDC) ranking analyzes and ranks the extent to which countries adopt and explore digital technologies leading to transformation in government practices, business models and society in general.

2. As in the case of the IMD World Competitiveness ranking, we assume that digital transformation takes place primarily at enterprise level (whether private or state-owned) but it also occurs at the government and society levels.

3. Based on our research, the methodology of the WDC ranking defines digital competitiveness into three main factors:

   - Knowledge
   - Technology
   - Future readiness

4. In turn, each of these factors is divided into 3 sub-factors which highlight every facet of the areas analyzed. Altogether, the WDC features 9 such sub-factors.

5. These 9 sub-factors comprise 52 criteria, although each sub-factor does not necessarily have the same number of criteria (for example, it takes more criteria to assess Training and Education than to evaluate IT integration).

6. Each sub-factor, independently of the number of criteria it contains, has the same weight in the overall consolidation of results, that is approximately 11.1% (100 ÷ 9 ~ 11.1).

7. Criteria can be hard data, which analyze digital competitiveness as it can be measured (e.g. Internet bandwidth speed) or soft data, which analyze competitiveness as it can be perceived (e.g. Agility of companies). Hard criteria represent a weight of 2/3 in the overall ranking whereas the survey data represent a weight of 1/3.

8. The 52 criteria include 19 new indicators which are only used in the assessment of the WDC ranking. The rest of the indicators are shared with the IMD World Competitiveness Ranking.

9. In addition, two criteria are for background information only, which means that they are not used in calculating the overall competitiveness ranking (i.e., Population and GDP).

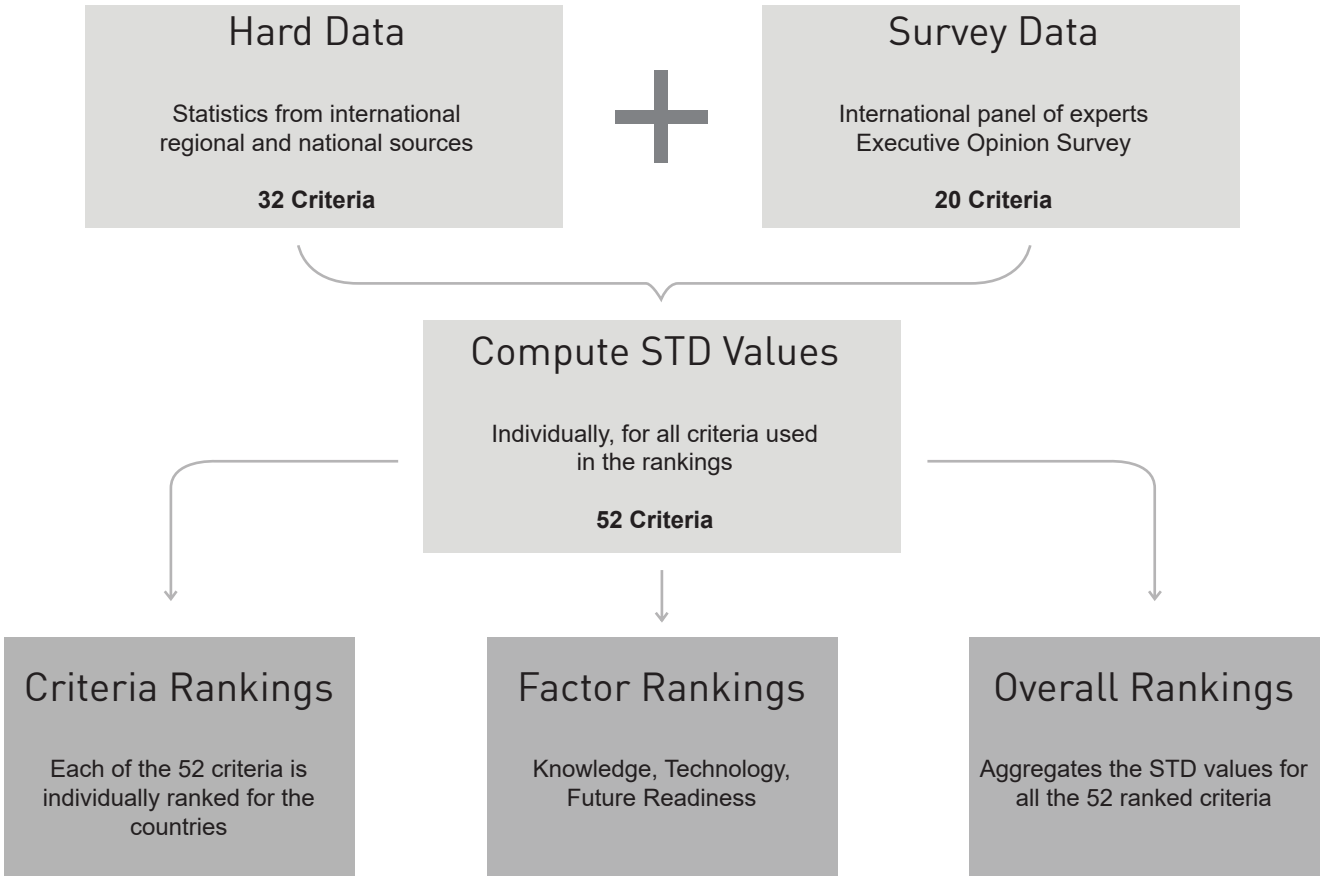
10. Finally, aggregating the results of the 9 sub-factors makes the total consolidation, which leads to the overall ranking of the WDC.

What is the IMD World Digital Competitiveness ranking?

Digital Competitiveness Factors and Sub-factors

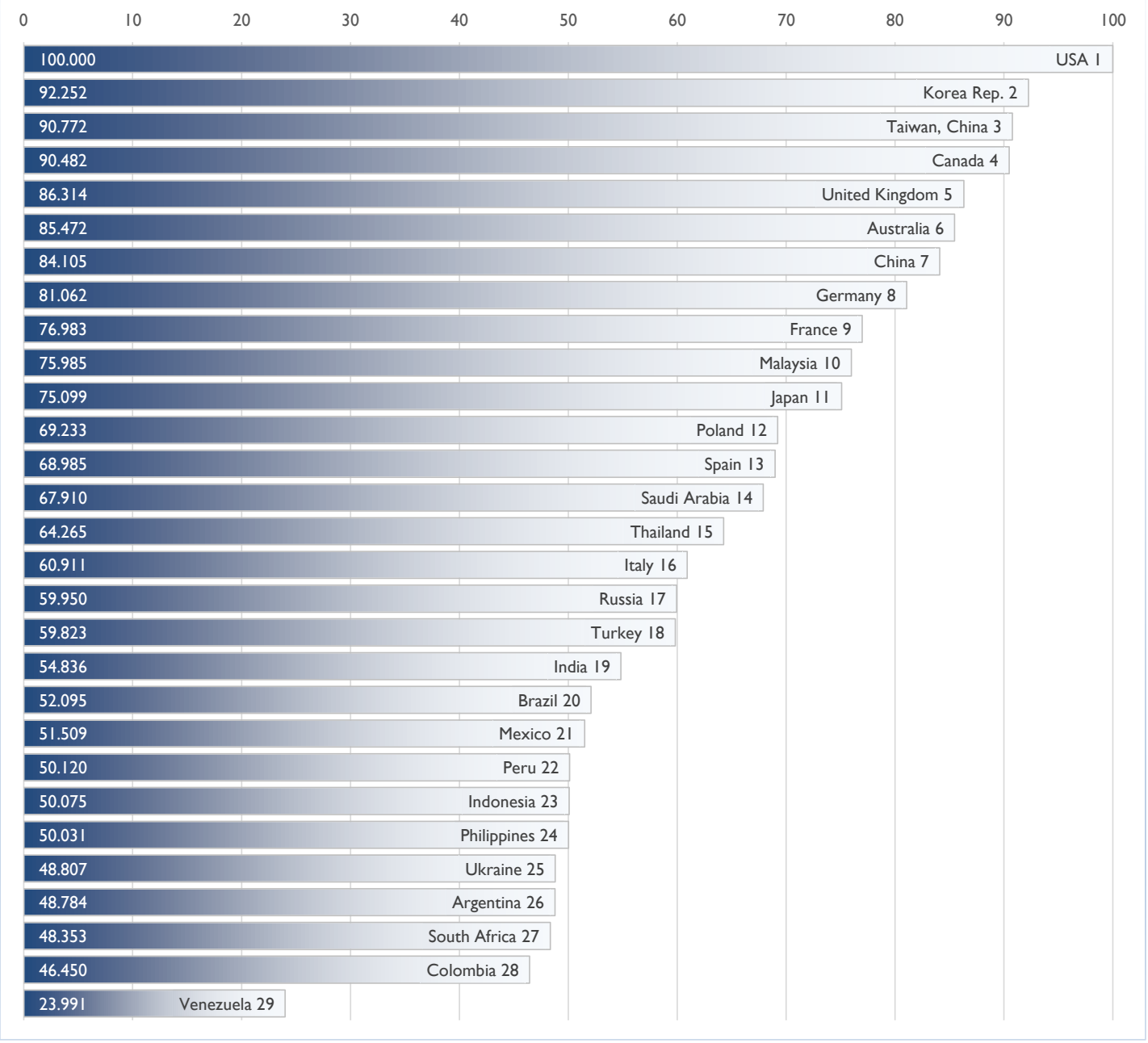
FACTORS	Knowledge	Technology	Future Readiness
	Know-how necessary to discover, understand and build new technologies.	*Overall context that enables the development of digital technologies.*	*Level of country preparedness to exploit digital transformation.*
SUB-FACTORS	Talent Training and Education Scientific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

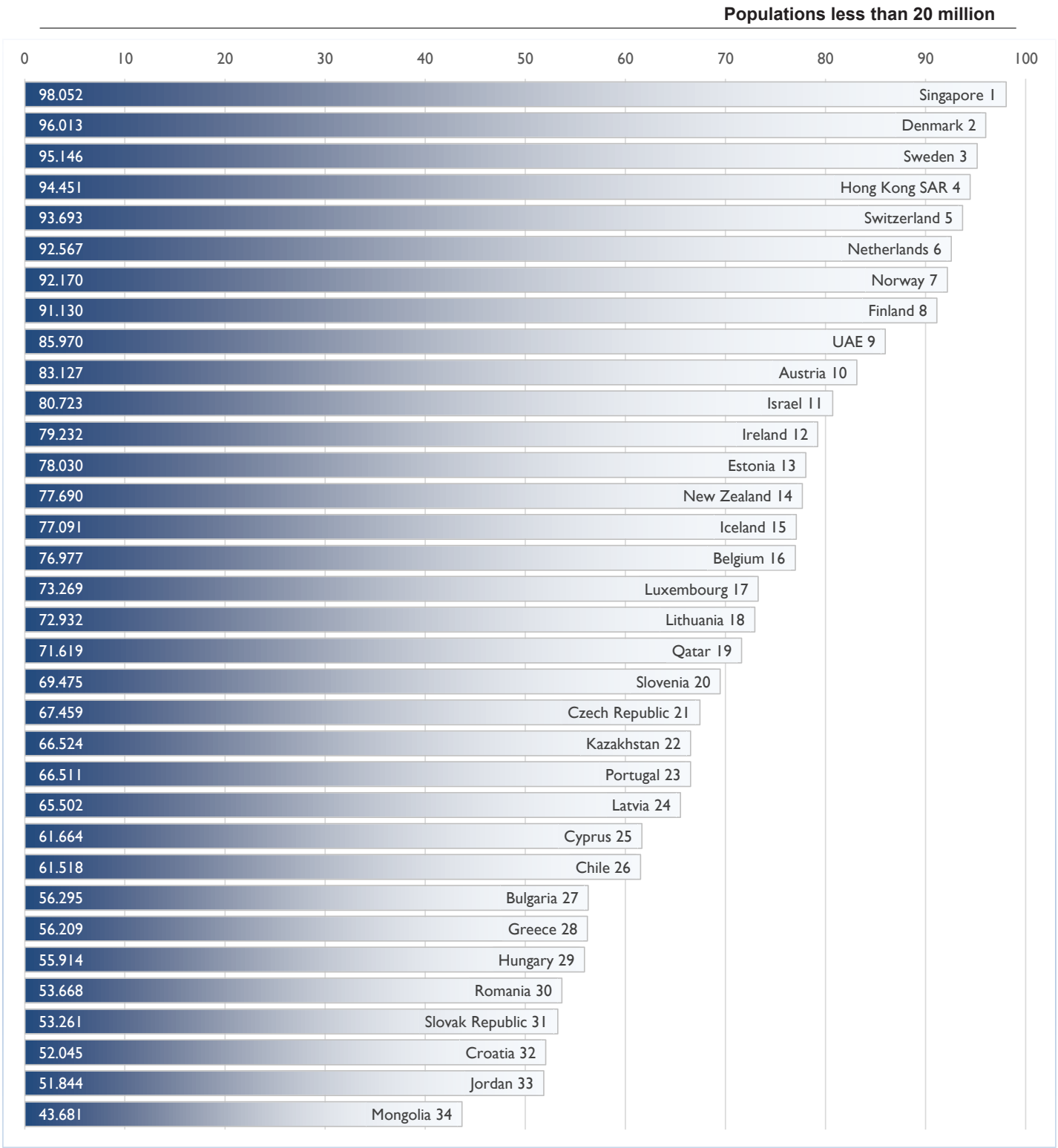
Computing the Rankings



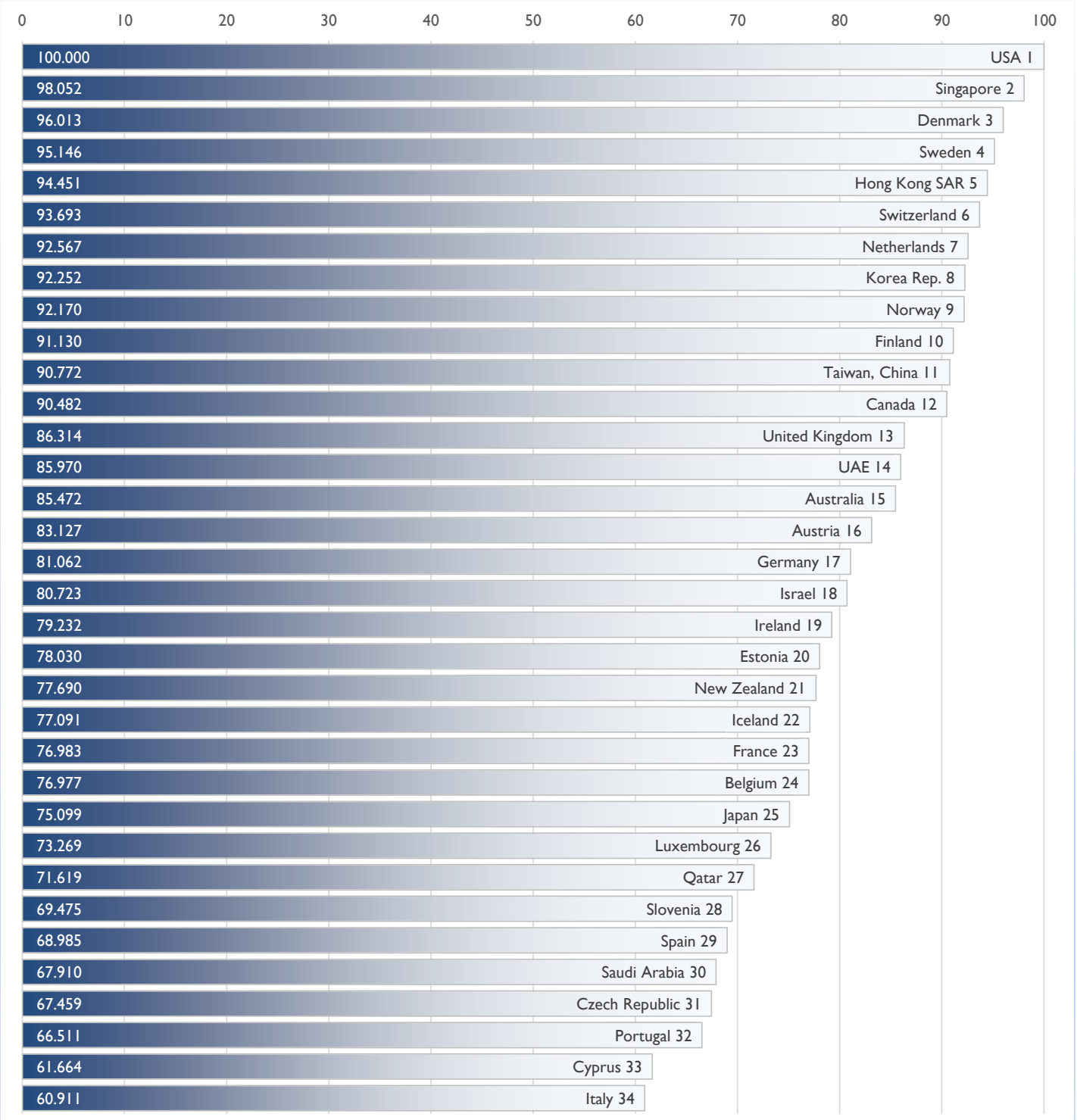
The 2020 IMD World Digital Competitiveness Rankings : Selected Breakdowns

Populations greater than 20 million

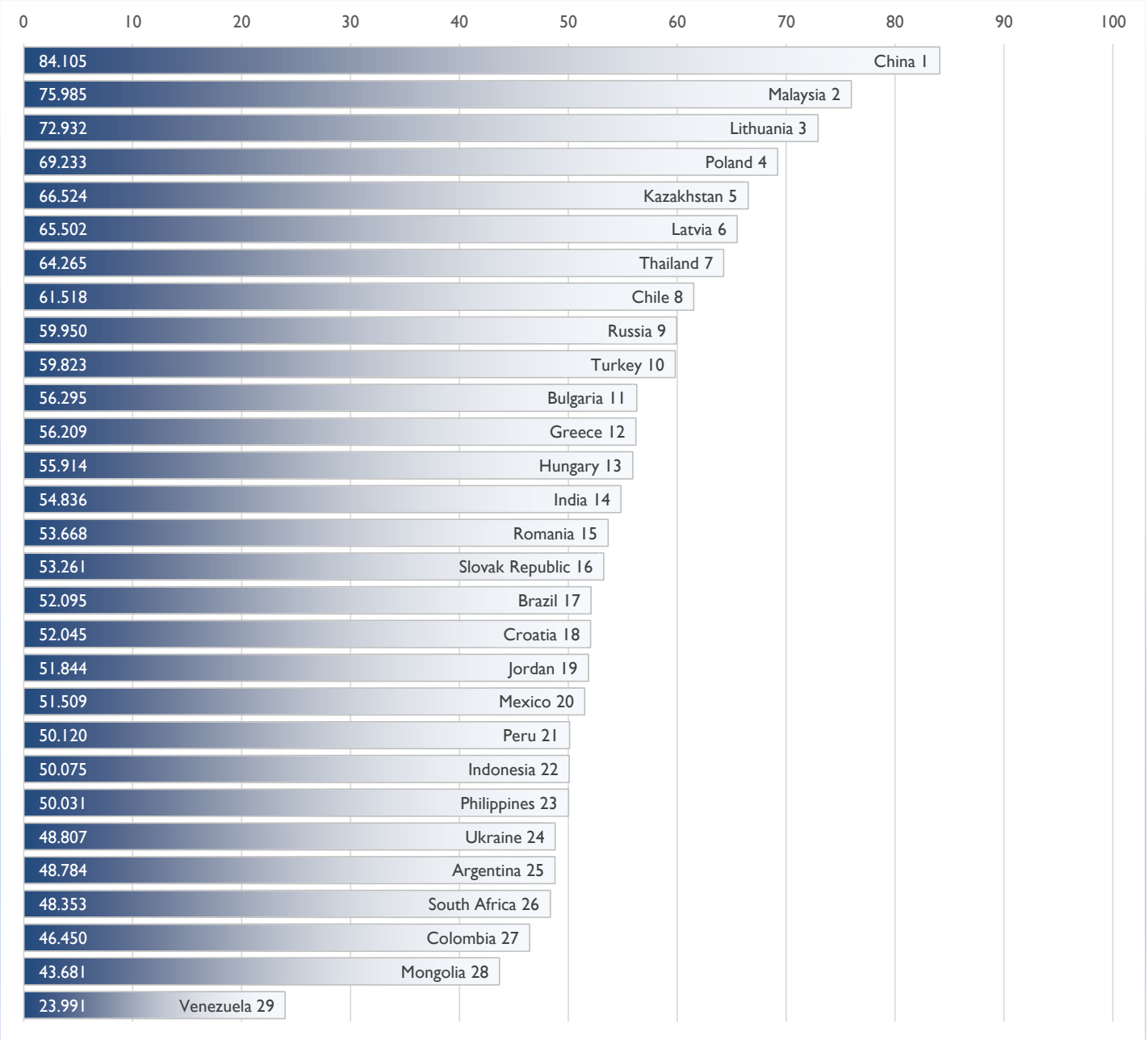



Populations less than 20 million
0
10
20
30
40
50
60
70
80
90
100
98.052 Singapore 1
96.013 Denmark 2
95.146 Sweden 3
94.451 Hong Kong SAR 4
93.693 Switzerland 5
92.567 Netherlands 6
92.170 Norway 7
91.130 Finland 8
85.970 UAE 9
83.127 Austria 10
80.723 Israel 11
79.232 Ireland 12
78.030 Estonia 13
77.690 New Zealand 14
77.091 Iceland 15
76.977 Belgium 16
73.269 Luxembourg 17
72.932 Lithuania 18
71.619 Qatar 19
69.475 Slovenia 20
67.459 Czech Republic 21
66.524 Kazakhstan 22
66.511 Portugal 23
65.502 Latvia 24
61.664 Cyprus 25
61.518 Chile 26
56.295 Bulgaria 27
56.209 Greece 28
55.914 Hungary 29
53.668 Romania 30
53.261 Slovak Republic 31
52.045 Croatia 32
51.844 Jordan 33
43.681 Mongolia 34

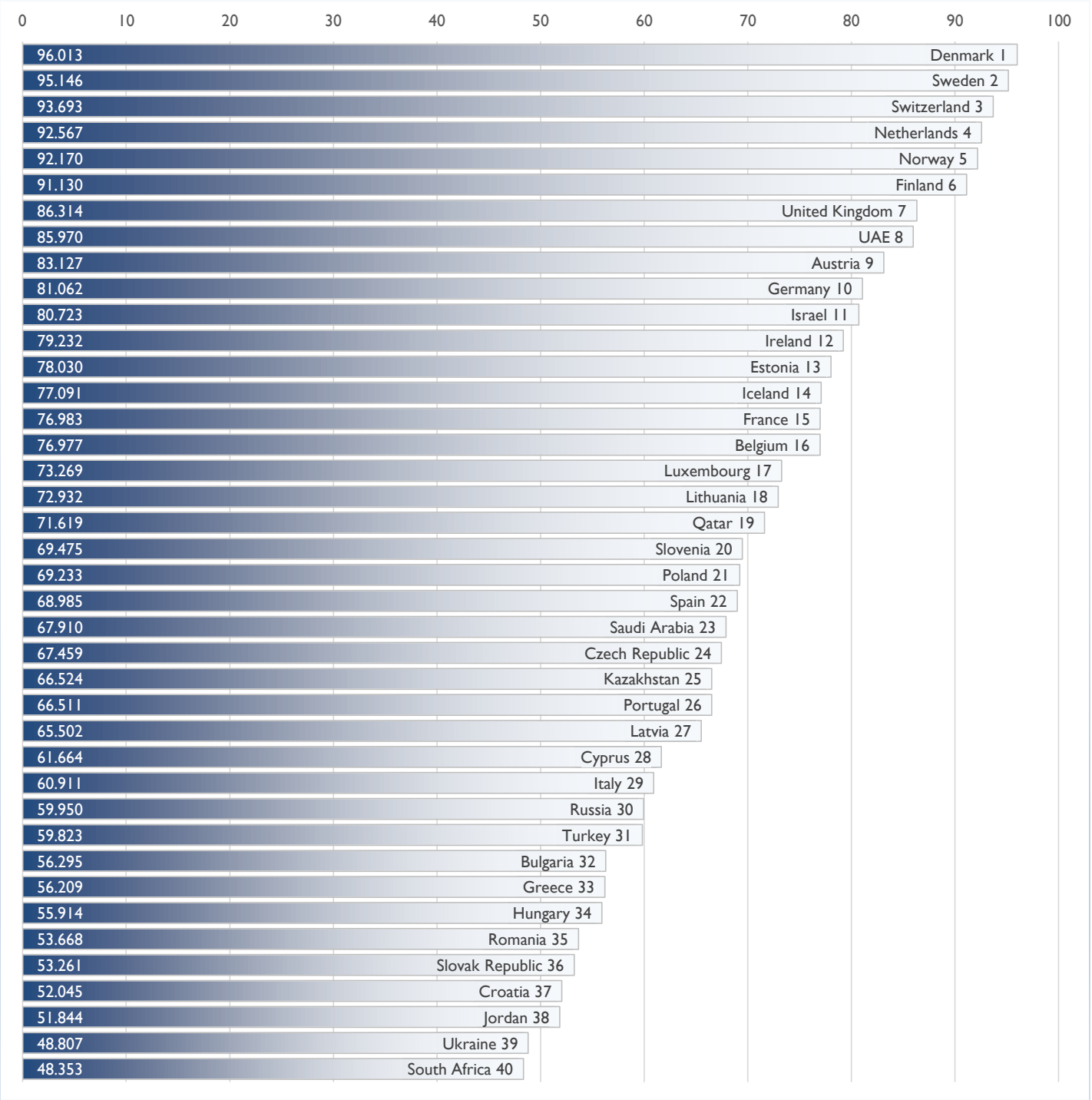
GDP per capita greater than $20,000



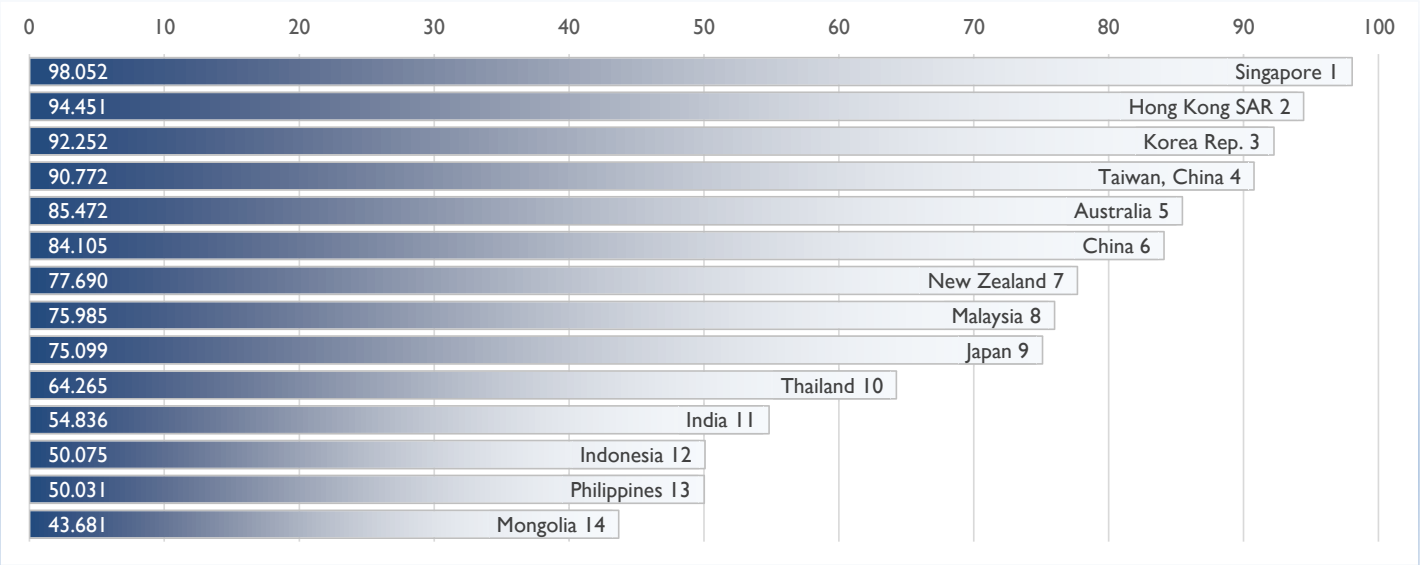
GDP per capita less than $20,000



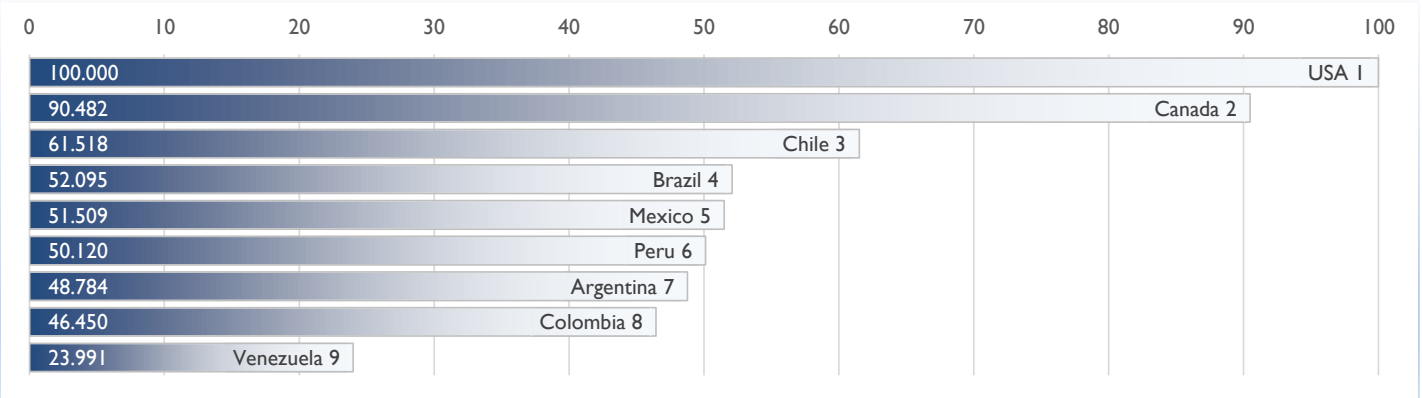
Europe - Middle East - Africa



Asia - Pacific

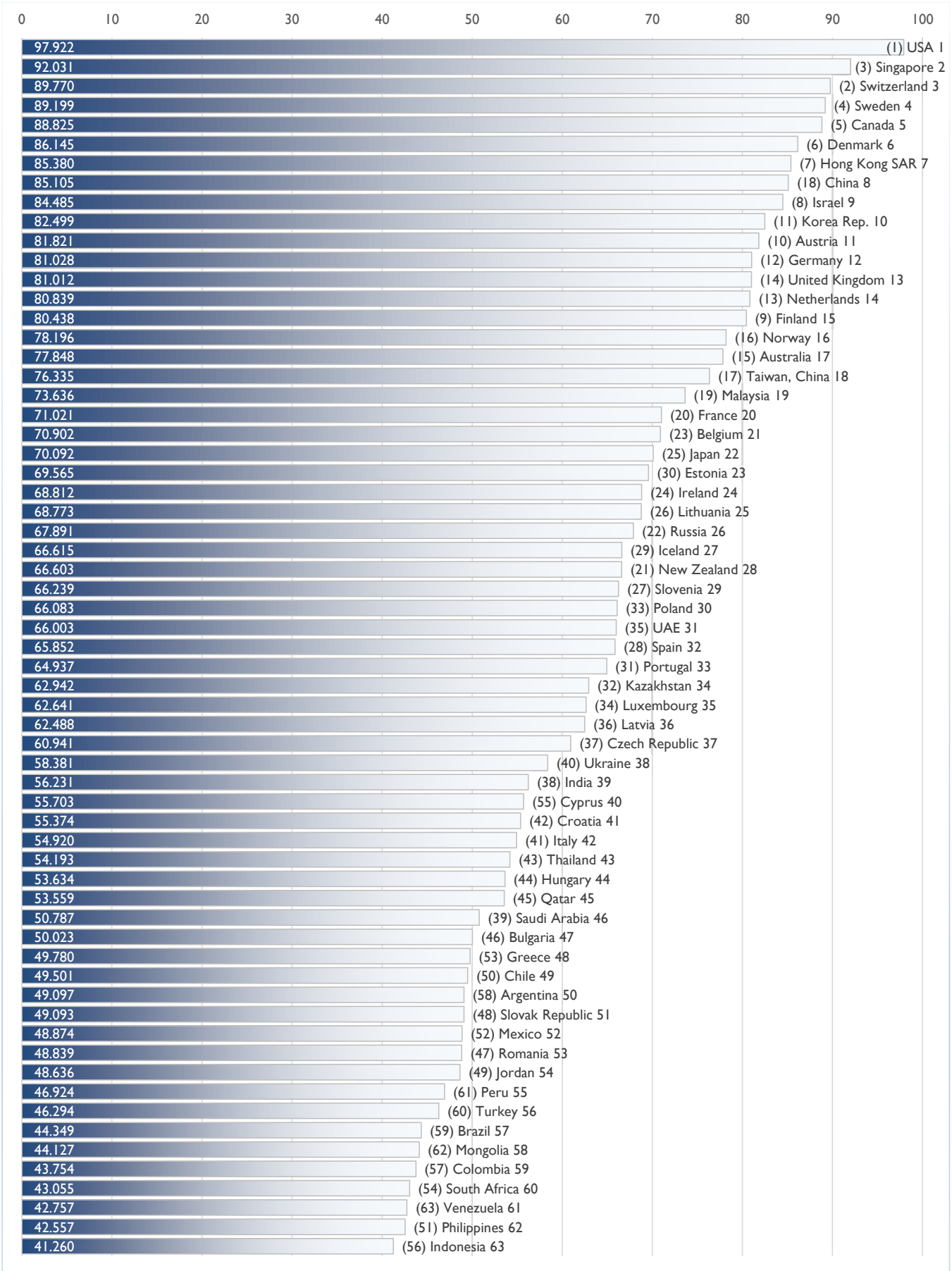


The Americas



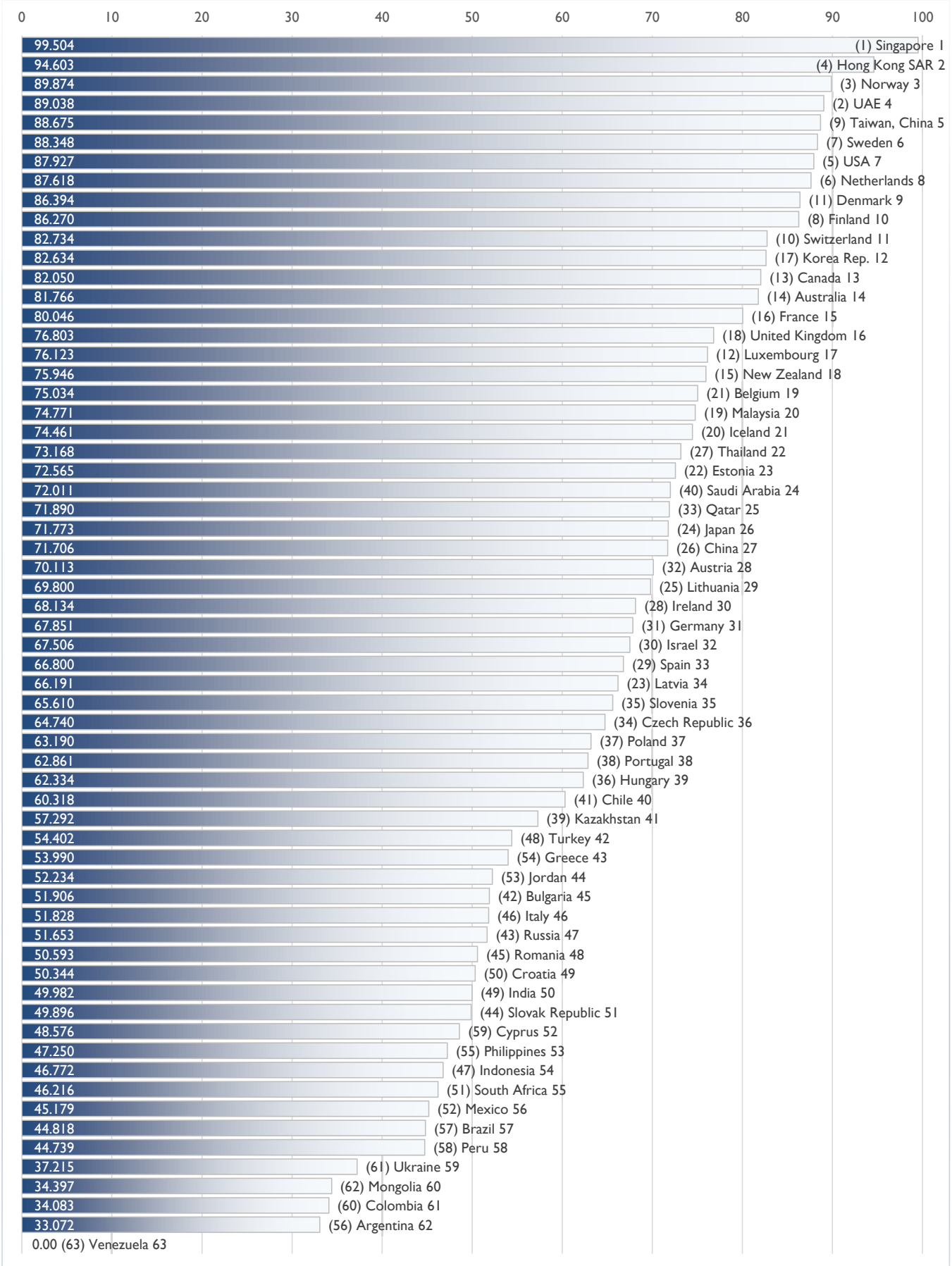
Knowledge

Know-how necessary to discover, understand and build new technologies



(2019 rankings are in parentheses)

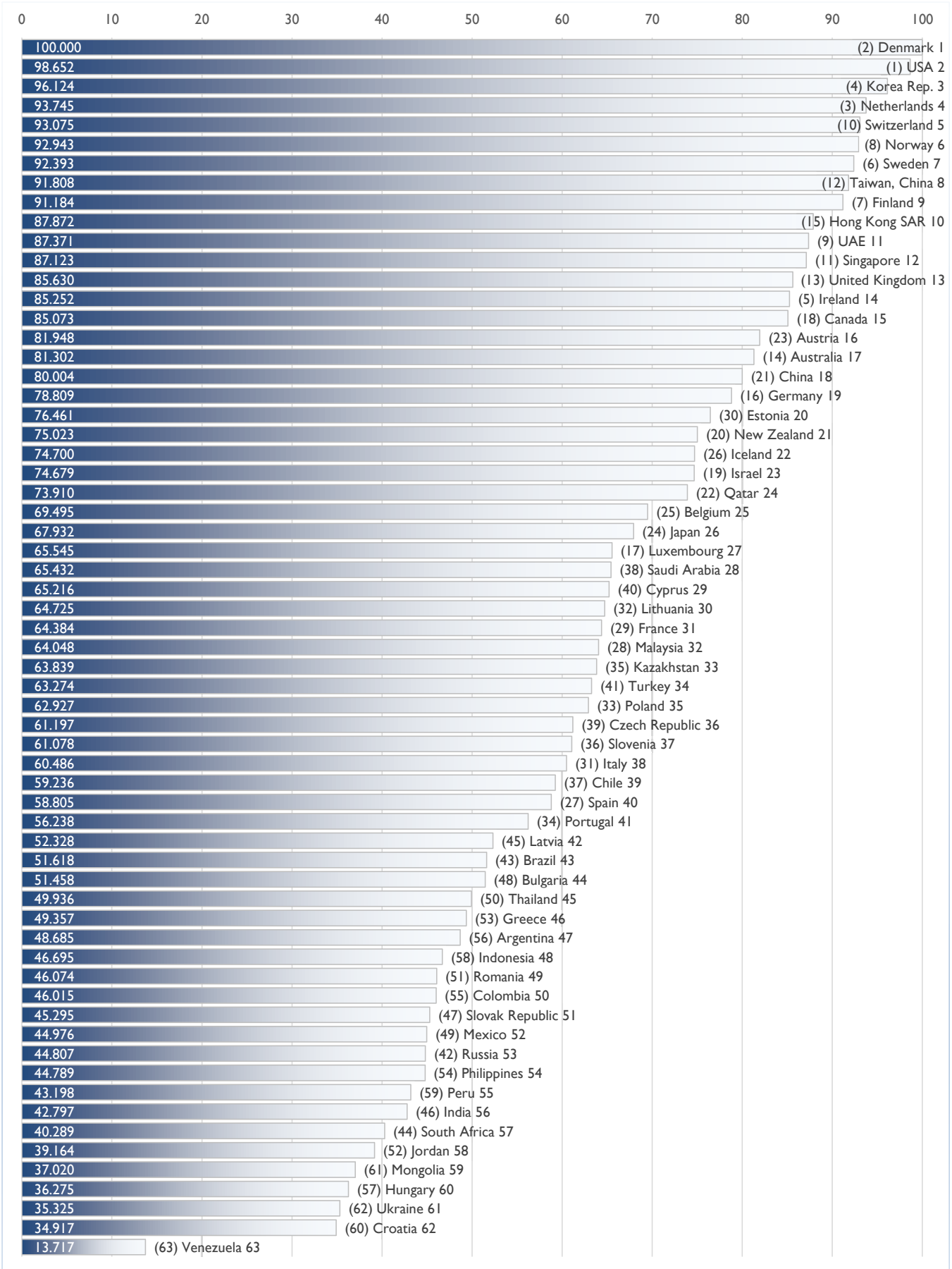
Overall context that enables the development of digital technologies



(2019 rankings are in parentheses)

Future Readiness

Level of country preparedness to exploit digital transformation



(2019 rankings are in parentheses)

Factor Rankings - 5 years overview

	OVERALL					Knowledge				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Argentina	55	57	55	59	59	53	56	58	58	50
Australia	14	15	13	14	15	16	18	15	15	17
Austria	19	16	15	20	17	12	12	13	10	11
Belgium	18	22	23	25	25	20	22	25	23	21
Brazil	54	55	57	57	51	54	55	62	59	57
Bulgaria	47	45	43	45	45	38	41	41	46	47
Canada	5	9	8	11	12	7	3	3	5	5
Chile	37	40	37	42	41	51	52	47	50	49
China	35	31	30	22	16	24	23	30	18	8
Colombia	56	58	59	58	61	56	57	57	57	59
Croatia	44	48	44	51	52	45	50	43	42	41
Cyprus	-	53	54	54	40	-	46	55	55	40
Czech Republic	32	32	33	37	35	34	36	38	37	37
Denmark	8	5	4	4	3	8	8	8	6	6
Estonia	27	26	25	29	21	30	28	29	30	23
Finland	6	4	7	7	10	9	9	9	9	15
France	22	25	26	24	24	21	19	20	20	20
Germany	15	17	18	17	18	10	13	14	12	12
Greece	45	50	53	53	46	46	51	51	53	48
Hong Kong SAR	11	7	11	8	5	6	6	5	7	7
Hungary	42	44	46	43	47	43	48	48	44	44
Iceland	26	23	21	27	23	32	30	28	29	27
India	53	51	48	44	48	39	37	46	38	39
Indonesia	60	59	62	56	56	60	58	61	56	63
Ireland	20	21	20	19	20	25	25	22	24	24
Israel	13	13	12	16	19	5	7	2	8	9
Italy	34	39	41	41	42	40	42	42	41	42
Japan	23	27	22	23	27	23	29	18	25	22
Jordan	48	56	45	50	53	59	61	56	49	54
Kazakhstan	43	38	38	35	36	47	40	35	32	34
Korea Rep.	17	19	14	10	8	15	14	11	11	10
Latvia	33	35	35	36	38	33	34	34	36	36
Lithuania	29	29	29	30	29	18	21	23	26	25
Luxembourg	21	20	24	21	28	29	27	32	34	35
Malaysia	24	24	27	26	26	22	17	17	19	19
Mexico	52	49	51	49	54	52	54	54	52	52
Mongolia	57	61	61	62	62	55	59	53	62	58
Netherlands	4	6	9	6	7	13	11	12	13	14
New Zealand	10	14	19	18	22	14	20	21	21	28
Norway	9	10	6	9	9	17	15	16	16	16
Peru	58	62	60	61	55	61	62	60	61	55
Philippines	46	46	56	55	57	50	53	50	51	62
Poland	38	37	36	33	32	27	32	33	33	30
Portugal	31	33	32	34	37	31	31	27	31	33
Qatar	28	28	28	31	30	37	35	37	45	45
Romania	49	54	47	46	49	48	47	45	47	53
Russia	40	42	40	38	43	28	24	24	22	26
Saudi Arabia	-	36	42	39	34	-	39	40	39	46
Singapore	1	1	2	2	2	1	1	1	3	2
Slovak Republic	41	43	50	47	50	41	43	49	48	51
Slovenia	36	34	34	32	31	26	26	26	27	29
South Africa	51	47	49	48	60	49	49	52	54	60
Spain	30	30	31	28	33	36	33	31	28	32
Sweden	3	2	3	3	4	2	2	7	4	4
Switzerland	7	8	5	5	6	3	4	6	2	3
Taiwan, China	16	12	16	13	11	19	16	19	17	18
Thailand	39	41	39	40	39	42	44	44	43	43
Turkey	50	52	52	52	44	58	60	59	60	56
UAE	25	18	17	12	14	35	38	36	35	31
Ukraine	59	60	58	60	58	44	45	39	40	38
United Kingdom	12	11	10	15	13	11	10	10	14	13
USA	2	3	1	1	1	4	5	4	1	1
Venezuela	61	63	63	63	63	57	63	63	63	61

Technology					Future readiness					
2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	
56	58	54	56	62	46	49	45	56	47	Argentina
15	15	14	14	14	7	14	11	14	17	Australia
28	28	26	32	28	19	15	14	23	16	Austria
21	24	24	21	19	16	22	23	25	25	Belgium
54	55	55	57	57	49	44	47	43	43	Brazil
38	42	42	42	45	58	57	55	48	44	Bulgaria
14	13	12	13	13	3	8	9	18	15	Canada
34	34	35	41	40	32	33	31	37	39	Chile
39	36	34	26	27	38	34	28	21	18	China
59	60	60	60	61	44	53	56	55	50	Colombia
43	47	49	50	49	50	56	54	60	62	Croatia
-	54	56	59	52	-	54	44	40	29	Cyprus
26	26	31	34	36	34	37	34	39	36	Czech Republic
12	10	10	11	9	6	1	1	2	1	Denmark
17	19	20	22	23	26	26	26	30	20	Estonia
7	4	4	8	10	5	4	8	7	9	Finland
23	22	19	16	15	20	28	27	29	31	France
25	21	21	31	31	14	18	20	16	19	Germany
52	52	51	54	43	36	47	46	53	46	Greece
2	3	6	4	2	27	17	24	15	10	Hong Kong SAR
37	38	40	36	39	45	55	58	57	60	Hungary
22	20	18	20	21	18	21	19	26	22	Iceland
57	59	53	49	50	54	51	48	46	56	India
58	56	59	47	54	60	62	62	58	48	Indonesia
27	25	29	28	30	12	10	13	5	14	Ireland
24	27	25	30	32	9	11	7	19	23	Israel
44	45	41	46	46	29	30	36	31	38	Italy
19	23	23	24	26	23	25	25	24	26	Japan
45	50	48	53	44	37	48	41	52	58	Jordan
42	35	39	39	41	41	38	40	35	33	Kazakhstan
13	17	17	17	12	25	24	17	4	3	Korea Rep.
33	32	32	23	34	39	41	39	45	42	Latvia
29	29	30	25	29	33	31	33	32	30	Lithuania
11	12	15	12	17	24	23	21	17	27	Luxembourg
16	18	22	19	20	28	27	29	28	32	Malaysia
49	48	46	52	56	56	50	50	49	52	Mexico
55	61	62	62	60	52	60	59	61	59	Mongolia
10	9	8	6	8	2	3	4	3	4	Netherlands
6	11	16	15	18	15	20	18	20	21	New Zealand
3	2	2	3	3	13	12	6	8	6	Norway
53	57	57	58	58	55	58	60	59	55	Peru
50	51	58	55	53	40	43	52	54	54	Philippines
36	39	37	37	37	51	39	37	33	35	Poland
35	37	36	38	38	31	35	32	34	41	Portugal
31	31	27	33	25	21	19	16	22	24	Qatar
46	46	44	45	48	57	59	57	51	49	Romania
47	44	43	43	47	53	52	51	42	53	Russia
-	41	50	40	24	-	32	38	38	28	Saudi Arabia
1	1	1	1	1	4	6	15	11	12	Singapore
41	43	47	44	51	43	46	53	47	51	Slovak Republic
40	40	38	35	35	35	36	35	36	37	Slovenia
51	53	52	51	55	47	42	43	44	57	South Africa
32	33	33	29	33	30	29	30	27	40	Spain
4	5	5	7	6	8	5	5	6	7	Sweden
9	8	9	10	11	10	13	10	10	5	Switzerland
8	7	11	9	5	22	16	22	12	8	Taiwan, China
30	30	28	27	22	48	45	49	50	45	Thailand
48	49	45	48	42	42	40	42	41	34	Turkey
20	14	7	2	4	17	7	12	9	11	UAE
60	62	61	61	59	61	61	61	62	61	Ukraine
18	16	13	18	16	11	9	3	13	13	United Kingdom
5	6	3	5	7	1	2	2	1	2	USA
61	63	63	63	63	59	63	63	63	63	Venezuela

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

DIGITAL COMPETITIVENESS COUNTRY PROFILES

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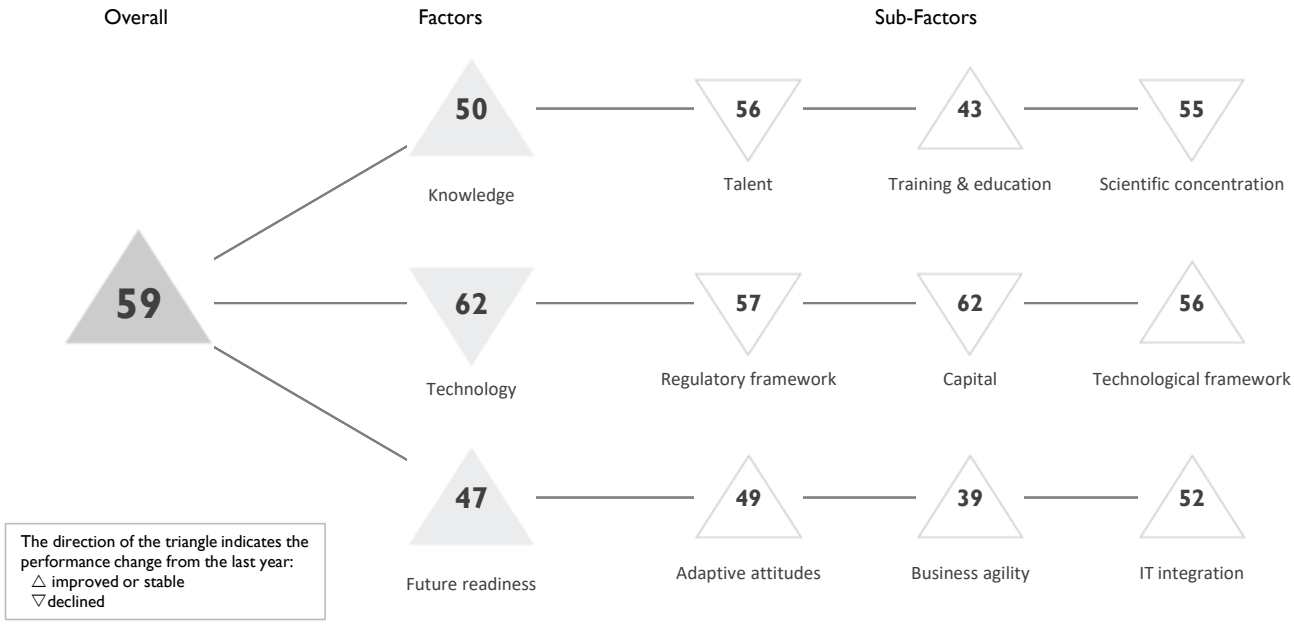
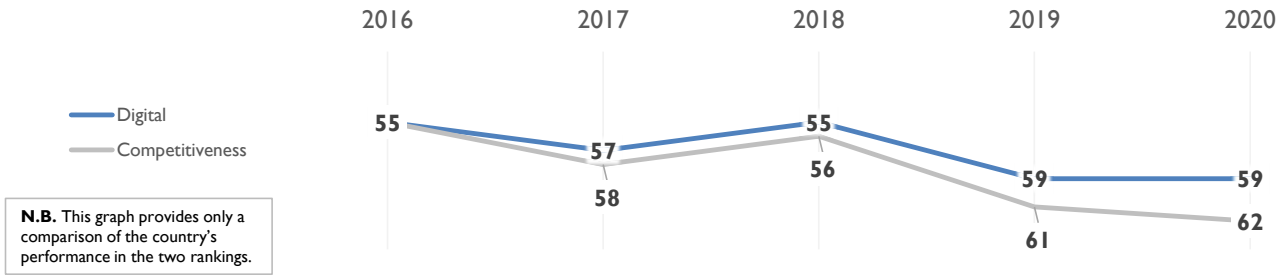
ARGENTINA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	55	57	55	59	59
Knowledge	53	56	58	58	50
Technology	56	58	54	56	62
Future readiness	46	49	45	56	47

COMPETITIVENESS & DIGITAL RANKINGS



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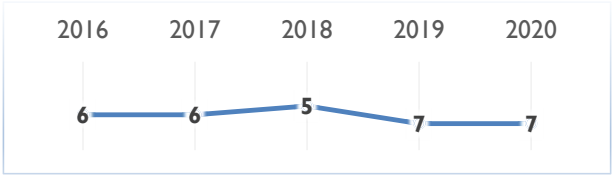
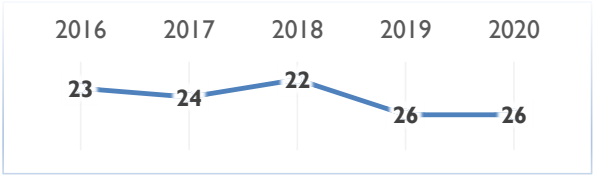
PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)



ARGENTINA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	50	54	47	51	56
Training & education	57	61	63	62	43
Scientific concentration	40	42	41	50	55

Talent	Rank
Educational assessment PISA - Math	56
International experience	30
Foreign highly-skilled personnel	60
Management of cities	51
Digital/Technological skills	49
Net flow of international students	17

Training & education	Rank
Employee training	53
▶ Total public expenditure on education	15
Higher education achievement	37
Pupil-teacher ratio (tertiary education)	24
Graduates in Sciences	59
Women with degrees	29

Scientific concentration	Rank
Total expenditure on R&D (%)	48
Total R&D personnel per capita	42
▶ Female researchers	2
R&D productivity by publication	23
Scientific and technical employment	56
▷ High-tech patent grants	62
Robots in Education and R&D	35

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	46	46	48	49	57
Capital	59	59	48	51	62
Technological framework	54	56	53	57	56

Regulatory framework	Rank
Starting a business	61
Enforcing contracts	49
▶ Immigration laws	5
Development & application of tech.	58
Scientific research legislation	56
Intellectual property rights	60

Capital	Rank
IT & media stock market capitalization	30
▷ Funding for technological development	62
▷ Banking and financial services	62
▷ Country credit rating	62
▷ Venture capital	62
▶ Investment in Telecommunications	12

Technological framework	Rank
Communications technology	60
Mobile Broadband subscribers	53
Wireless broadband	54
Internet users	53
Internet bandwidth speed	55
High-tech exports (%)	53

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	49	49	49	57	49
Business agility	42	36	37	48	39
IT integration	51	54	52	52	52

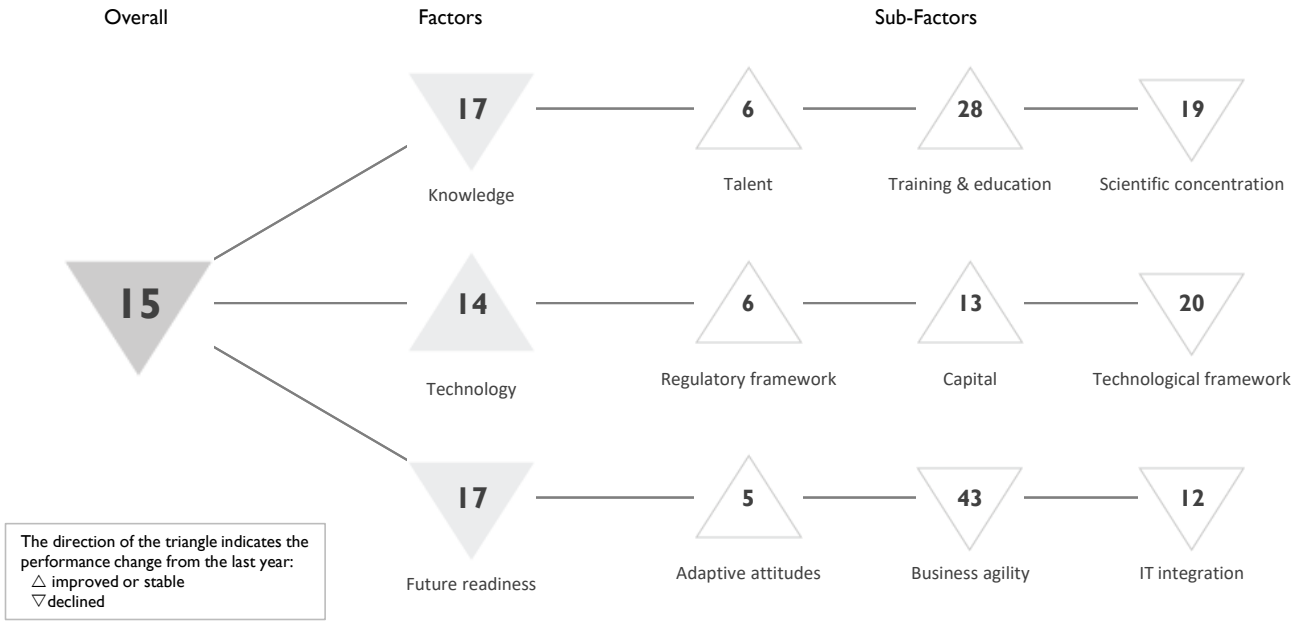
Adaptive attitudes	Rank
E-Participation	28
Internet retailing	44
Tablet possession	39
Smartphone possession	44
Attitudes toward globalization	60

Business agility	Rank
Opportunities and threats	36
World robots distribution	38
Agility of companies	46
Use of big data and analytics	49
Knowledge transfer	55
▶ Entrepreneurial fear of failure	13

IT integration	Rank
E-Government	29
Public-private partnerships	47
Cyber security	53
Software piracy	58

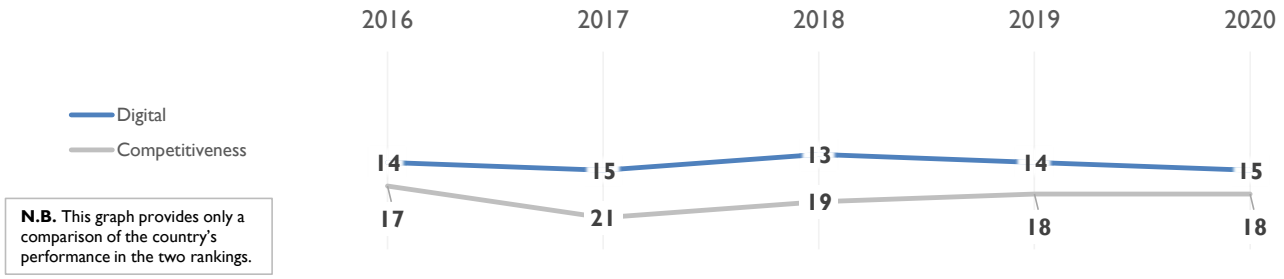
AUSTRALIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	14	15	13	14	15
Knowledge	16	18	15	15	17
Technology	15	15	14	14	14
Future readiness	7	14	11	14	17

COMPETITIVENESS & DIGITAL RANKINGS



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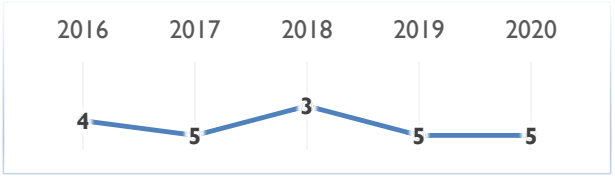
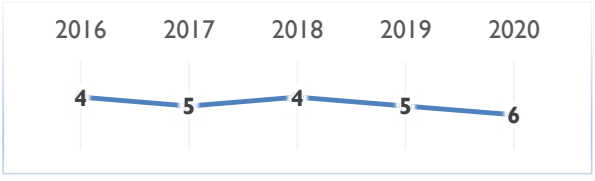
PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



AUSTRALIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	6	8	8	7	6
Training & education	47	51	32	29	28
Scientific concentration	12	14	11	13	19

Talent	Rank
Educational assessment PISA - Math	28
International experience	37
Foreign highly-skilled personnel	9
Management of cities	26
Digital/Technological skills	40
▶ Net flow of international students	1

Training & education	Rank
Employee training	38
Total public expenditure on education	19
Higher education achievement	14
Pupil-teacher ratio (tertiary education)	-
▷ Graduates in Sciences	53
Women with degrees	11

Scientific concentration	Rank
Total expenditure on R&D (%)	21
Total R&D personnel per capita	-
Female researchers	-
R&D productivity by publication	17
Scientific and technical employment	15
▷ High-tech patent grants	44
Robots in Education and R&D	25

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	6	11	6	7	6
Capital	15	16	18	19	13
Technological framework	17	21	19	17	20

Regulatory framework	Rank
Starting a business	5
Enforcing contracts	6
Immigration laws	26
Development & application of tech.	17
Scientific research legislation	18
Intellectual property rights	8

Capital	Rank
IT & media stock market capitalization	37
Funding for technological development	24
Banking and financial services	19
▶ Country credit rating	1
Venture capital	35
▶ Investment in Telecommunications	4

Technological framework	Rank
▷ Communications technology	51
▶ Mobile Broadband subscribers	1
Wireless broadband	10
Internet users	28
Internet bandwidth speed	41
High-tech exports (%)	25

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	2	4	2	7	5
Business agility	22	42	28	35	43
IT integration	8	10	6	11	12

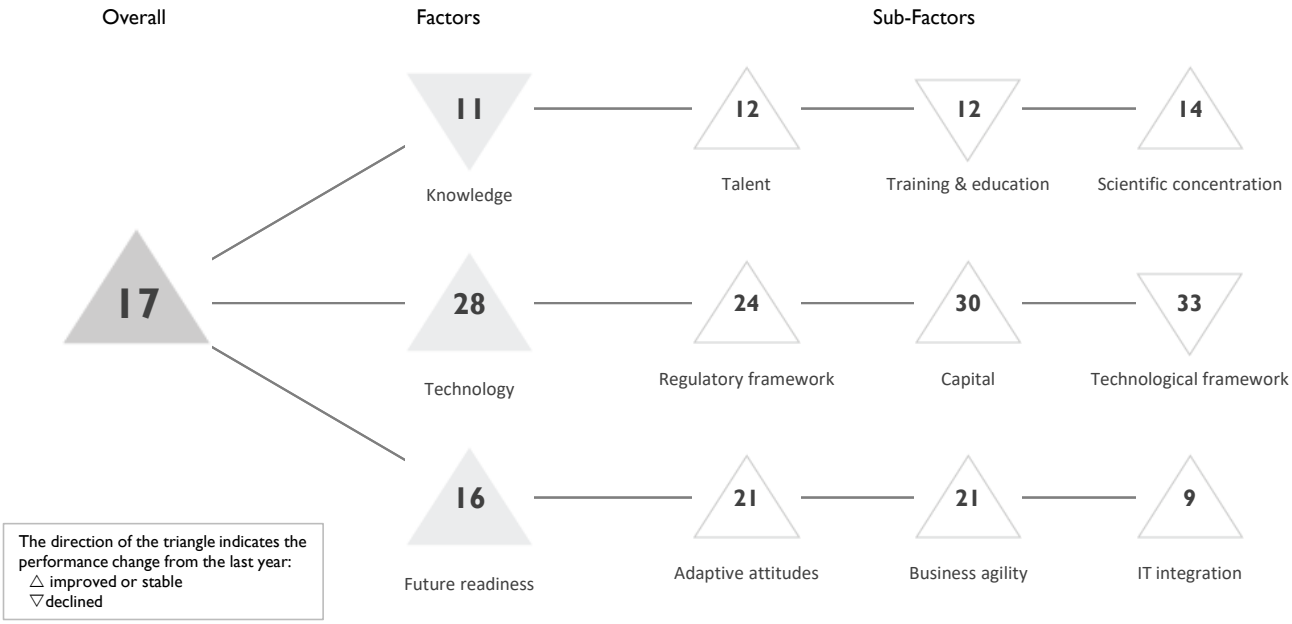
Adaptive attitudes	Rank
E-Participation	9
Internet retailing	10
▶ Tablet possession	4
Smartphone possession	7
Attitudes toward globalization	21

Business agility	Rank
▷ Opportunities and threats	45
World robots distribution	29
▷ Agility of companies	48
Use of big data and analytics	29
Knowledge transfer	27
Entrepreneurial fear of failure	43

IT integration	Rank
E-Government	5
Public-private partnerships	25
Cyber security	28
Software piracy	5

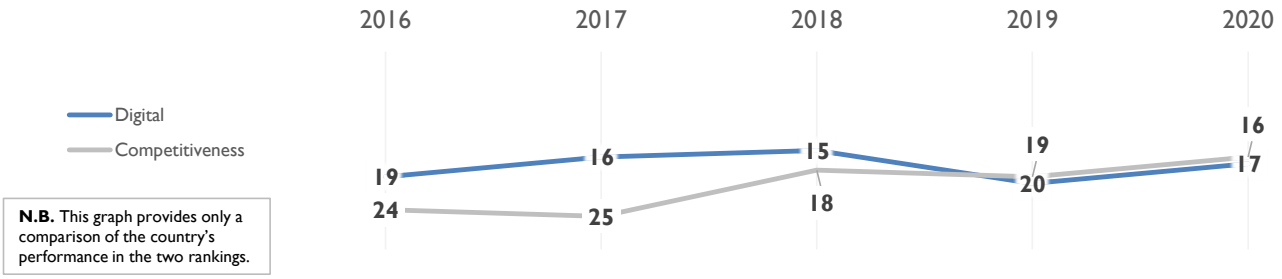
AUSTRIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	19	16	15	20	17
Knowledge	12	12	13	10	11
Technology	28	28	26	32	28
Future readiness	19	15	14	23	16

COMPETITIVENESS & DIGITAL RANKINGS



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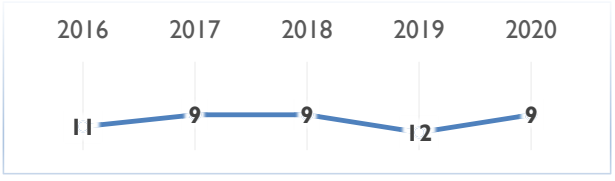
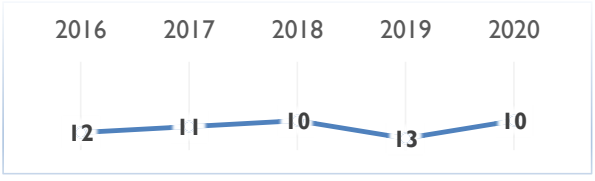
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



AUSTRIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	13	12	12	12	12
Training & education	4	4	7	8	12
Scientific concentration	22	21	18	14	14

	Talent	Rank
	Educational assessment PISA - Math	22
	International experience	27
	Foreign highly-skilled personnel	17
	Management of cities	10
	Digital/Technological skills	38
▶	Net flow of international students	4

	Training & education	Rank
▶	Employee training	2
	Total public expenditure on education	28
	Higher education achievement	35
▶	Pupil-teacher ratio (tertiary education)	2
	Graduates in Sciences	8
	Women with degrees	38

	Scientific concentration	Rank
	Total expenditure on R&D (%)	7
	Total R&D personnel per capita	7
▷	Female researchers	46
▷	R&D productivity by publication	50
	Scientific and technical employment	17
	High-tech patent grants	24
	Robots in Education and R&D	10

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	29	25	24	25	24
Capital	39	38	38	34	30
Technological framework	19	22	21	31	33

	Regulatory framework	Rank
▷	Starting a business	53
	Enforcing contracts	10
▷	Immigration laws	45
	Development & application of tech.	22
	Scientific research legislation	13
	Intellectual property rights	9

	Capital	Rank
	IT & media stock market capitalization	36
	Funding for technological development	19
	Banking and financial services	18
	Country credit rating	12
	Venture capital	27
▷	Investment in Telecommunications	58

	Technological framework	Rank
	Communications technology	21
	Mobile Broadband subscribers	18
	Wireless broadband	35
	Internet users	30
	Internet bandwidth speed	39
	High-tech exports (%)	34

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	30	25	25	29	21
Business agility	9	8	5	25	21
IT integration	16	9	10	15	9

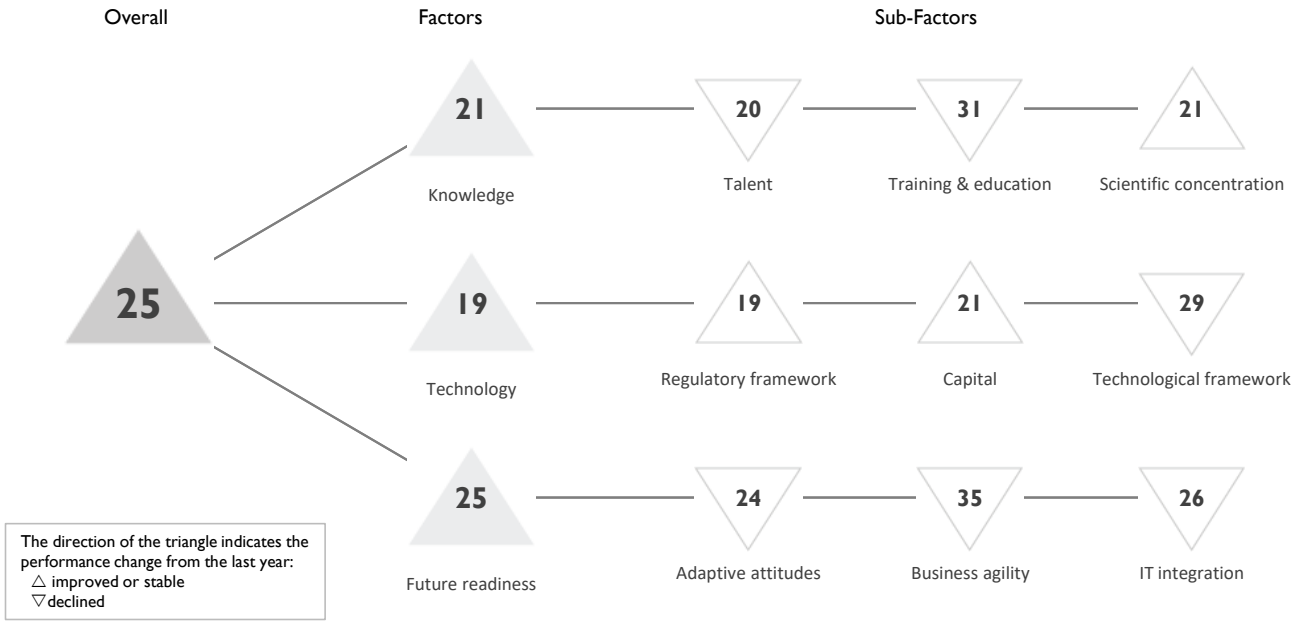
	Adaptive attitudes	Rank
▶	E-Participation	6
	Internet retailing	18
	Tablet possession	16
	Smartphone possession	36
	Attitudes toward globalization	42

	Business agility	Rank
	Opportunities and threats	18
	World robots distribution	23
	Agility of companies	11
	Use of big data and analytics	36
	Knowledge transfer	10
	Entrepreneurial fear of failure	21

	IT integration	Rank
	E-Government	15
	Public-private partnerships	23
	Cyber security	7
▶	Software piracy	6

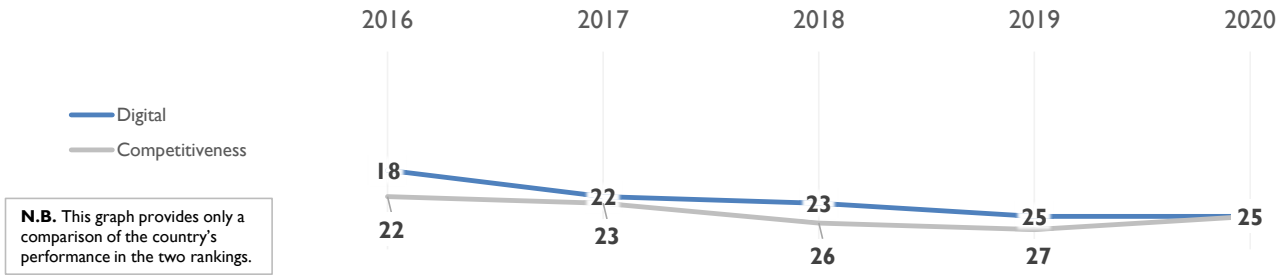
BELGIUM

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	18	22	23	25	25
Knowledge	20	22	25	23	21
Technology	21	24	24	21	19
Future readiness	16	22	23	25	25

COMPETITIVENESS & DIGITAL RANKINGS



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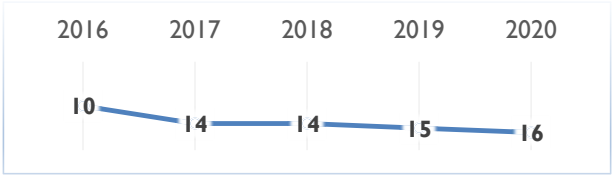
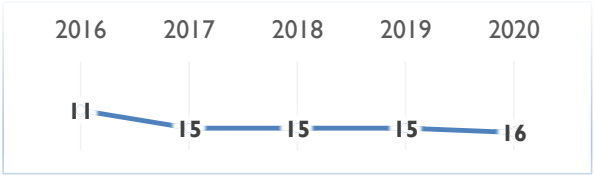
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



BELGIUM

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	12	17	17	18	20
Training & education	24	29	30	26	31
Scientific concentration	30	27	29	24	21

Talent	Rank
Educational assessment PISA - Math	14
International experience	12
Foreign highly-skilled personnel	27
Management of cities	39
Digital/Technological skills	32
Net flow of international students	14

Training & education	Rank
Employee training	26
▶ Total public expenditure on education	7
Higher education achievement	23
Pupil-teacher ratio (tertiary education)	39
▷ Graduates in Sciences	57
Women with degrees	24

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	11
Total R&D personnel per capita	14
Female researchers	35
R&D productivity by publication	42
Scientific and technical employment	21
High-tech patent grants	42
Robots in Education and R&D	18

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	13	16	17	22	19
Capital	19	23	23	25	21
Technological framework	29	31	33	26	29

Regulatory framework	Rank
Starting a business	28
Enforcing contracts	40
Immigration laws	12
Development & application of tech.	30
Scientific research legislation	17
▶ Intellectual property rights	11

Capital	Rank
IT & media stock market capitalization	33
Funding for technological development	12
Banking and financial services	22
Country credit rating	19
Venture capital	16
Investment in Telecommunications	28

Technological framework	Rank
Communications technology	30
Mobile Broadband subscribers	16
▷ Wireless broadband	56
Internet users	19
Internet bandwidth speed	22
High-tech exports (%)	38

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	18	21	19	23	24
Business agility	7	21	21	33	35
IT integration	23	19	21	23	26

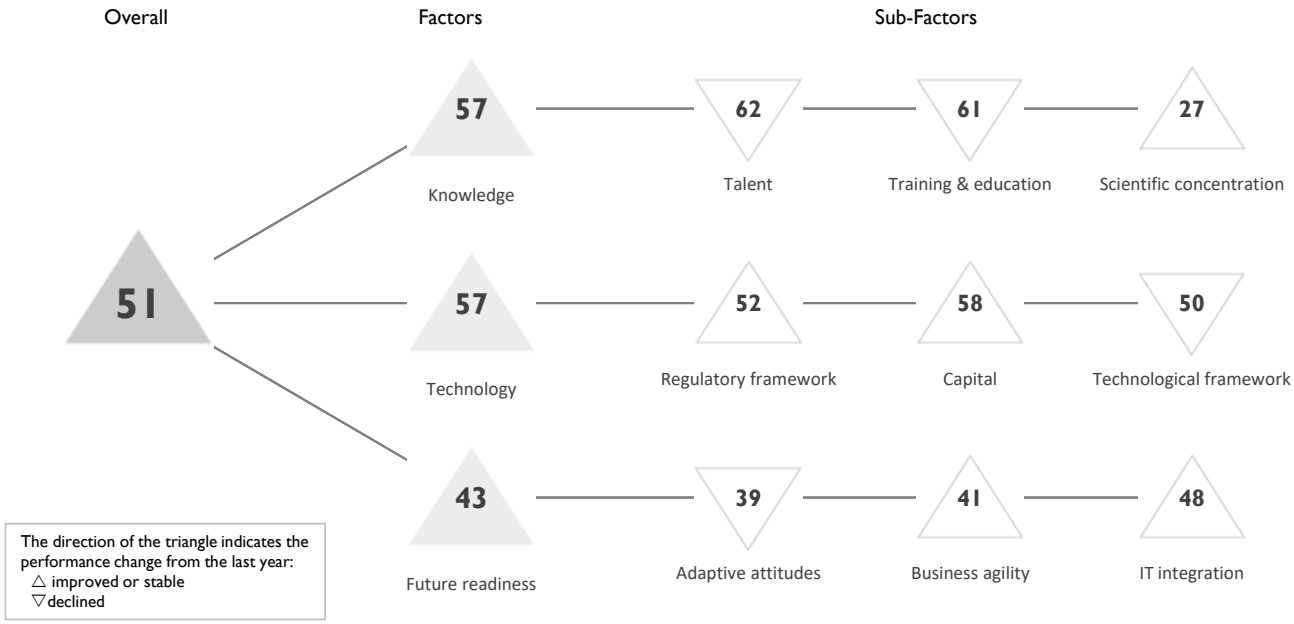
Adaptive attitudes	Rank
▷ E-Participation	56
▶ Internet retailing	11
▶ Tablet possession	11
Smartphone possession	20
Attitudes toward globalization	38

Business agility	Rank
▷ Opportunities and threats	46
World robots distribution	24
Agility of companies	31
Use of big data and analytics	31
Knowledge transfer	17
▷ Entrepreneurial fear of failure	46

IT integration	Rank
E-Government	36
Public-private partnerships	34
Cyber security	30
Software piracy	13

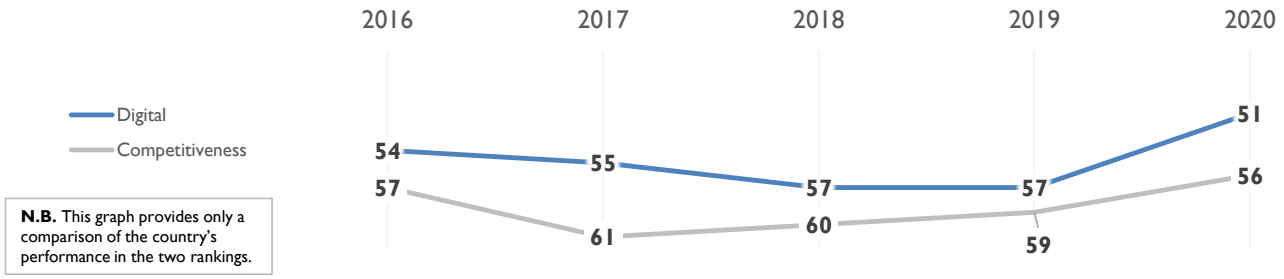
BRAZIL

OVERALL PERFORMANCE (63 countries)



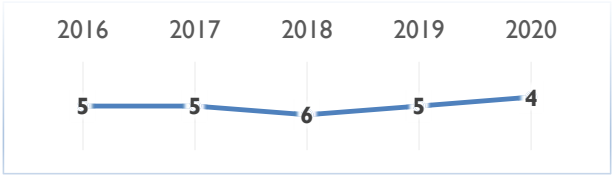
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	54	55	57	57	51
Knowledge	54	55	62	59	57
Technology	54	55	55	57	57
Future readiness	49	44	47	43	43

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)

BRAZIL

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	59	60	61	61	62
Training & education	49	48	57	59	61
Scientific concentration	43	44	54	44	27

Talent	Rank
Educational assessment PISA - Math	55
International experience	56
Foreign highly-skilled personnel	57
▷ Management of cities	59
▷ Digital/Technological skills	60
Net flow of international students	41

Training & education	Rank
▷ Employee training	59
▶ Total public expenditure on education	9
Higher education achievement	56
Pupil-teacher ratio (tertiary education)	46
Graduates in Sciences	55
Women with degrees	51

Scientific concentration	Rank
Total expenditure on R&D (%)	31
Total R&D personnel per capita	44
▶ Female researchers	8
▶ R&D productivity by publication	9
Scientific and technical employment	40
High-tech patent grants	46
▶ Robots in Education and R&D	14

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	58	60	59	57	52
Capital	54	56	56	61	58
Technological framework	47	48	47	47	50

Regulatory framework	Rank
Starting a business	58
Enforcing contracts	42
Immigration laws	30
Development & application of tech.	55
Scientific research legislation	55
Intellectual property rights	51

Capital	Rank
IT & media stock market capitalization	42
Funding for technological development	55
Banking and financial services	45
Country credit rating	56
Venture capital	49
Investment in Telecommunications	38

Technological framework	Rank
▷ Communications technology	59
Mobile Broadband subscribers	23
Wireless broadband	43
Internet users	46
Internet bandwidth speed	49
High-tech exports (%)	31

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	44	45	38	33	39
Business agility	51	46	52	58	41
IT integration	48	49	51	49	48

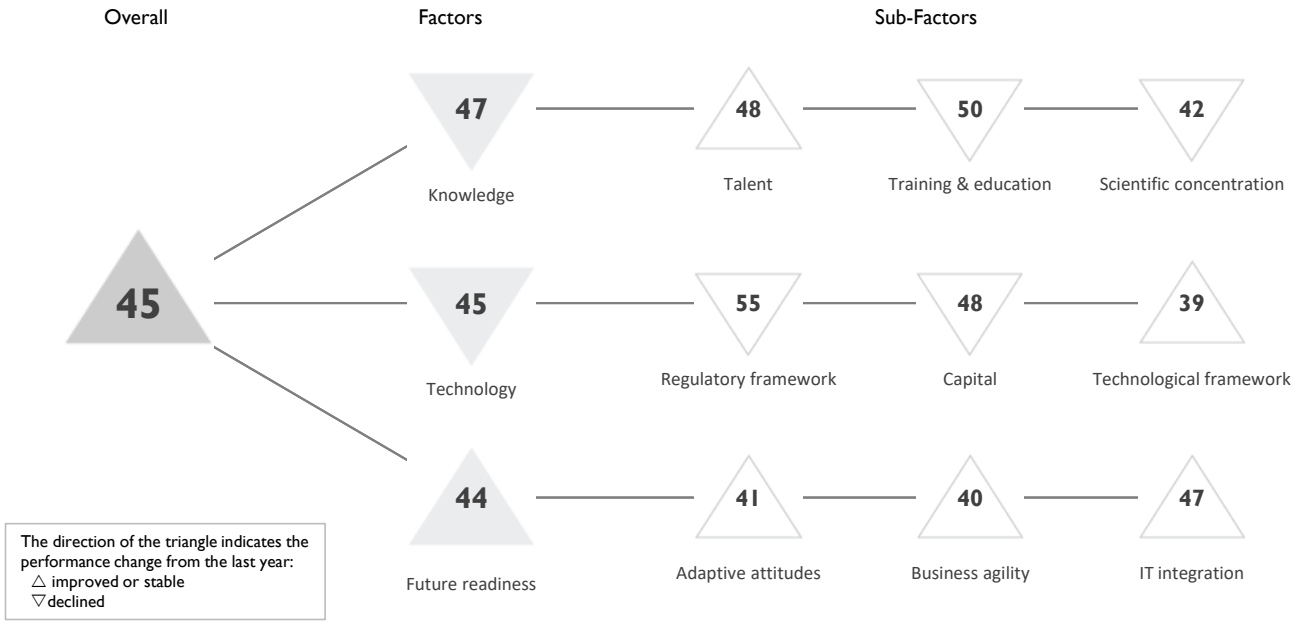
Adaptive attitudes	Rank
E-Participation	18
Internet retailing	43
Tablet possession	47
Smartphone possession	34
Attitudes toward globalization	44

Business agility	Rank
Opportunities and threats	44
World robots distribution	17
Agility of companies	39
▷ Use of big data and analytics	58
Knowledge transfer	54
▶ Entrepreneurial fear of failure	18

IT integration	Rank
E-Government	47
Public-private partnerships	56
Cyber security	51
Software piracy	36

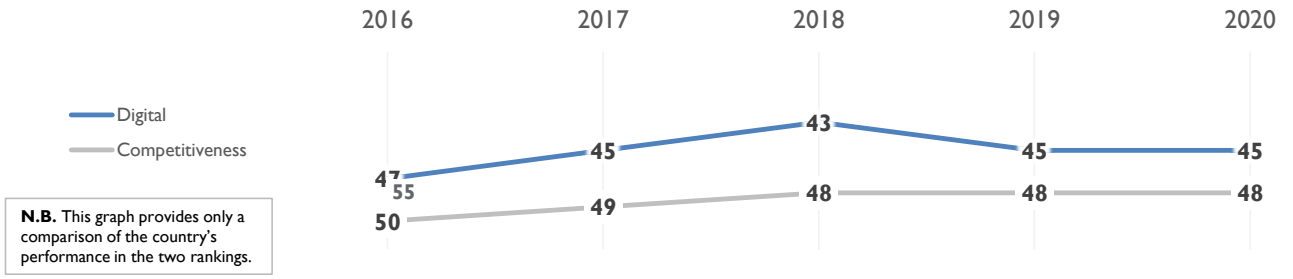
BULGARIA

OVERALL PERFORMANCE (63 countries)



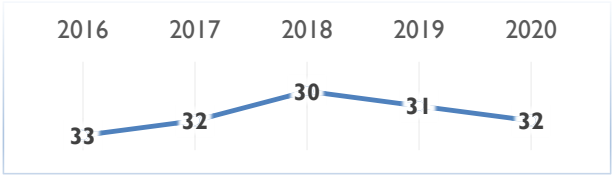
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	47	45	43	45	45
Knowledge	38	41	41	46	47
Technology	38	42	42	42	45
Future readiness	58	57	55	48	44

COMPETITIVENESS & DIGITAL RANKINGS

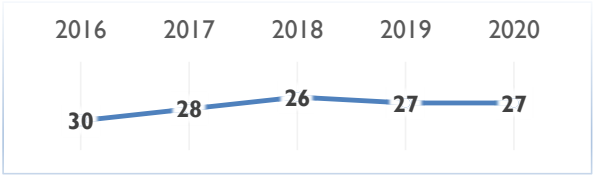


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



BULGARIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	52	51	53	50	48
Training & education	40	39	42	46	50
Scientific concentration	31	30	33	37	42

Talent	Rank
Educational assessment PISA - Math	44
International experience	52
▷ Foreign highly-skilled personnel	56
Management of cities	47
Digital/Technological skills	23
Net flow of international students	53

Training & education	Rank
▷ Employee training	61
Total public expenditure on education	48
Higher education achievement	44
▶ Pupil-teacher ratio (tertiary education)	14
Graduates in Sciences	47
Women with degrees	35

Scientific concentration	Rank
Total expenditure on R&D (%)	45
Total R&D personnel per capita	26
▶ Female researchers	12
R&D productivity by publication	52
Scientific and technical employment	42
High-tech patent grants	26
Robots in Education and R&D	50

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	48	50	52	46	55
Capital	36	46	50	42	48
Technological framework	34	34	36	44	39

Regulatory framework	Rank
Starting a business	47
Enforcing contracts	32
Immigration laws	55
Development & application of tech.	54
▷ Scientific research legislation	56
▷ Intellectual property rights	55

Capital	Rank
IT & media stock market capitalization	38
Funding for technological development	41
Banking and financial services	52
Country credit rating	42
Venture capital	39
Investment in Telecommunications	34

Technological framework	Rank
Communications technology	37
Mobile Broadband subscribers	39
▶ Wireless broadband	22
Internet users	44
Internet bandwidth speed	40
High-tech exports (%)	40

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	58	47	48	43	41
Business agility	60	61	59	56	40
IT integration	53	55	54	47	47

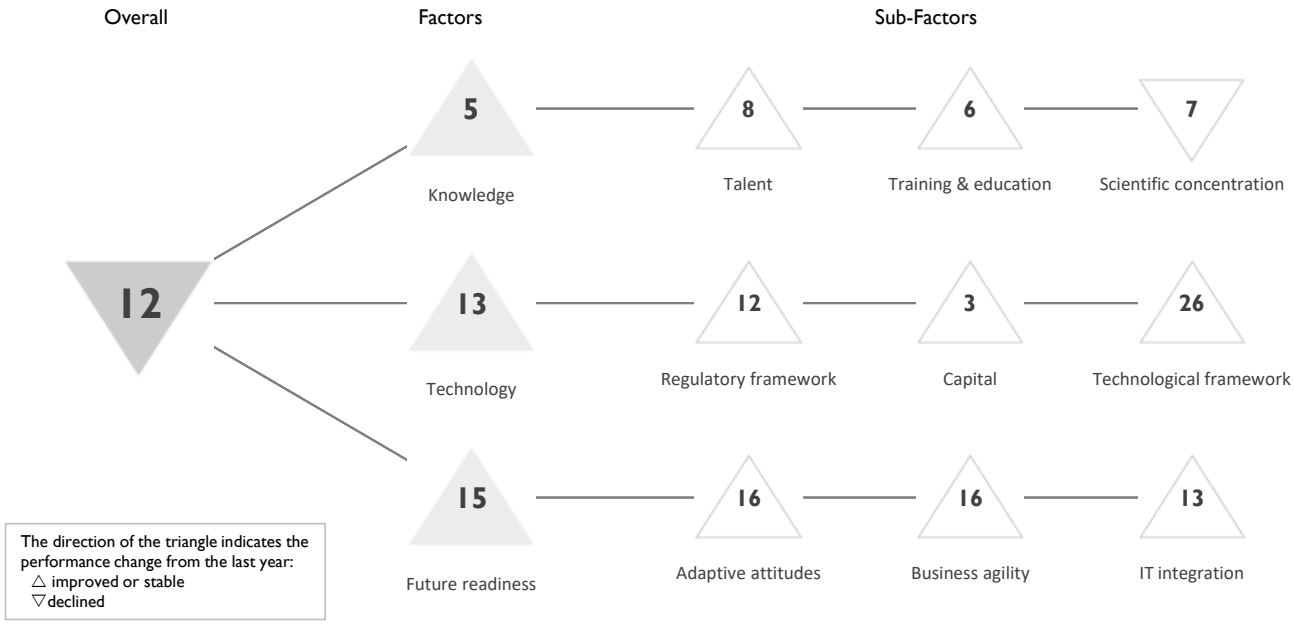
Adaptive attitudes	Rank
▶ E-Participation	22
Internet retailing	52
Tablet possession	46
Smartphone possession	41
Attitudes toward globalization	51

Business agility	Rank
Opportunities and threats	51
World robots distribution	45
Agility of companies	54
Use of big data and analytics	39
Knowledge transfer	49
▶ Entrepreneurial fear of failure	9

IT integration	Rank
E-Government	39
Public-private partnerships	39
▷ Cyber security	56
Software piracy	50

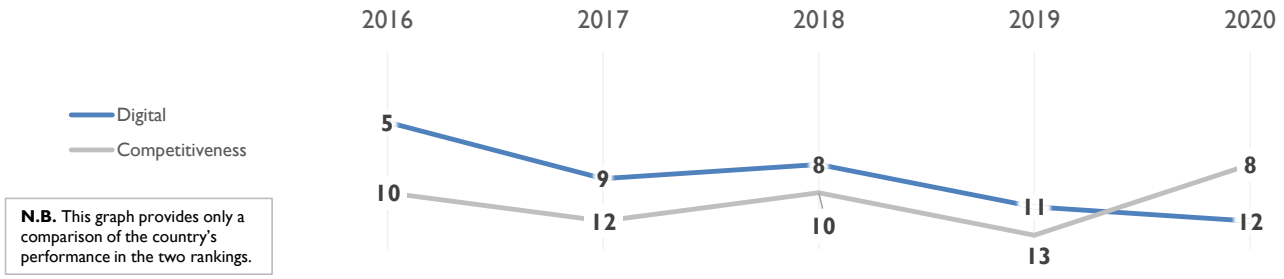
CANADA

OVERALL PERFORMANCE (63 countries)



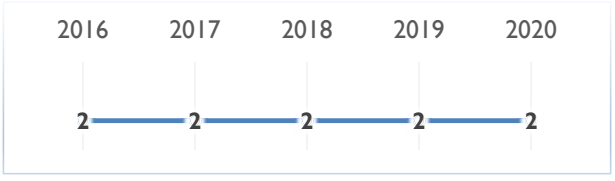
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	5	9	8	11	12
Knowledge	7	3	3	5	5
Technology	14	13	12	13	13
Future readiness	3	8	9	18	15

COMPETITIVENESS & DIGITAL RANKINGS

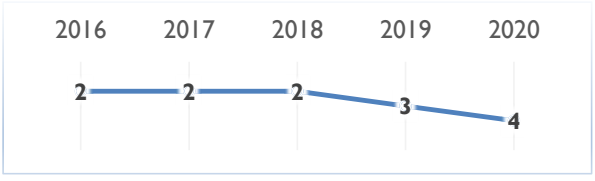


PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)



CANADA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	10	9	7	13	8
Training & education	13	10	4	7	6
Scientific concentration	4	4	4	2	7

Talent	Rank
Educational assessment PISA - Math	11
International experience	17
Foreign highly-skilled personnel	11
Management of cities	16
Digital/Technological skills	9
Net flow of international students	10

Training & education	Rank
Employee training	20
Total public expenditure on education	35
Higher education achievement	6
Pupil-teacher ratio (tertiary education)	7
▷ Graduates in Sciences	38
▶ Women with degrees	2

Scientific concentration	Rank
Total expenditure on R&D (%)	23
Total R&D personnel per capita	22
Female researchers	20
R&D productivity by publication	11
Scientific and technical employment	6
High-tech patent grants	12
Robots in Education and R&D	9

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	17	21	11	17	12
Capital	5	1	5	10	3
Technological framework	24	27	24	27	26

Regulatory framework	Rank
▶ Starting a business	2
▷ Enforcing contracts	50
Immigration laws	14
Development & application of tech.	8
Scientific research legislation	9
Intellectual property rights	12

Capital	Rank
IT & media stock market capitalization	24
Funding for technological development	14
Banking and financial services	4
▶ Country credit rating	1
Venture capital	10
Investment in Telecommunications	16

Technological framework	Rank
Communications technology	17
▷ Mobile Broadband subscribers	43
▷ Wireless broadband	51
Internet users	17
Internet bandwidth speed	11
High-tech exports (%)	27

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	16	13	15	17	16
Business agility	1	5	4	16	16
IT integration	7	15	12	13	13

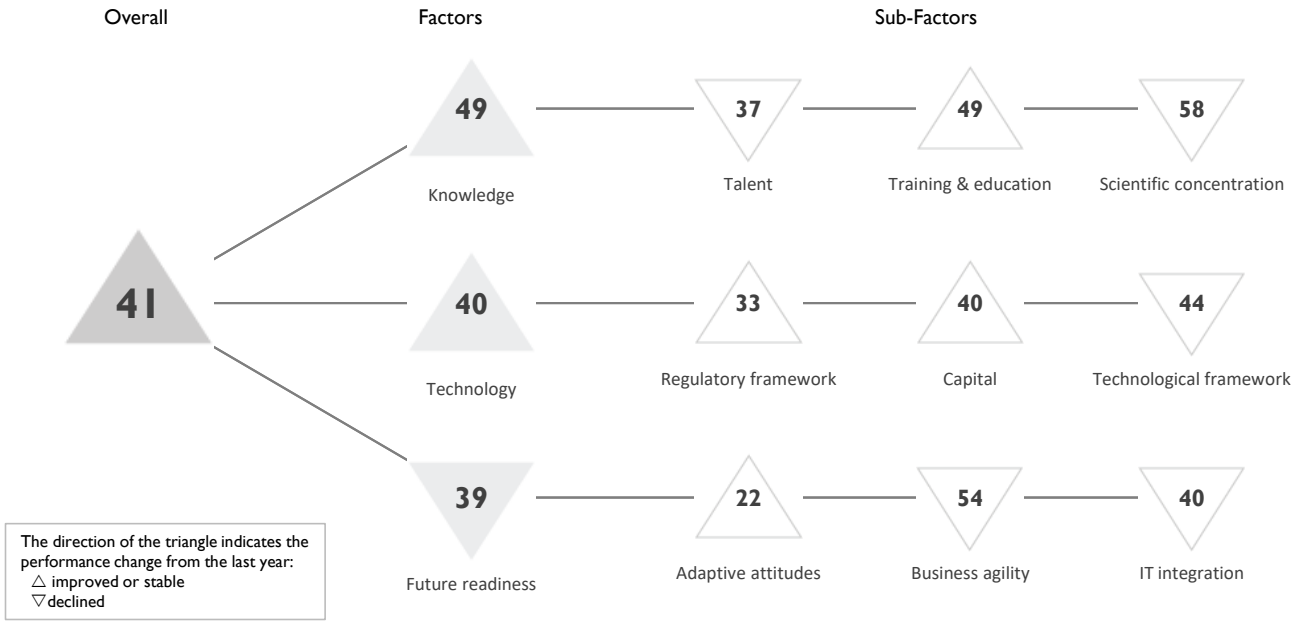
Adaptive attitudes	Rank
E-Participation	16
Internet retailing	6
Tablet possession	22
Smartphone possession	33
Attitudes toward globalization	16

Business agility	Rank
Opportunities and threats	14
World robots distribution	13
Agility of companies	14
▶ Use of big data and analytics	4
Knowledge transfer	7
▷ Entrepreneurial fear of failure	42

IT integration	Rank
E-Government	26
▶ Public-private partnerships	3
Cyber security	13
Software piracy	13

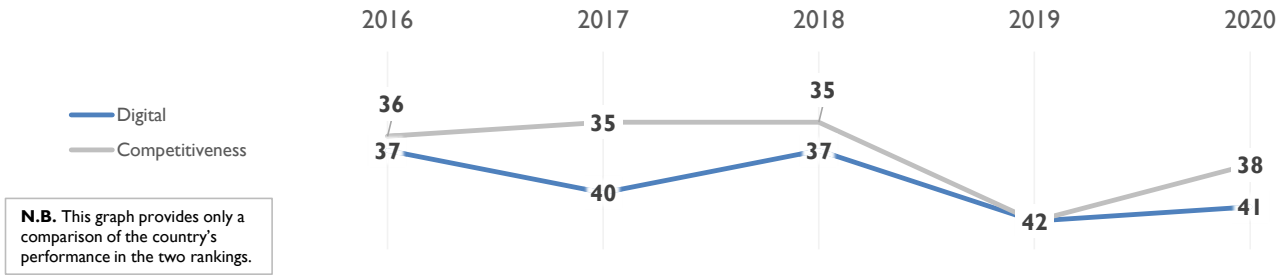
CHILE

OVERALL PERFORMANCE (63 countries)



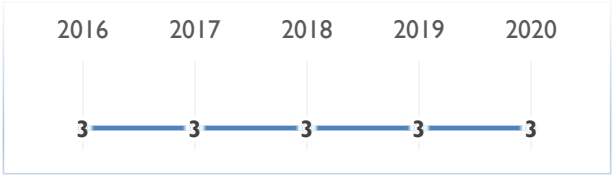
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	37	40	37	42	41
Knowledge	51	52	47	50	49
Technology	34	34	35	41	40
Future readiness	32	33	31	37	39

COMPETITIVENESS & DIGITAL RANKINGS

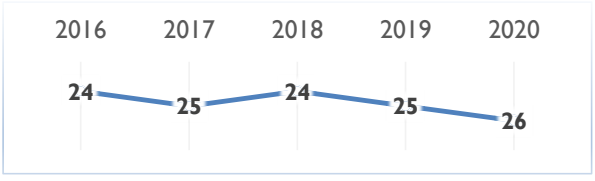


PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS < 20 MILLION (34 countries)



CHILE

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	35	34	31	36	37
Training & education	52	50	49	55	49
Scientific concentration	58	59	61	57	58

Talent	Rank
Educational assessment PISA - Math	49
International experience	19
▶ Foreign highly-skilled personnel	8
Management of cities	40
Digital/Technological skills	42
Net flow of international students	48

Training & education	Rank
Employee training	47
Total public expenditure on education	17
Higher education achievement	43
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	48
Women with degrees	45

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	53
▷ Total R&D personnel per capita	52
Female researchers	36
R&D productivity by publication	22
Scientific and technical employment	47
▷ High-tech patent grants	61
Robots in Education and R&D	46

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	32	33	33	36	33
Capital	23	20	26	44	40
Technological framework	45	46	41	42	44

Regulatory framework	Rank
Starting a business	31
Enforcing contracts	38
▶ Immigration laws	6
Development & application of tech.	40
Scientific research legislation	51
Intellectual property rights	40

Capital	Rank
IT & media stock market capitalization	47
Funding for technological development	48
▶ Banking and financial services	14
Country credit rating	26
Venture capital	46
Investment in Telecommunications	17

Technological framework	Rank
Communications technology	26
Mobile Broadband subscribers	47
Wireless broadband	38
Internet users	39
Internet bandwidth speed	38
High-tech exports (%)	51

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	22	30	27	27	22
Business agility	44	31	39	50	54
IT integration	37	40	38	39	40

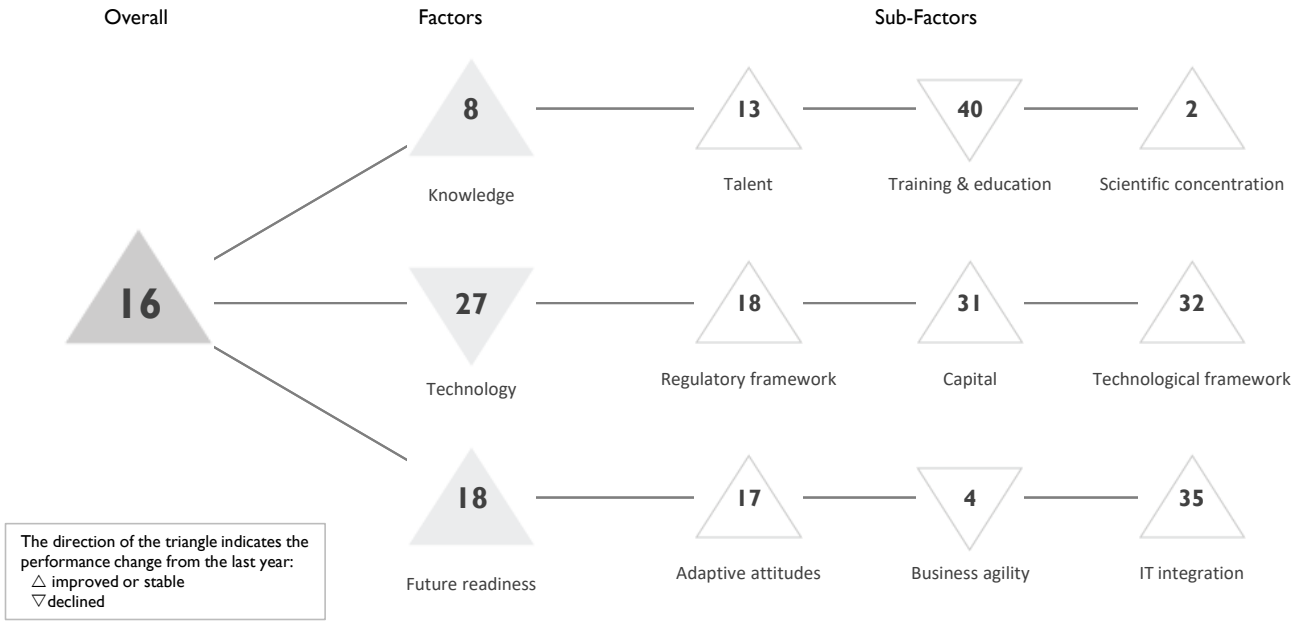
Adaptive attitudes	Rank
E-Participation	28
Internet retailing	36
Tablet possession	29
▶ Smartphone possession	8
▶ Attitudes toward globalization	11

Business agility	Rank
Opportunities and threats	20
World robots distribution	48
Agility of companies	20
▷ Use of big data and analytics	56
Knowledge transfer	51
▷ Entrepreneurial fear of failure	52

IT integration	Rank
E-Government	31
Public-private partnerships	27
Cyber security	49
Software piracy	46

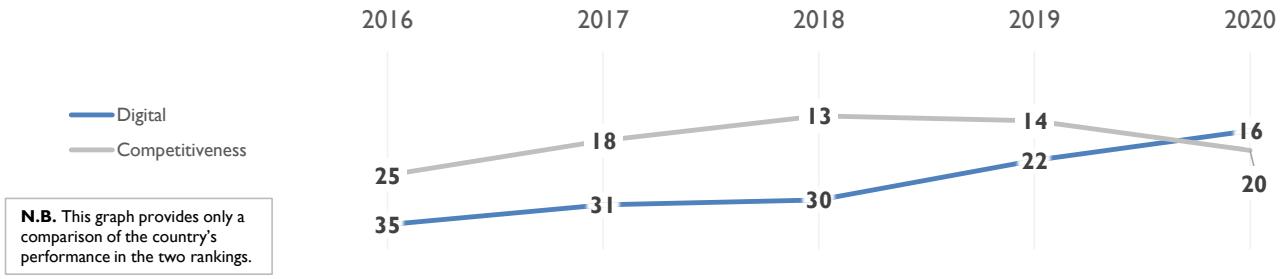
CHINA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	35	31	30	22	16
Knowledge	24	23	30	18	8
Technology	39	36	34	26	27
Future readiness	38	34	28	21	18

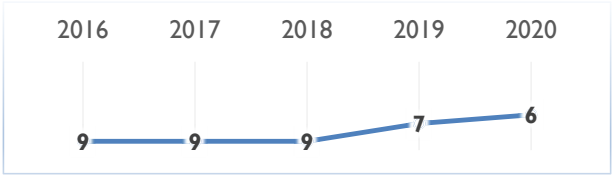
COMPETITIVENESS & DIGITAL RANKINGS



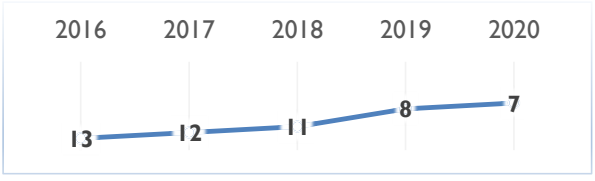
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



CHINA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

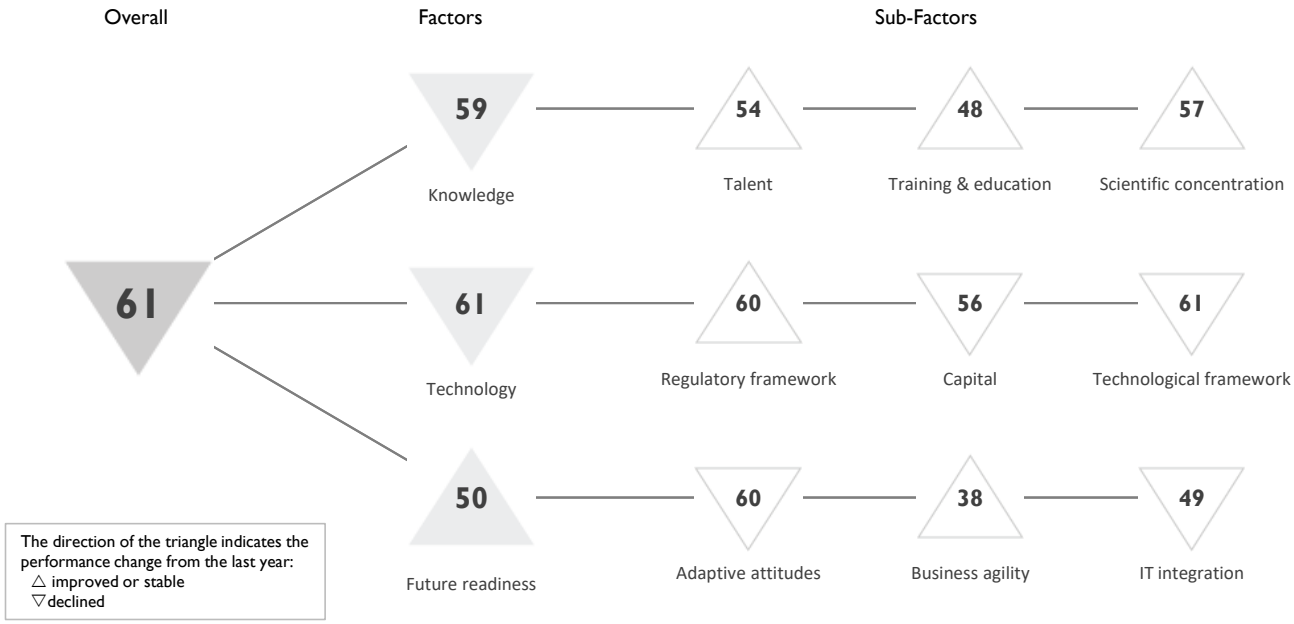
Adaptive attitudes	Rank
E-Participation	9
Internet retailing	19
Tablet possession	31
Smartphone possession	17
Attitudes toward globalization	8

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

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

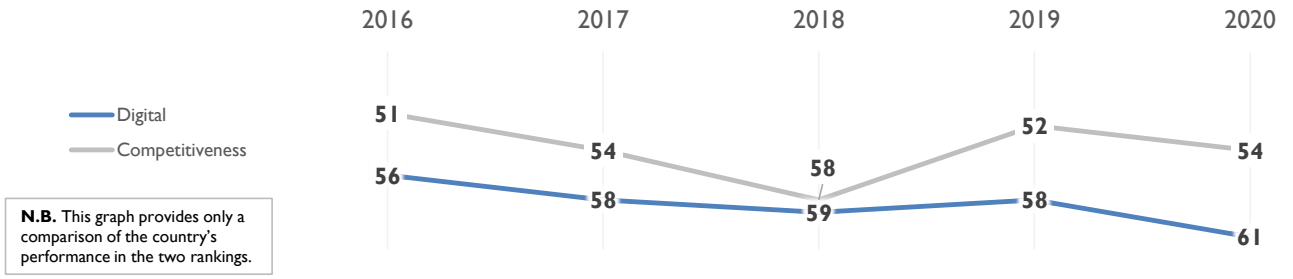
COLOMBIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	56	58	59	58	61
Knowledge	56	57	57	57	59
Technology	59	60	60	60	61
Future readiness	44	53	56	55	50

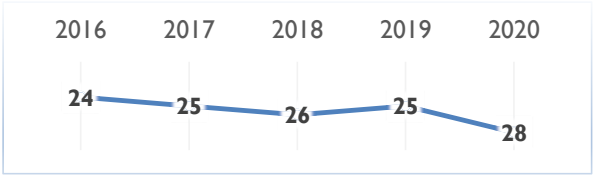
COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (29 countries)



COLOMBIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	55	58	57	56	54
Training & education	46	45	45	49	48
Scientific concentration	57	58	57	58	57

Talent	Rank
Educational assessment PISA - Math	54
International experience	51
Foreign highly-skilled personnel	34
Management of cities	49
Digital/Technological skills	54
Net flow of international students	50

Training & education	Rank
Employee training	33
Total public expenditure on education	42
Higher education achievement	51
Pupil-teacher ratio (tertiary education)	34
Graduates in Sciences	36
Women with degrees	46

Scientific concentration	Rank
Total expenditure on R&D (%)	56
Total R&D personnel per capita	49
Female researchers	29
▶ R&D productivity by publication	18
Scientific and technical employment	51
▷ High-tech patent grants	60
Robots in Education and R&D	50

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	57	58	62	61	60
Capital	53	55	57	55	56
Technological framework	55	55	55	52	61

Regulatory framework	Rank
Starting a business	40
▷ Enforcing contracts	63
▶ Immigration laws	27
Development & application of tech.	42
Scientific research legislation	52
Intellectual property rights	53

Capital	Rank
IT & media stock market capitalization	51
Funding for technological development	52
Banking and financial services	57
Country credit rating	45
Venture capital	53
▶ Investment in Telecommunications	6

Technological framework	Rank
Communications technology	55
▷ Mobile Broadband subscribers	61
▷ Wireless broadband	60
Internet users	51
▷ Internet bandwidth speed	60
High-tech exports (%)	47

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	42	53	57	56	60
Business agility	47	54	54	55	38
IT integration	44	45	48	45	49

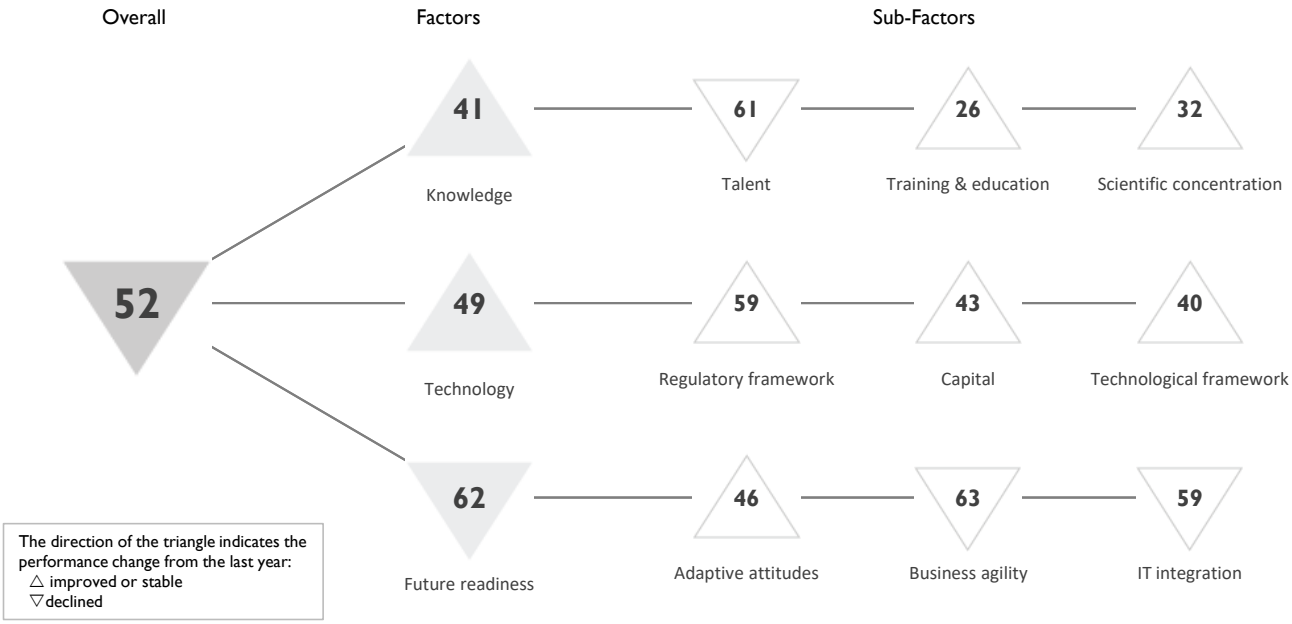
Adaptive attitudes	Rank
▶ E-Participation	26
Internet retailing	55
Tablet possession	53
Smartphone possession	59
Attitudes toward globalization	36

Business agility	Rank
Opportunities and threats	54
World robots distribution	49
Agility of companies	40
Use of big data and analytics	41
Knowledge transfer	40
▶ Entrepreneurial fear of failure	14

IT integration	Rank
E-Government	52
Public-private partnerships	32
Cyber security	57
Software piracy	40

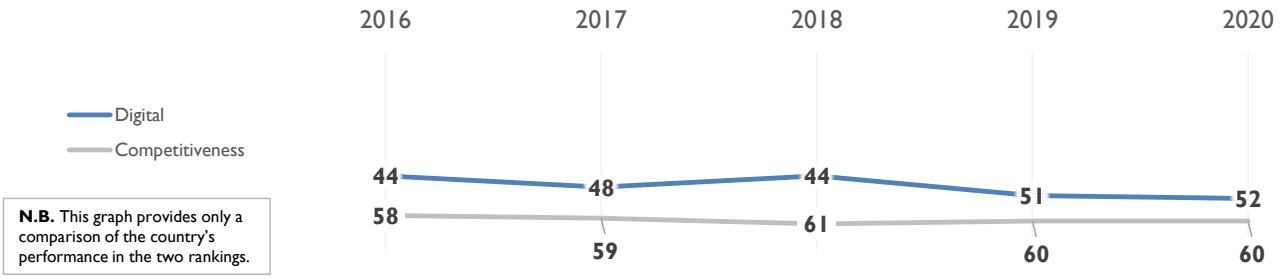
CROATIA

OVERALL PERFORMANCE (63 countries)



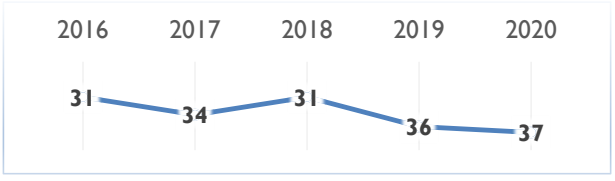
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	44	48	44	51	52
Knowledge	45	50	43	42	41
Technology	43	47	49	50	49
Future readiness	50	56	54	60	62

COMPETITIVENESS & DIGITAL RANKINGS

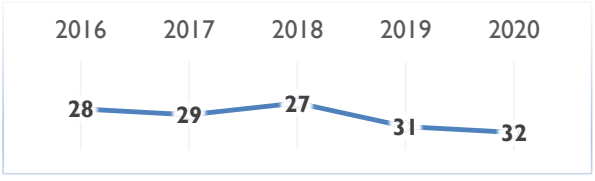


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



CROATIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	56	59	59	58	61
Training & education	37	41	36	31	26
Scientific concentration	36	35	32	33	32

Talent	Rank
Educational assessment PISA - Math	37
▷ International experience	62
Foreign highly-skilled personnel	62
Management of cities	60
Digital/Technological skills	53
Net flow of international students	52

Training & education	Rank
▷ Employee training	63
Total public expenditure on education	18
Higher education achievement	41
▶ Pupil-teacher ratio (tertiary education)	9
Graduates in Sciences	20
▶ Women with degrees	5

Scientific concentration	Rank
Total expenditure on R&D (%)	39
Total R&D personnel per capita	38
▶ Female researchers	10
R&D productivity by publication	48
Scientific and technical employment	31
▶ High-tech patent grants	10
Robots in Education and R&D	41

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	47	52	55	59	59
Capital	48	52	52	50	43
Technological framework	40	40	43	41	40

Regulatory framework	Rank
Starting a business	48
Enforcing contracts	24
Immigration laws	60
▷ Development & application of tech.	63
Scientific research legislation	60
Intellectual property rights	57

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	57
Banking and financial services	58
Country credit rating	53
Venture capital	56
▶ Investment in Telecommunications	3

Technological framework	Rank
Communications technology	44
Mobile Broadband subscribers	17
Wireless broadband	49
Internet users	37
Internet bandwidth speed	46
High-tech exports (%)	44

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	54	43	37	51	46
Business agility	45	62	63	62	63
IT integration	46	46	49	57	59

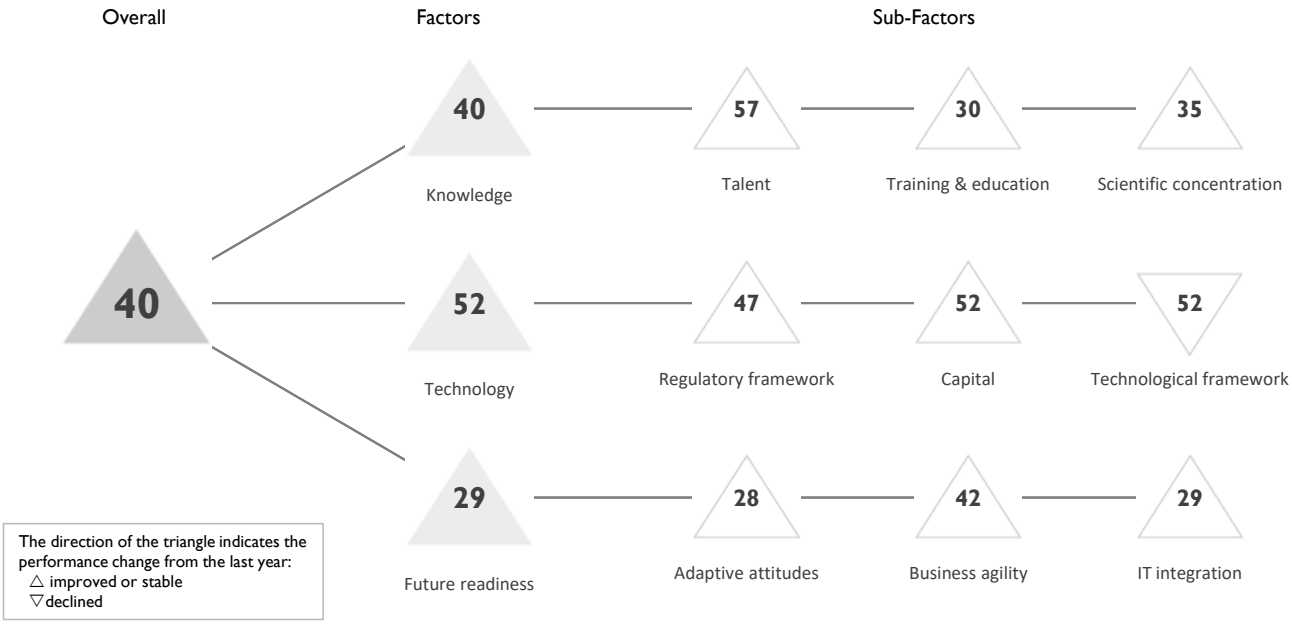
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	47
Tablet possession	34
Smartphone possession	30
Attitudes toward globalization	61

Business agility	Rank
▷ Opportunities and threats	62
World robots distribution	49
Agility of companies	62
Use of big data and analytics	62
Knowledge transfer	62
Entrepreneurial fear of failure	48

IT integration	Rank
E-Government	44
▷ Public-private partnerships	62
Cyber security	58
Software piracy	43

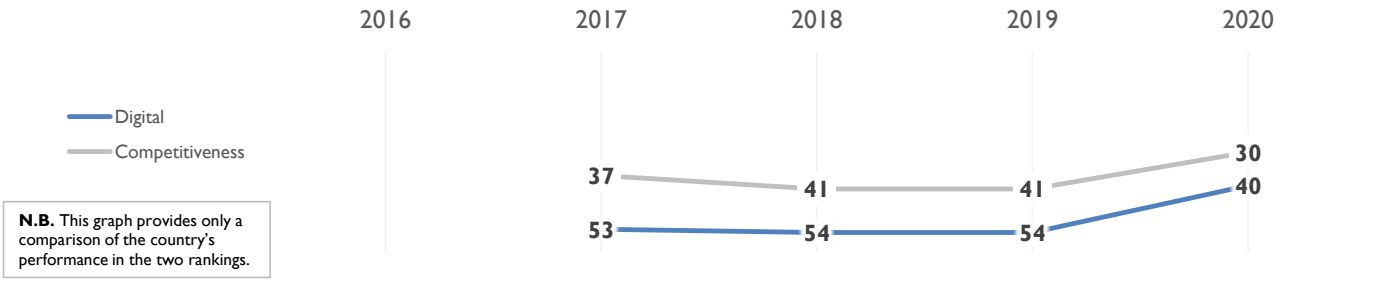
CYPRUS

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL		53	54	54	40
Knowledge		46	55	55	40
Technology		54	56	59	52
Future readiness		54	44	40	29

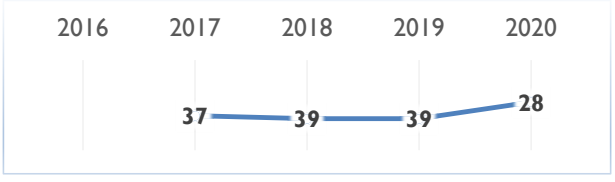
COMPETITIVENESS & DIGITAL RANKINGS



N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)

CYPRUS

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent		56	62	62	57
Training & education		22	29	33	30
Scientific concentration		51	52	53	35

	Talent	Rank
	Educational assessment PISA - Math	42
▶	International experience	13
	Foreign highly-skilled personnel	30
	Management of cities	30
	Digital/Technological skills	28
▷	Net flow of international students	61

	Training & education	Rank
	Employee training	36
	Total public expenditure on education	20
▶	Higher education achievement	10
	Pupil-teacher ratio (tertiary education)	29
▷	Graduates in Sciences	60
	Women with degrees	16

	Scientific concentration	Rank
	Total expenditure on R&D (%)	51
	Total R&D personnel per capita	46
	Female researchers	27
▷	R&D productivity by publication	58
▶	Scientific and technical employment	7
▶	High-tech patent grants	13
	Robots in Education and R&D	-

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework		45	51	56	47
Capital		54	60	60	52
Technological framework		54	49	48	52

	Regulatory framework	Rank
	Starting a business	29
▷	Enforcing contracts	58
	Immigration laws	53
	Development & application of tech.	38
	Scientific research legislation	34
	Intellectual property rights	37

	Capital	Rank
	IT & media stock market capitalization	44
	Funding for technological development	46
	Banking and financial services	26
	Country credit rating	55
	Venture capital	50
	Investment in Telecommunications	29

	Technological framework	Rank
	Communications technology	33
▷	Mobile Broadband subscribers	62
	Wireless broadband	46
	Internet users	42
	Internet bandwidth speed	54
	High-tech exports (%)	18

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes		56	45	34	28
Business agility		51	45	57	42
IT integration		47	46	38	29

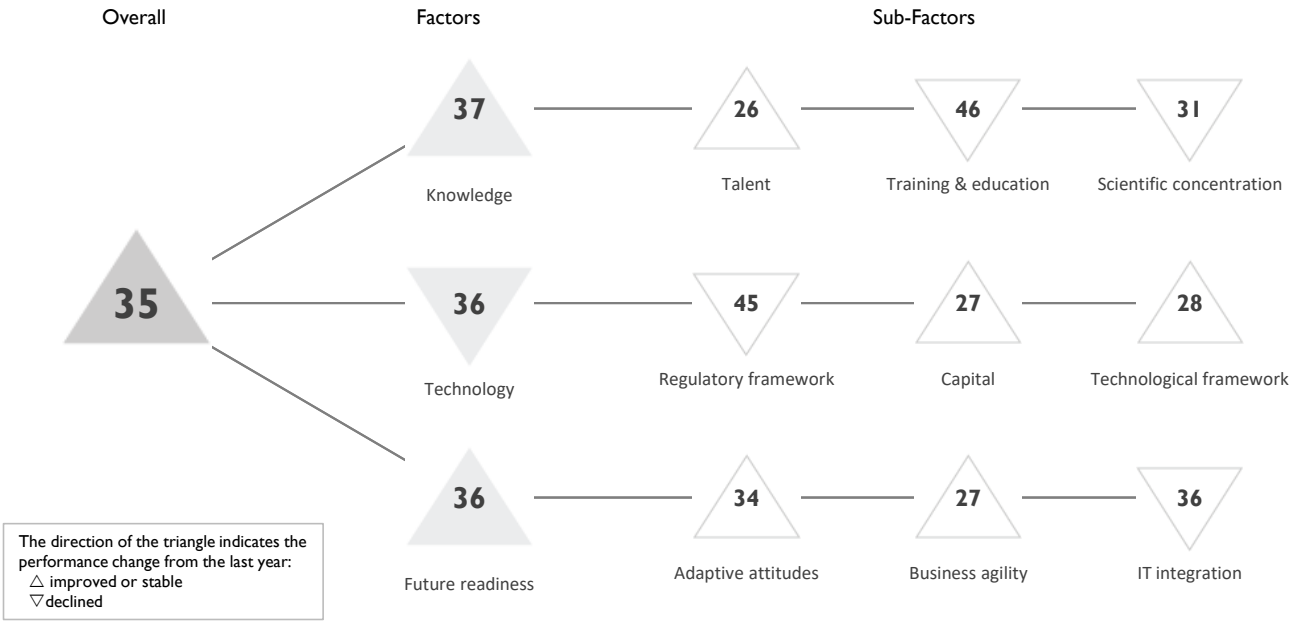
	Adaptive attitudes	Rank
▶	E-Participation	14
	Internet retailing	-
	Tablet possession	36
	Smartphone possession	-
	Attitudes toward globalization	46

	Business agility	Rank
	Opportunities and threats	48
	World robots distribution	58
	Agility of companies	47
	Use of big data and analytics	50
	Knowledge transfer	35
	Entrepreneurial fear of failure	19

	IT integration	Rank
	E-Government	18
	Public-private partnerships	30
	Cyber security	32
	Software piracy	34

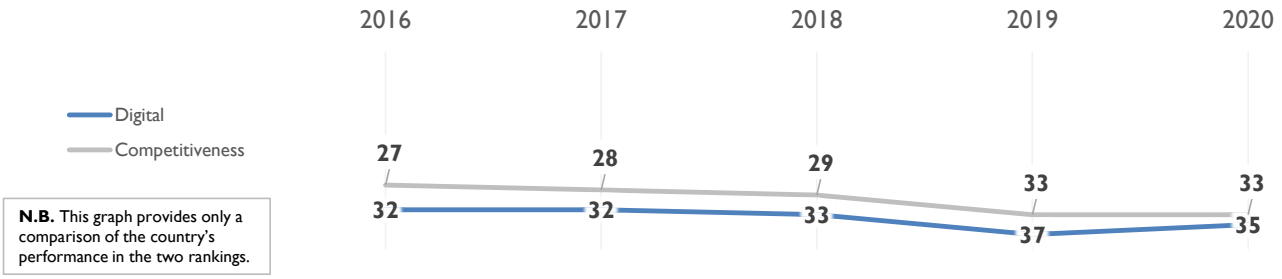
CZECH REPUBLIC

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	32	32	33	37	35
Knowledge	34	36	38	37	37
Technology	26	26	31	34	36
Future readiness	34	37	34	39	36

COMPETITIVENESS & DIGITAL RANKINGS



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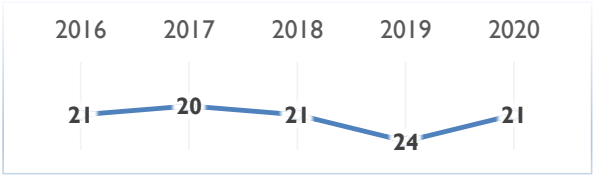
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)



CZECH REPUBLIC

▶ **Overall top strengths**
▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	22	26	29	35	26
Training & education	50	49	55	44	46
Scientific concentration	33	34	36	30	31

Talent	Rank
Educational assessment PISA - Math	21
International experience	33
Foreign highly-skilled personnel	42
Management of cities	33
Digital/Technological skills	39
▶ Net flow of international students	12

Training & education	Rank
Employee training	35
Total public expenditure on education	29
Higher education achievement	45
Pupil-teacher ratio (tertiary education)	41
Graduates in Sciences	33
Women with degrees	44

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	19
Total R&D personnel per capita	20
▷ Female researchers	50
R&D productivity by publication	34
Scientific and technical employment	29
High-tech patent grants	36
▶ Robots in Education and R&D	19

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	39	43	44	43	45
Capital	17	15	19	28	27
Technological framework	15	15	18	28	28

Regulatory framework	Rank
▷ Starting a business	56
▷ Enforcing contracts	52
Immigration laws	32
Development & application of tech.	39
Scientific research legislation	37
Intellectual property rights	35

Capital	Rank
▶ IT & media stock market capitalization	12
Funding for technological development	32
Banking and financial services	35
Country credit rating	21
Venture capital	31
Investment in Telecommunications	40

Technological framework	Rank
Communications technology	43
Mobile Broadband subscribers	20
Wireless broadband	26
Internet users	27
Internet bandwidth speed	34
High-tech exports (%)	19

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	48	42	34	46	34
Business agility	29	33	25	37	27
IT integration	36	33	34	35	36

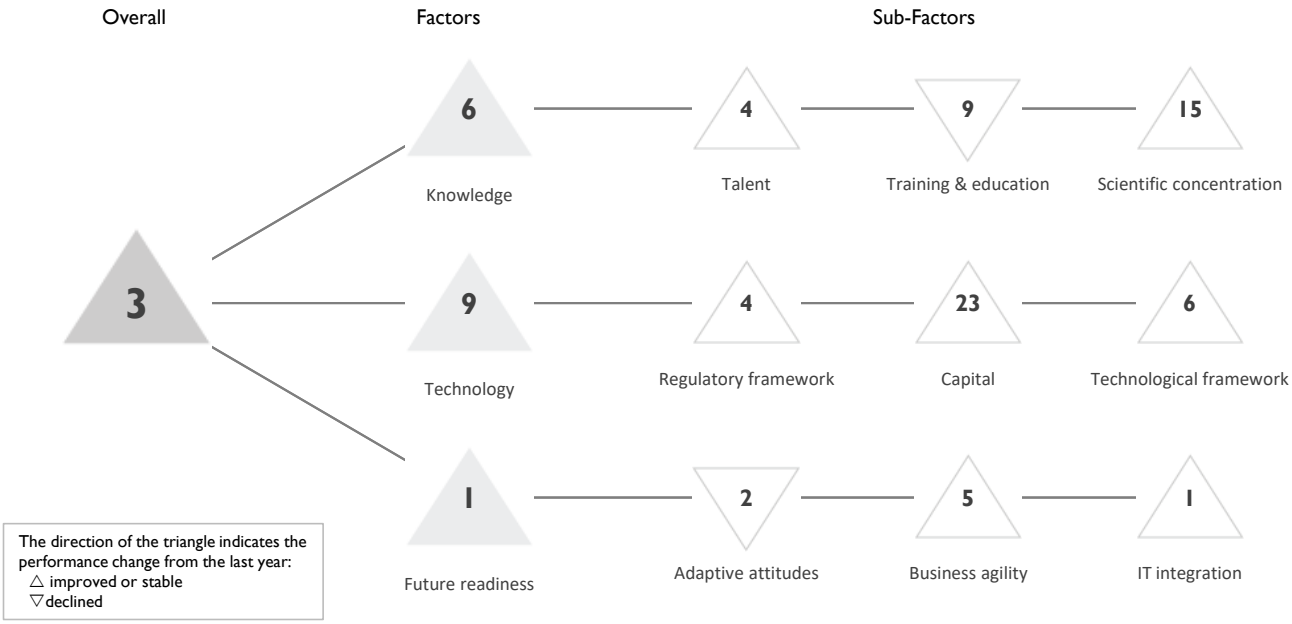
Adaptive attitudes	Rank
▷ E-Participation	50
Internet retailing	22
Tablet possession	45
Smartphone possession	27
Attitudes toward globalization	40

Business agility	Rank
Opportunities and threats	31
▶ World robots distribution	16
Agility of companies	32
Use of big data and analytics	27
Knowledge transfer	31
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	35
▷ Public-private partnerships	55
Cyber security	42
Software piracy	20

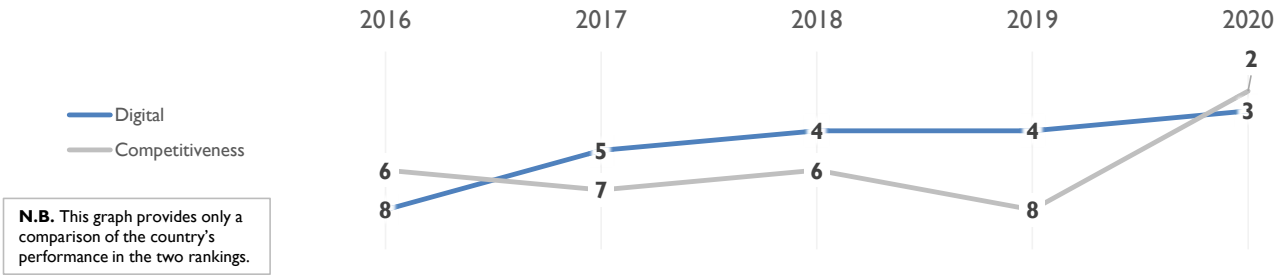
DENMARK

OVERALL PERFORMANCE (63 countries)



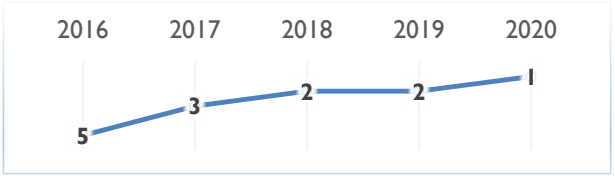
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	8	5	4	4	3
Knowledge	8	8	8	6	6
Technology	12	10	10	11	9
Future readiness	6	1	1	2	1

COMPETITIVENESS & DIGITAL RANKINGS

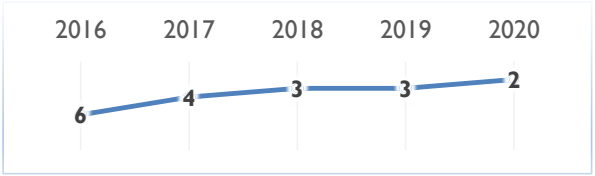


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



DENMARK

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	8	6	6	6	4
Training & education	7	5	3	6	9
Scientific concentration	18	19	14	17	15

Talent	Rank
Educational assessment PISA - Math	12
International experience	10
Foreign highly-skilled personnel	19
Management of cities	2
Digital/Technological skills	5
Net flow of international students	7

Training & education	Rank
▶ Employee training	1
Total public expenditure on education	6
Higher education achievement	27
Pupil-teacher ratio (tertiary education)	4
▷ Graduates in Sciences	45
Women with degrees	22

Scientific concentration	Rank
Total expenditure on R&D (%)	9
▶ Total R&D personnel per capita	1
Female researchers	33
▷ R&D productivity by publication	49
Scientific and technical employment	19
▷ High-tech patent grants	38
Robots in Education and R&D	27

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	9	8	8	10	4
Capital	26	25	22	27	23
Technological framework	8	5	5	8	6

Regulatory framework	Rank
Starting a business	26
Enforcing contracts	13
Immigration laws	20
Development & application of tech.	3
Scientific research legislation	4
Intellectual property rights	1

Capital	Rank
▷ IT & media stock market capitalization	46
Funding for technological development	6
Banking and financial services	11
▶ Country credit rating	1
Venture capital	13
▷ Investment in Telecommunications	35

Technological framework	Rank
Communications technology	2
Mobile Broadband subscribers	8
Wireless broadband	9
Internet users	8
Internet bandwidth speed	7
High-tech exports (%)	29

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	5	1	5	1	2
Business agility	15	11	6	10	5
IT integration	10	11	5	1	1

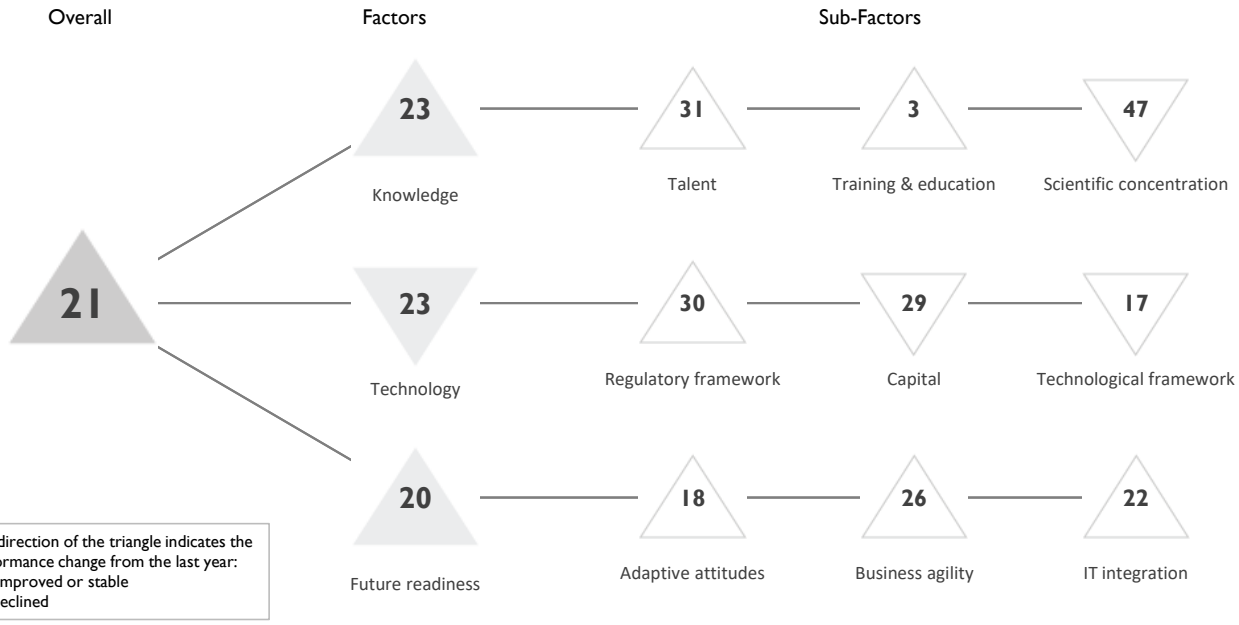
Adaptive attitudes	Rank
E-Participation	9
Internet retailing	4
Tablet possession	19
Smartphone possession	10
▶ Attitudes toward globalization	1

Business agility	Rank
Opportunities and threats	3
World robots distribution	30
Agility of companies	2
Use of big data and analytics	12
Knowledge transfer	3
Entrepreneurial fear of failure	-

IT integration	Rank
▶ E-Government	1
Public-private partnerships	5
Cyber security	12
Software piracy	8

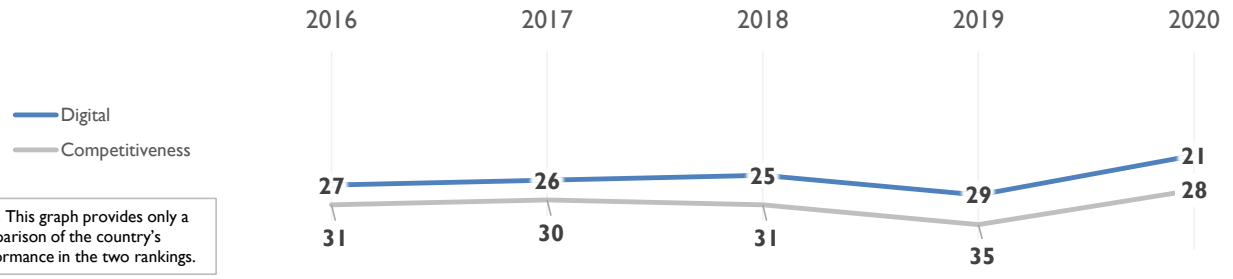
ESTONIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	27	26	25	29	21
Knowledge	30	28	29	30	23
Technology	17	19	20	22	23
Future readiness	26	26	26	30	20

COMPETITIVENESS & DIGITAL RANKINGS



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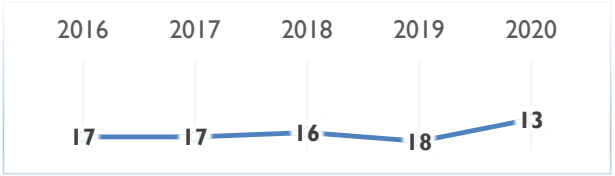
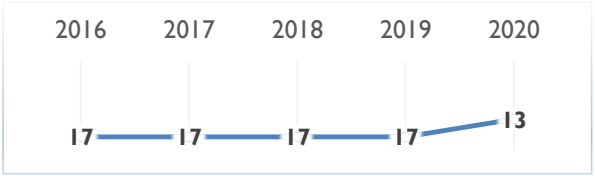
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



ESTONIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	46	40	34	37	31
Training & education	3	2	17	10	3
Scientific concentration	38	38	39	46	47

Talent	Rank
Educational assessment PISA - Math	7
International experience	45
Foreign highly-skilled personnel	29
Management of cities	36
▷ Digital/Technological skills	47
Net flow of international students	34

Training & education	Rank
▶ Employee training	5
Total public expenditure on education	8
Higher education achievement	29
Pupil-teacher ratio (tertiary education)	16
Graduates in Sciences	14
Women with degrees	10

Scientific concentration	Rank
Total expenditure on R&D (%)	26
Total R&D personnel per capita	29
Female researchers	19
▷ R&D productivity by publication	60
Scientific and technical employment	30
High-tech patent grants	20
▷ Robots in Education and R&D	50

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	19	23	25	31	30
Capital	16	18	21	24	29
Technological framework	14	18	15	16	17

Regulatory framework	Rank
Starting a business	7
Enforcing contracts	8
▷ Immigration laws	59
Development & application of tech.	24
Scientific research legislation	42
Intellectual property rights	25

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	36
Banking and financial services	38
Country credit rating	23
Venture capital	18
Investment in Telecommunications	33

Technological framework	Rank
Communications technology	20
Mobile Broadband subscribers	44
▶ Wireless broadband	4
Internet users	11
Internet bandwidth speed	29
High-tech exports (%)	24

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	28	31	24	26	18
Business agility	20	19	29	43	26
IT integration	25	25	22	26	22

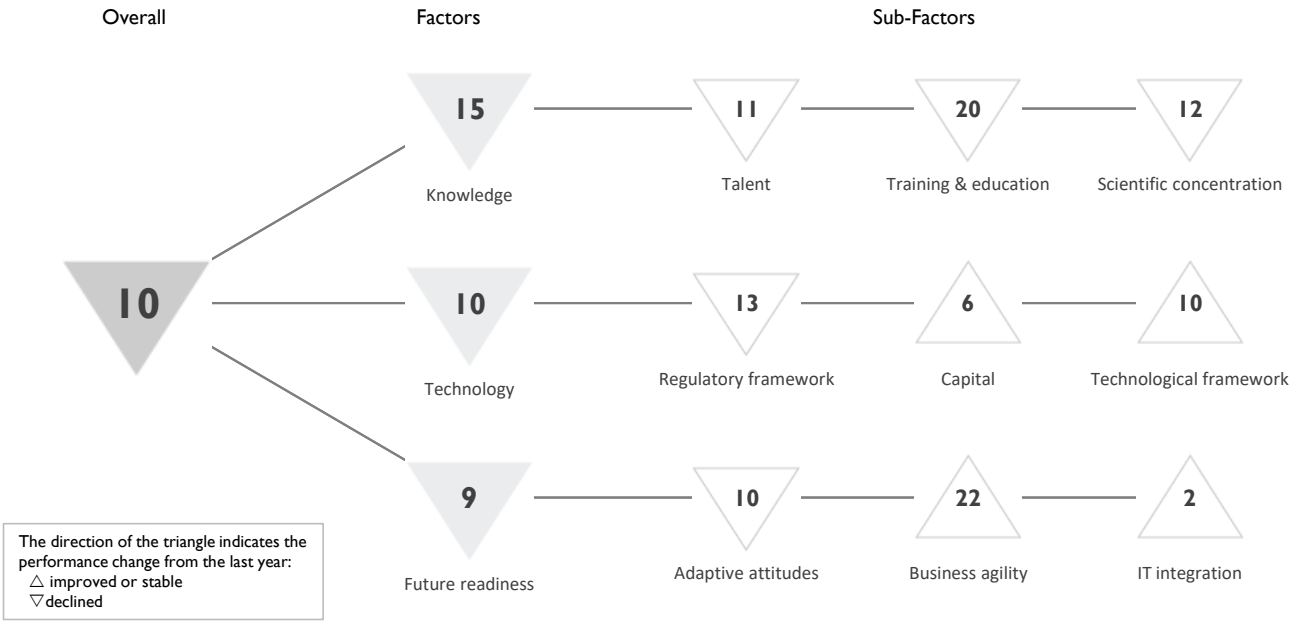
Adaptive attitudes	Rank
▶ E-Participation	1
Internet retailing	20
▶ Tablet possession	7
Smartphone possession	31
Attitudes toward globalization	32

Business agility	Rank
Opportunities and threats	29
▷ World robots distribution	47
Agility of companies	9
Use of big data and analytics	37
Knowledge transfer	42
Entrepreneurial fear of failure	12

IT integration	Rank
▶ E-Government	3
Public-private partnerships	44
Cyber security	16
Software piracy	30

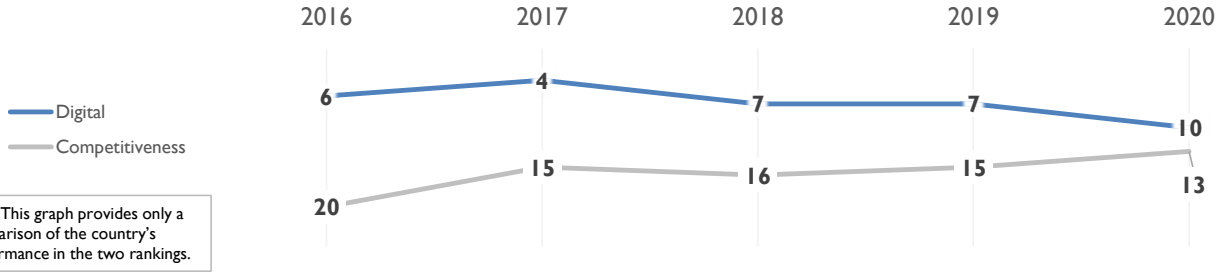
FINLAND

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	6	4	7	7	10
Knowledge	9	9	9	9	15
Technology	7	4	4	8	10
Future readiness	5	4	8	7	9

COMPETITIVENESS & DIGITAL RANKINGS



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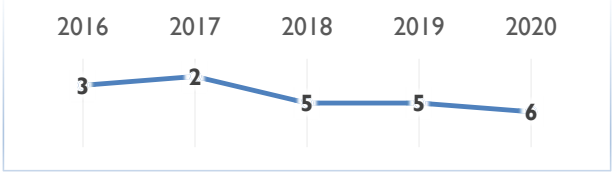
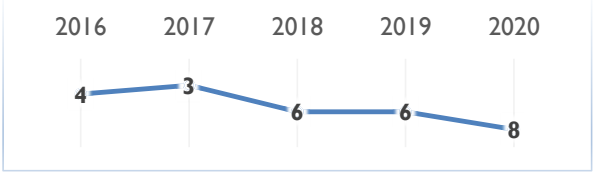
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



FINLAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	15	10	13	9	11
Training & education	8	8	9	16	20
Scientific concentration	7	12	9	10	12

Talent	Rank
Educational assessment PISA - Math	15
International experience	16
Foreign highly-skilled personnel	39
Management of cities	7
Digital/Technological skills	4
Net flow of international students	16

Training & education	Rank
Employee training	8
Total public expenditure on education	14
Higher education achievement	33
▷ Pupil-teacher ratio (tertiary education)	47
Graduates in Sciences	19
Women with degrees	7

Scientific concentration	Rank
Total expenditure on R&D (%)	12
Total R&D personnel per capita	9
Female researchers	40
▷ R&D productivity by publication	51
Scientific and technical employment	13
High-tech patent grants	8
Robots in Education and R&D	23

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	7	2	4	9	13
Capital	13	10	9	11	6
Technological framework	7	8	6	13	10

Regulatory framework	Rank
Starting a business	18
Enforcing contracts	34
▷ Immigration laws	52
Development & application of tech.	4
▶ Scientific research legislation	3
Intellectual property rights	3

Capital	Rank
IT & media stock market capitalization	15
▶ Funding for technological development	1
▶ Banking and financial services	1
Country credit rating	12
▶ Venture capital	3
▷ Investment in Telecommunications	48

Technological framework	Rank
▶ Communications technology	1
Mobile Broadband subscribers	7
Wireless broadband	5
Internet users	6
Internet bandwidth speed	24
▷ High-tech exports (%)	43

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	9	3	6	6	10
Business agility	12	17	22	27	22
IT integration	5	2	1	2	2

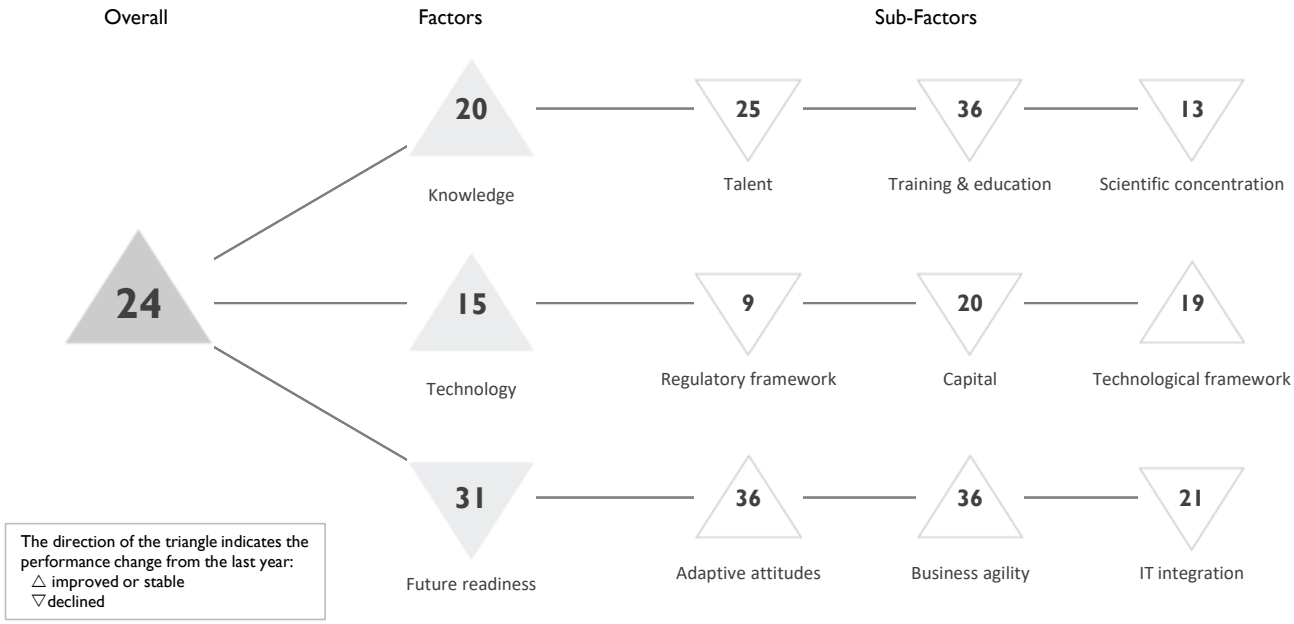
Adaptive attitudes	Rank
E-Participation	14
Internet retailing	15
Tablet possession	9
Smartphone possession	12
Attitudes toward globalization	6

Business agility	Rank
Opportunities and threats	26
World robots distribution	33
Agility of companies	23
Use of big data and analytics	15
Knowledge transfer	8
Entrepreneurial fear of failure	24

IT integration	Rank
E-Government	4
Public-private partnerships	10
Cyber security	5
Software piracy	13

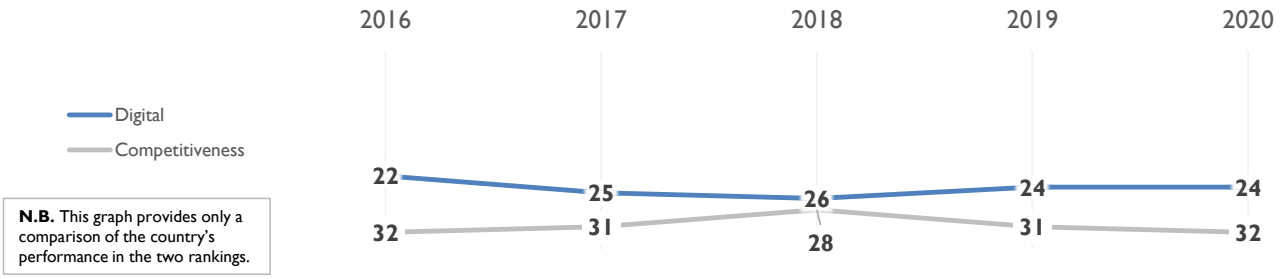
FRANCE

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	22	25	26	24	24
Knowledge	21	19	20	20	20
Technology	23	22	19	16	15
Future readiness	20	28	27	29	31

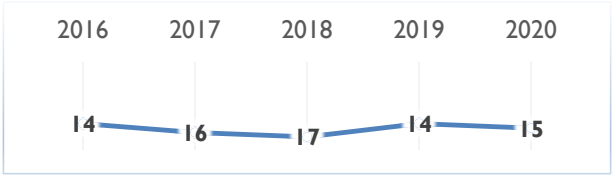
COMPETITIVENESS & DIGITAL RANKINGS



N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)

FRANCE

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	24	24	21	24	25
Training & education	34	35	33	28	36
Scientific concentration	9	10	17	12	13

Talent	Rank
Educational assessment PISA - Math	24
▷ International experience	54
Foreign highly-skilled personnel	28
Management of cities	17
Digital/Technological skills	34
Net flow of international students	15

Training & education	Rank
▷ Employee training	50
Total public expenditure on education	21
Higher education achievement	25
Pupil-teacher ratio (tertiary education)	40
Graduates in Sciences	24
Women with degrees	30

Scientific concentration	Rank
Total expenditure on R&D (%)	13
Total R&D personnel per capita	21
Female researchers	47
R&D productivity by publication	15
Scientific and technical employment	18
High-tech patent grants	18
▶ Robots in Education and R&D	5

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	15	15	5	8	9
Capital	31	26	25	18	20
Technological framework	22	25	28	22	19

Regulatory framework	Rank
Starting a business	21
Enforcing contracts	15
▶ Immigration laws	9
Development & application of tech.	26
Scientific research legislation	22
Intellectual property rights	17

Capital	Rank
IT & media stock market capitalization	25
Funding for technological development	16
Banking and financial services	36
Country credit rating	16
Venture capital	20
Investment in Telecommunications	22

Technological framework	Rank
Communications technology	14
Mobile Broadband subscribers	41
Wireless broadband	36
Internet users	23
Internet bandwidth speed	15
▶ High-tech exports (%)	8

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	23	26	32	36	36
Business agility	21	44	36	39	36
IT integration	19	20	19	19	21

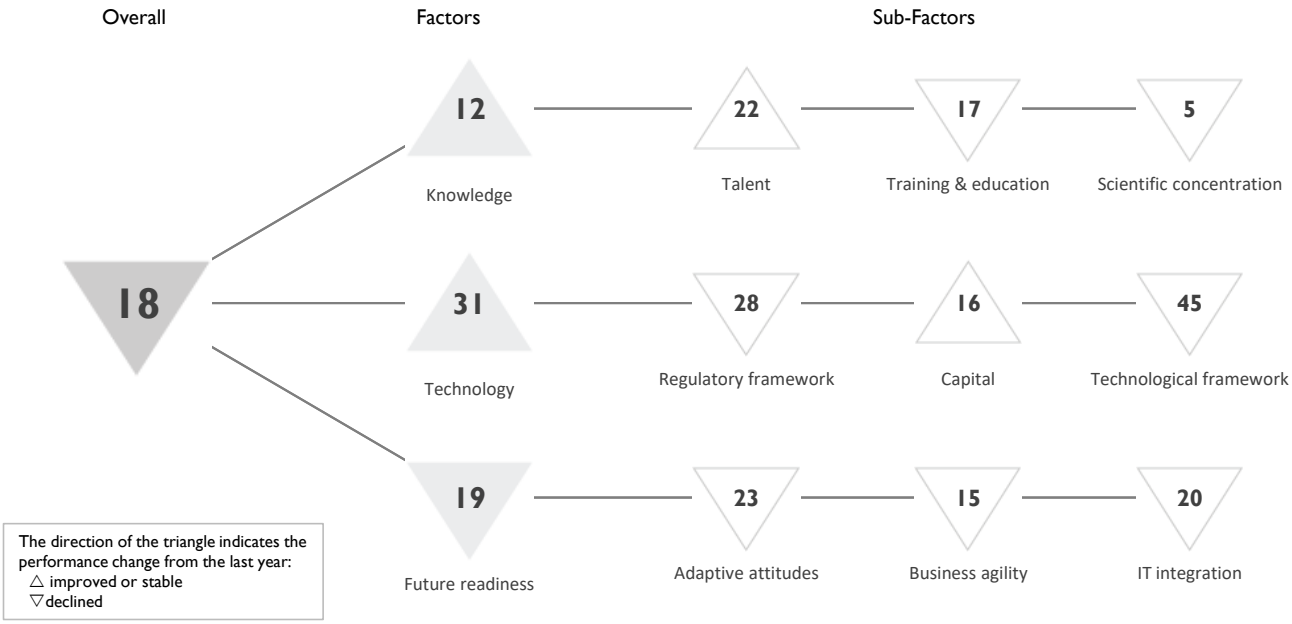
Adaptive attitudes	Rank
E-Participation	18
▶ Internet retailing	13
Tablet possession	48
Smartphone possession	40
▷ Attitudes toward globalization	62

Business agility	Rank
▷ Opportunities and threats	57
▶ World robots distribution	8
▷ Agility of companies	55
Use of big data and analytics	47
Knowledge transfer	26
Entrepreneurial fear of failure	22

IT integration	Rank
E-Government	19
Public-private partnerships	20
Cyber security	26
Software piracy	20

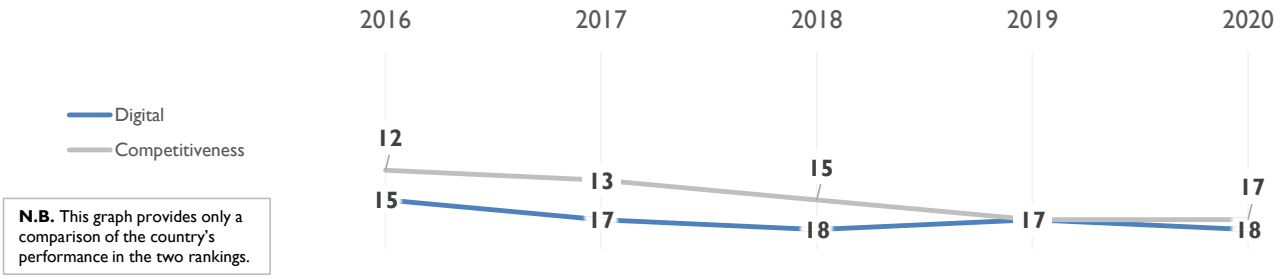
GERMANY

OVERALL PERFORMANCE (63 countries)



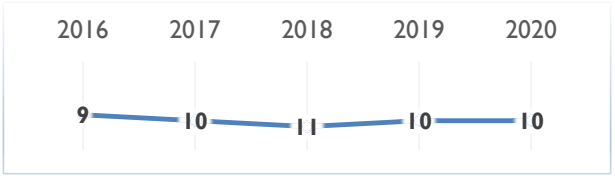
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	15	17	18	17	18
Knowledge	10	13	14	12	12
Technology	25	21	21	31	31
Future readiness	14	18	20	16	19

COMPETITIVENESS & DIGITAL RANKINGS

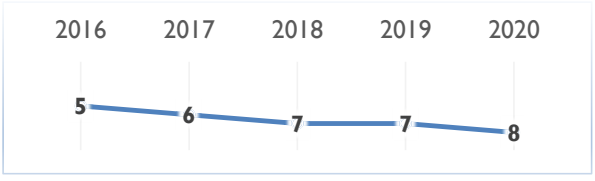


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)



GERMANY

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	16	16	22	25	22
Training & education	2	15	19	14	17
Scientific concentration	15	15	10	4	5

Talent	Rank
Educational assessment PISA - Math	19
International experience	14
Foreign highly-skilled personnel	20
Management of cities	15
▷ Digital/Technological skills	56
Net flow of international students	20

Training & education	Rank
▶ Employee training	3
Total public expenditure on education	39
Higher education achievement	49
▶ Pupil-teacher ratio (tertiary education)	3
▶ Graduates in Sciences	3
Women with degrees	43

Scientific concentration	Rank
Total expenditure on R&D (%)	8
Total R&D personnel per capita	12
Female researchers	49
R&D productivity by publication	13
Scientific and technical employment	22
High-tech patent grants	21
▶ Robots in Education and R&D	2

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	23	20	23	27	28
Capital	22	19	16	17	16
Technological framework	30	26	27	40	45

Regulatory framework	Rank
▷ Starting a business	51
Enforcing contracts	12
Immigration laws	22
Development & application of tech.	41
Scientific research legislation	27
Intellectual property rights	7

Capital	Rank
IT & media stock market capitalization	10
Funding for technological development	25
Banking and financial services	23
▶ Country credit rating	1
Venture capital	20
Investment in Telecommunications	45

Technological framework	Rank
▷ Communications technology	53
▷ Mobile Broadband subscribers	57
Wireless broadband	47
Internet users	18
Internet bandwidth speed	26
High-tech exports (%)	26

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	20	22	22	16	23
Business agility	6	18	20	11	15
IT integration	17	16	18	17	20

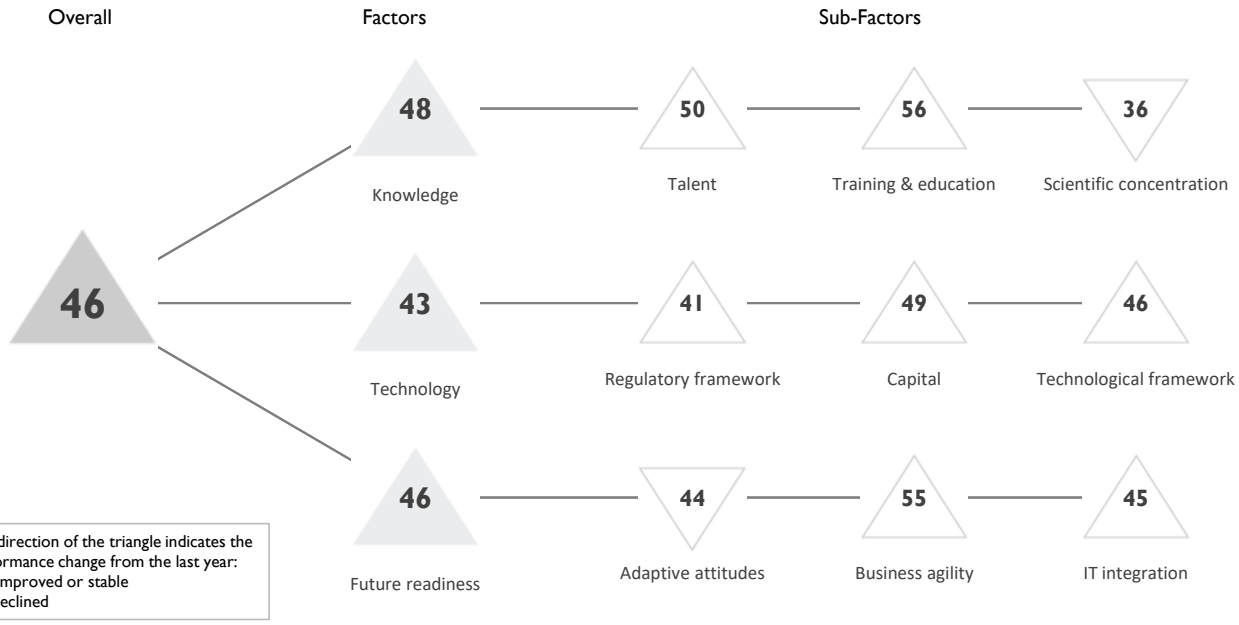
Adaptive attitudes	Rank
E-Participation	45
Internet retailing	12
Tablet possession	24
Smartphone possession	23
Attitudes toward globalization	33

Business agility	Rank
▷ Opportunities and threats	53
World robots distribution	5
Agility of companies	43
Use of big data and analytics	46
Knowledge transfer	15
Entrepreneurial fear of failure	6

IT integration	Rank
E-Government	24
Public-private partnerships	37
Cyber security	25
Software piracy	8

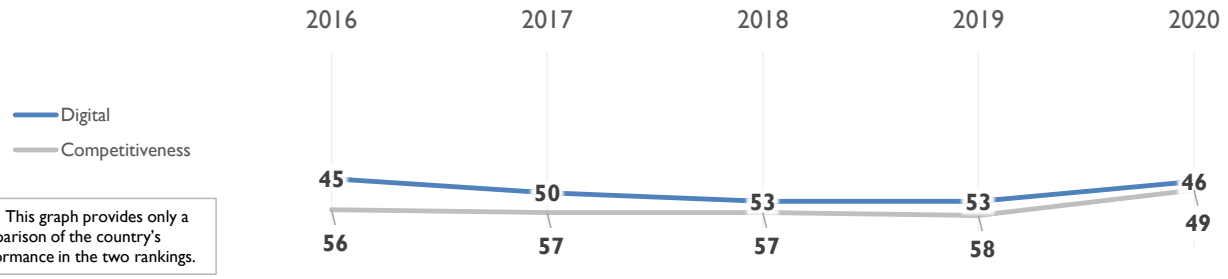
GREECE

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	45	50	53	53	46
Knowledge	46	51	51	53	48
Technology	52	52	51	54	43
Future readiness	36	47	46	53	46

COMPETITIVENESS & DIGITAL RANKINGS

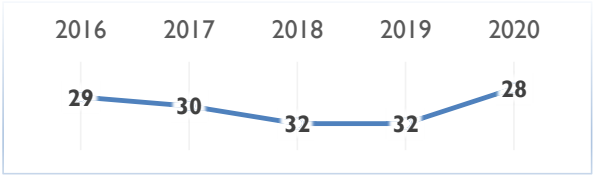


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)



GREECE

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	47	47	50	53	50
Training & education	51	55	58	60	56
Scientific concentration	34	33	37	34	36

	Talent	Rank
	Educational assessment PISA - Math	41
	International experience	47
▷	Foreign highly-skilled personnel	58
	Management of cities	46
	Digital/Technological skills	41
	Net flow of international students	51

	Training & education	Rank
	Employee training	56
	Total public expenditure on education	44
	Higher education achievement	31
▷	Pupil-teacher ratio (tertiary education)	57
▶	Graduates in Sciences	10
	Women with degrees	36

	Scientific concentration	Rank
	Total expenditure on R&D (%)	35
	Total R&D personnel per capita	28
	Female researchers	28
	R&D productivity by publication	33
	Scientific and technical employment	25
	High-tech patent grants	45
	Robots in Education and R&D	39

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	51	49	47	52	41
Capital	55	58	54	52	49
Technological framework	49	49	48	49	46

	Regulatory framework	Rank
▶	Starting a business	6
▷	Enforcing contracts	59
▶	Immigration laws	15
	Development & application of tech.	47
	Scientific research legislation	40
	Intellectual property rights	45

	Capital	Rank
▶	IT & media stock market capitalization	11
	Funding for technological development	50
▷	Banking and financial services	60
▷	Country credit rating	57
	Venture capital	57
▶	Investment in Telecommunications	11

	Technological framework	Rank
	Communications technology	50
	Mobile Broadband subscribers	40
	Wireless broadband	40
	Internet users	40
	Internet bandwidth speed	51
	High-tech exports (%)	32

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	33	41	50	41	44
Business agility	40	53	49	60	55
IT integration	43	48	47	50	45

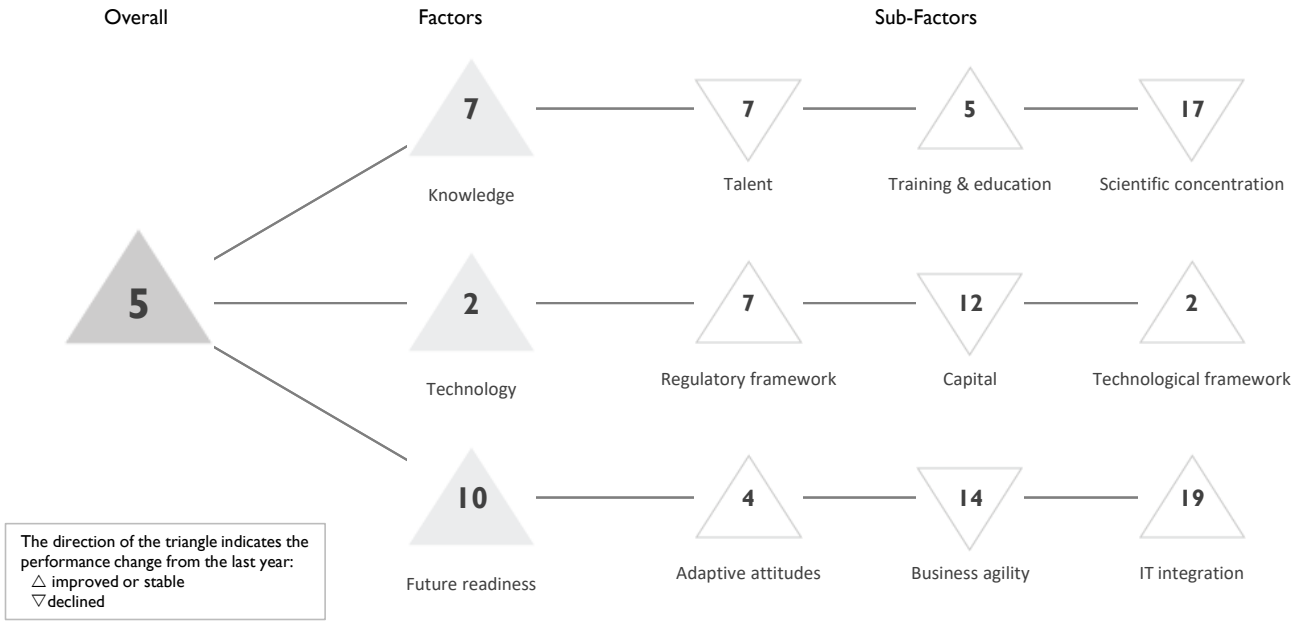
	Adaptive attitudes	Rank
	E-Participation	41
	Internet retailing	29
	Tablet possession	41
	Smartphone possession	48
	Attitudes toward globalization	48

	Business agility	Rank
	Opportunities and threats	47
	World robots distribution	44
	Agility of companies	57
	Use of big data and analytics	57
	Knowledge transfer	53
	Entrepreneurial fear of failure	26

	IT integration	Rank
	E-Government	37
	Public-private partnerships	40
	Cyber security	37
	Software piracy	52

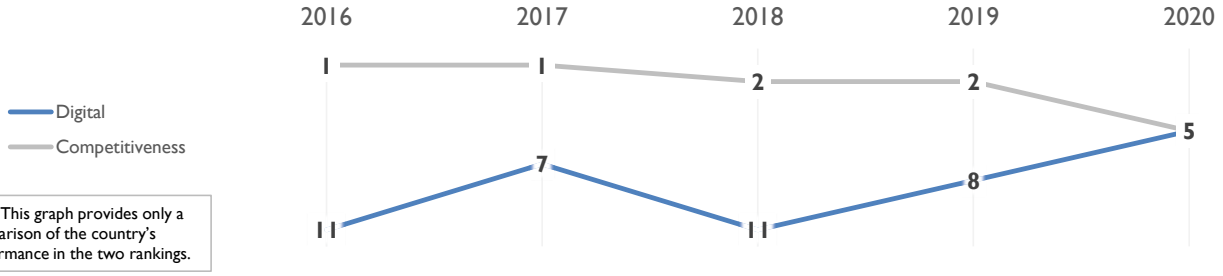
HONG KONG SAR

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	11	7	11	8	5
Knowledge	6	6	5	7	7
Technology	2	3	6	4	2
Future readiness	27	17	24	15	10

COMPETITIVENESS & DIGITAL RANKINGS



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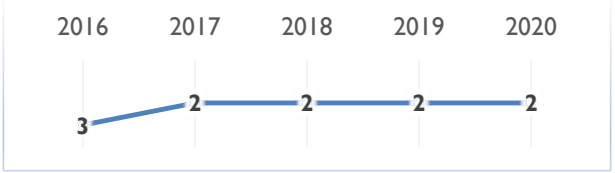
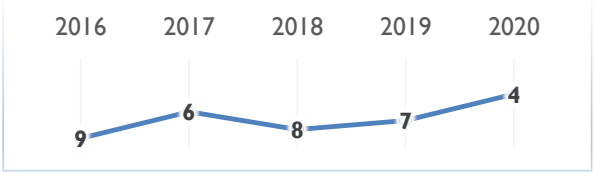
PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS < 20 MILLION (34 countries)



HONG KONG SAR

▶ **Overall top strengths**
▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	3	4	5	4	7
Training & education	26	27	13	12	5
Scientific concentration	6	7	5	16	17

Talent	Rank
Educational assessment PISA - Math	3
International experience	4
Foreign highly-skilled personnel	14
Management of cities	4
Digital/Technological skills	13
▷ Net flow of international students	43

Training & education	Rank
Employee training	30
▷ Total public expenditure on education	45
Higher education achievement	9
Pupil-teacher ratio (tertiary education)	30
▶ Graduates in Sciences	2
Women with degrees	-

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	42
Total R&D personnel per capita	31
Female researchers	-
R&D productivity by publication	19
Scientific and technical employment	3
▶ High-tech patent grants	2
▷ Robots in Education and R&D	54

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	4	6	14	12	7
Capital	2	6	6	6	12
Technological framework	11	9	11	3	2

Regulatory framework	Rank
Starting a business	4
Enforcing contracts	25
Immigration laws	8
Development & application of tech.	16
Scientific research legislation	20
Intellectual property rights	12

Capital	Rank
IT & media stock market capitalization	5
Funding for technological development	15
Banking and financial services	7
Country credit rating	15
Venture capital	8
▷ Investment in Telecommunications	46

Technological framework	Rank
Communications technology	7
Mobile Broadband subscribers	13
Wireless broadband	8
Internet users	13
Internet bandwidth speed	6
▶ High-tech exports (%)	1

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	6	9	11	12	4
Business agility	57	25	26	8	14
IT integration	20	21	25	22	19

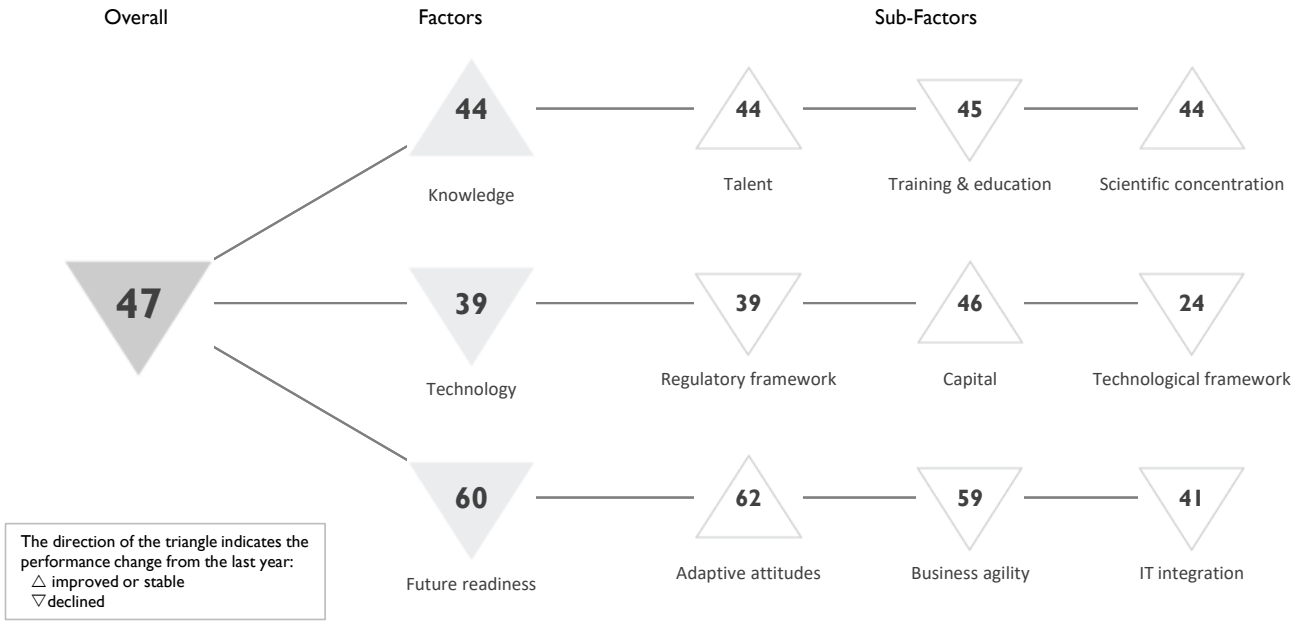
Adaptive attitudes	Rank
E-Participation	-
Internet retailing	24
Tablet possession	6
▶ Smartphone possession	1
Attitudes toward globalization	3

Business agility	Rank
▶ Opportunities and threats	1
World robots distribution	37
Agility of companies	4
Use of big data and analytics	21
Knowledge transfer	11
Entrepreneurial fear of failure	23

IT integration	Rank
E-Government	-
Public-private partnerships	13
Cyber security	9
Software piracy	28

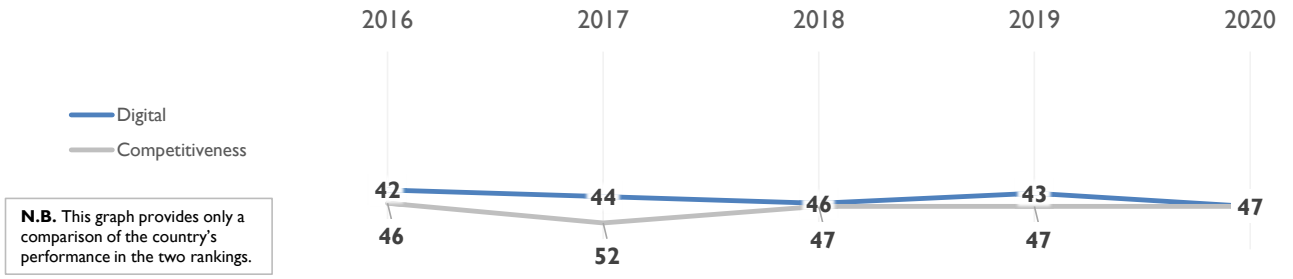
HUNGARY

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	42	44	46	43	47
Knowledge	43	48	48	44	44
Technology	37	38	40	36	39
Future readiness	45	55	58	57	60

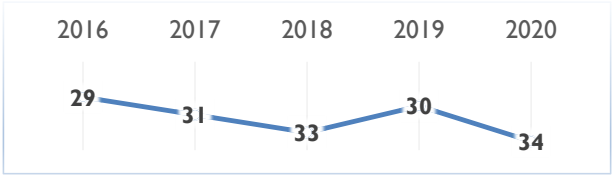
COMPETITIVENESS & DIGITAL RANKINGS



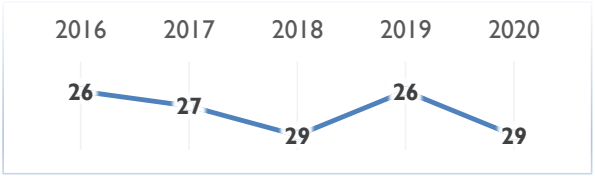
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



HUNGARY

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	43	46	46	47	44
Training & education	41	43	48	43	45
Scientific concentration	46	46	51	45	44

Talent	Rank
Educational assessment PISA - Math	35
International experience	49
Foreign highly-skilled personnel	50
Management of cities	43
Digital/Technological skills	59
▶ Net flow of international students	18

Training & education	Rank
Employee training	52
Total public expenditure on education	22
Higher education achievement	50
▶ Pupil-teacher ratio (tertiary education)	21
Graduates in Sciences	35
Women with degrees	41

Scientific concentration	Rank
Total expenditure on R&D (%)	24
Total R&D personnel per capita	30
Female researchers	44
R&D productivity by publication	47
Scientific and technical employment	38
High-tech patent grants	40
Robots in Education and R&D	29

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	30	29	35	35	39
Capital	47	44	51	46	46
Technological framework	44	45	46	19	24

Regulatory framework	Rank
Starting a business	38
▶ Enforcing contracts	22
Immigration laws	35
Development & application of tech.	50
Scientific research legislation	46
Intellectual property rights	43

Capital	Rank
IT & media stock market capitalization	29
Funding for technological development	45
Banking and financial services	48
Country credit rating	47
Venture capital	48
Investment in Telecommunications	26

Technological framework	Rank
Communications technology	39
▶ Mobile Broadband subscribers	5
Wireless broadband	58
Internet users	31
▶ Internet bandwidth speed	13
High-tech exports (%)	23

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	50	57	62	62	62
Business agility	50	58	56	53	59
IT integration	35	38	36	37	41

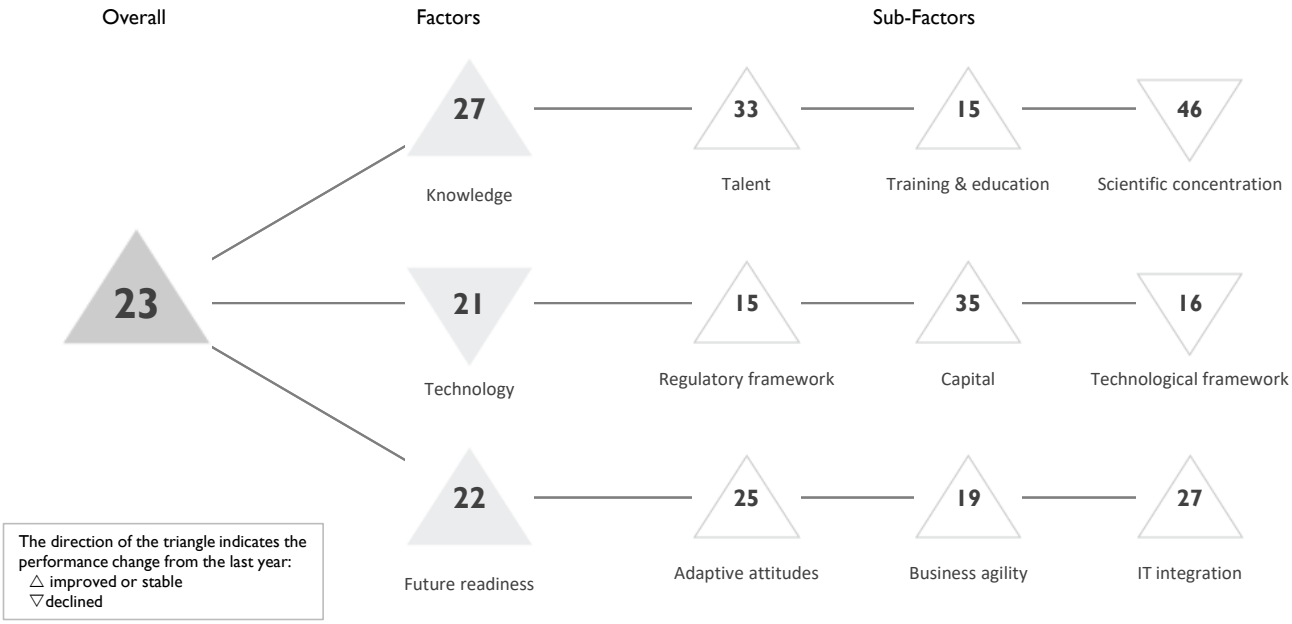
Adaptive attitudes	Rank
E-Participation	55
Internet retailing	38
Tablet possession	51
▷ Smartphone possession	60
▷ Attitudes toward globalization	63

Business agility	Rank
▷ Opportunities and threats	61
World robots distribution	27
▷ Agility of companies	60
▷ Use of big data and analytics	60
Knowledge transfer	44
Entrepreneurial fear of failure	31

IT integration	Rank
E-Government	44
Public-private partnerships	45
Cyber security	52
Software piracy	27

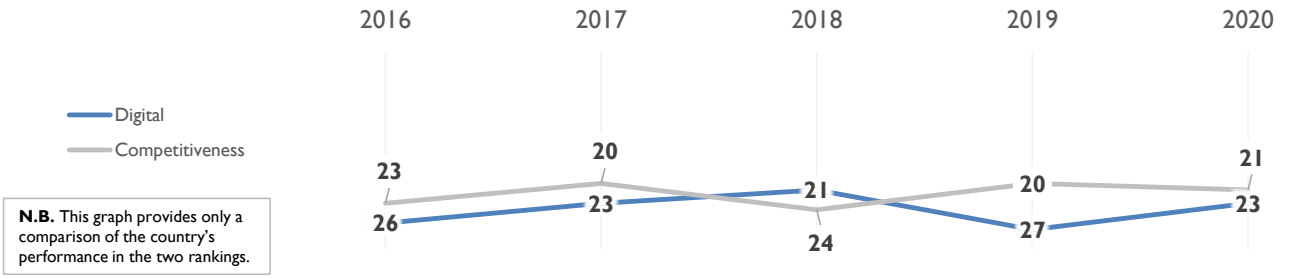
ICELAND

OVERALL PERFORMANCE (63 countries)



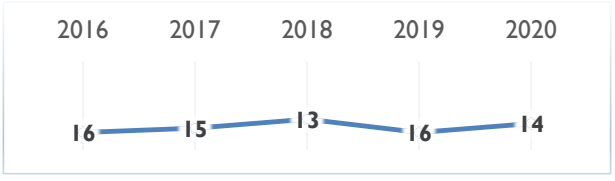
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	26	23	21	27	23
Knowledge	32	30	28	29	27
Technology	22	20	18	20	21
Future readiness	18	21	19	26	22

COMPETITIVENESS & DIGITAL RANKINGS

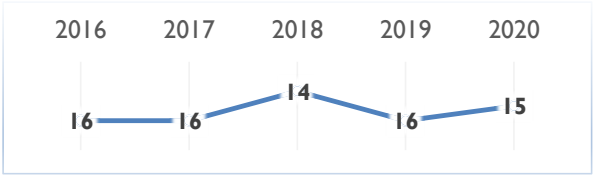


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



ICELAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	41	38	37	34	33
Training & education	10	7	18	18	15
Scientific concentration	37	37	35	39	46

Talent	Rank
Educational assessment PISA - Math	25
International experience	43
Foreign highly-skilled personnel	41
Management of cities	29
▶ Digital/Technological skills	1
▷ Net flow of international students	59

Training & education	Rank
Employee training	27
▶ Total public expenditure on education	2
Higher education achievement	24
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	49
Women with degrees	9

Scientific concentration	Rank
Total expenditure on R&D (%)	17
▶ Total R&D personnel per capita	5
Female researchers	14
▷ R&D productivity by publication	63
Scientific and technical employment	14
▷ High-tech patent grants	56
▷ Robots in Education and R&D	54

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	22	22	18	15	15
Capital	43	43	40	39	35
Technological framework	10	11	12	15	16

Regulatory framework	Rank
Starting a business	34
Enforcing contracts	26
Immigration laws	10
Development & application of tech.	15
Scientific research legislation	23
Intellectual property rights	18

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	26
Banking and financial services	33
Country credit rating	33
Venture capital	45
Investment in Telecommunications	31

Technological framework	Rank
▶ Communications technology	4
Mobile Broadband subscribers	25
Wireless broadband	11
Internet users	10
Internet bandwidth speed	45
High-tech exports (%)	10

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	25	16	18	28	25
Business agility	5	10	11	24	19
IT integration	27	28	28	28	27

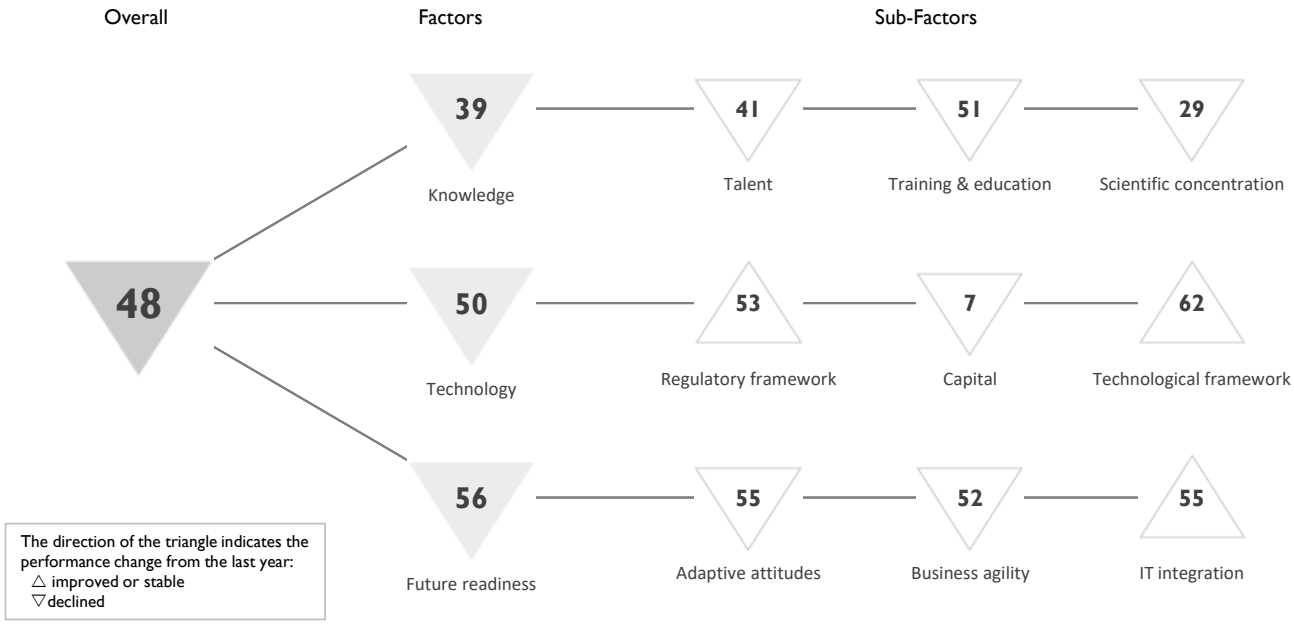
Adaptive attitudes	Rank
E-Participation	42
Internet retailing	26
Tablet possession	-
Smartphone possession	14
Attitudes toward globalization	13

Business agility	Rank
▶ Opportunities and threats	5
▷ World robots distribution	55
Agility of companies	10
Use of big data and analytics	19
Knowledge transfer	20
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	12
Public-private partnerships	38
Cyber security	23
Software piracy	34

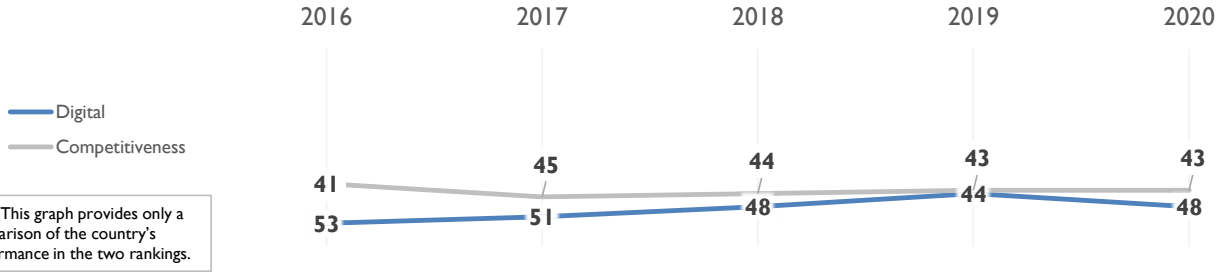
INDIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	53	51	48	44	48
Knowledge	39	37	46	38	39
Technology	57	59	53	49	50
Future readiness	54	51	48	46	56

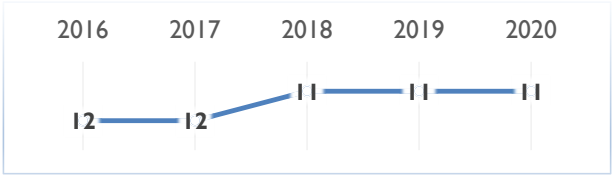
COMPETITIVENESS & DIGITAL RANKINGS



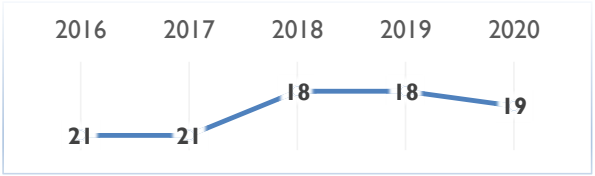
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



INDIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	38	43	43	38	41
Training & education	56	57	59	47	51
Scientific concentration	21	6	26	28	29

Talent	Rank
Educational assessment PISA - Math	-
International experience	41
Foreign highly-skilled personnel	46
Management of cities	54
Digital/Technological skills	22
Net flow of international students	42

Training & education	Rank
Employee training	44
Total public expenditure on education	34
Higher education achievement	59
Pupil-teacher ratio (tertiary education)	55
▶ Graduates in Sciences	6
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	47
Total R&D personnel per capita	55
Female researchers	-
▶ R&D productivity by publication	2
Scientific and technical employment	-
High-tech patent grants	39
Robots in Education and R&D	20

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	56	59	56	55	53
Capital	30	28	3	3	7
Technological framework	61	63	62	62	62

Regulatory framework	Rank
Starting a business	57
▷ Enforcing contracts	62
Immigration laws	25
Development & application of tech.	31
Scientific research legislation	33
Intellectual property rights	48

Capital	Rank
▶ IT & media stock market capitalization	13
Funding for technological development	33
Banking and financial services	30
Country credit rating	49
Venture capital	22
▶ Investment in Telecommunications	1

Technological framework	Rank
Communications technology	36
▷ Mobile Broadband subscribers	60
▷ Wireless broadband	63
▷ Internet users	63
Internet bandwidth speed	57
High-tech exports (%)	42

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	57	59	54	54	55
Business agility	35	29	33	29	52
IT integration	54	56	56	56	55

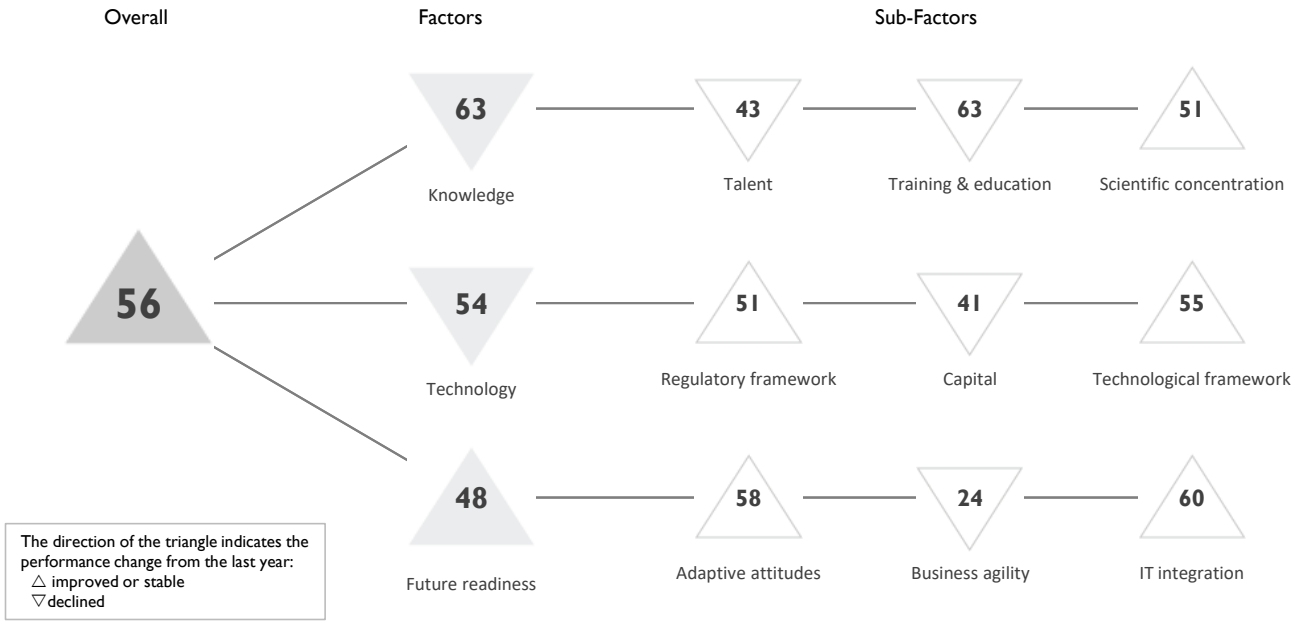
Adaptive attitudes	Rank
E-Participation	28
Internet retailing	56
▷ Tablet possession	60
Smartphone possession	53
Attitudes toward globalization	22

Business agility	Rank
Opportunities and threats	34
▶ World robots distribution	12
Agility of companies	35
Use of big data and analytics	32
Knowledge transfer	47
Entrepreneurial fear of failure	54

IT integration	Rank
E-Government	59
Public-private partnerships	31
Cyber security	38
Software piracy	48

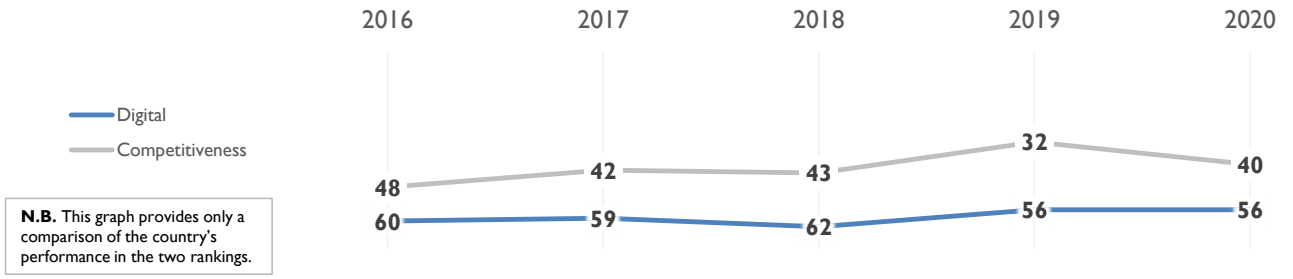
INDONESIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	60	59	62	56	56
Knowledge	60	58	61	56	63
Technology	58	56	59	47	54
Future readiness	60	62	62	58	48

COMPETITIVENESS & DIGITAL RANKINGS



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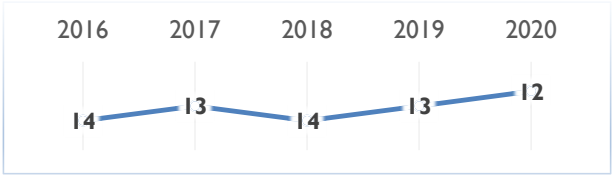
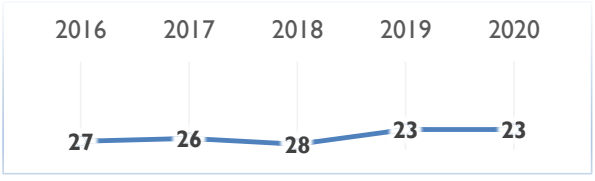
PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



INDONESIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	54	48	51	42	43
Training & education	60	59	61	61	63
Scientific concentration	53	54	58	52	51

Talent	Rank
Educational assessment PISA - Math	57
International experience	23
Foreign highly-skilled personnel	24
Management of cities	41
Digital/Technological skills	44
Net flow of international students	39

Training & education	Rank
Employee training	32
Total public expenditure on education	59
Higher education achievement	58
Pupil-teacher ratio (tertiary education)	56
Graduates in Sciences	51
Women with degrees	53

Scientific concentration	Rank
Total expenditure on R&D (%)	57
Total R&D personnel per capita	50
▶ Female researchers	15
▶ R&D productivity by publication	10
Scientific and technical employment	-
High-tech patent grants	55
Robots in Education and R&D	43

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	60	61	57	51	51
Capital	42	37	34	26	41
Technological framework	57	58	60	56	55

Regulatory framework	Rank
▷ Starting a business	60
Enforcing contracts	57
Immigration laws	37
Development & application of tech.	33
Scientific research legislation	38
Intellectual property rights	47

Capital	Rank
▶ IT & media stock market capitalization	21
Funding for technological development	34
Banking and financial services	27
Country credit rating	44
Venture capital	23
▷ Investment in Telecommunications	61

Technological framework	Rank
Communications technology	52
Mobile Broadband subscribers	31
Wireless broadband	42
▷ Internet users	61
▷ Internet bandwidth speed	62
High-tech exports (%)	45

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	61	63	61	60	58
Business agility	48	35	46	21	24
IT integration	59	61	60	60	60

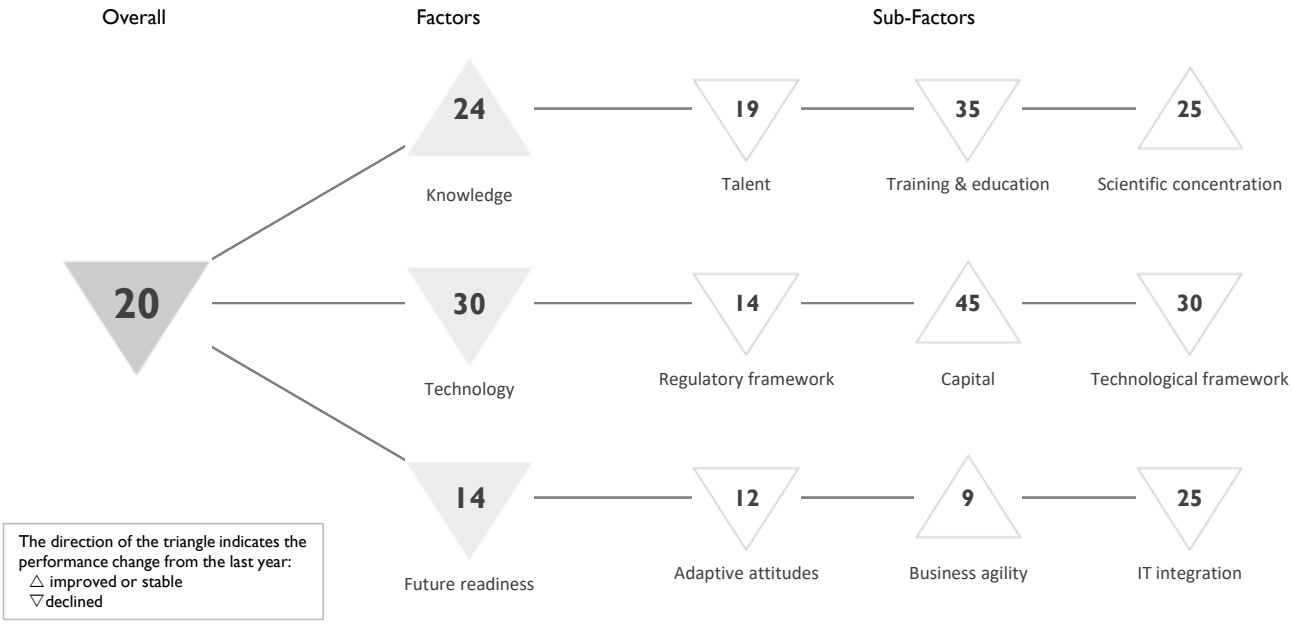
Adaptive attitudes	Rank
E-Participation	45
Internet retailing	50
Tablet possession	59
Smartphone possession	55
Attitudes toward globalization	25

Business agility	Rank
Opportunities and threats	23
World robots distribution	25
Agility of companies	30
▶ Use of big data and analytics	17
Knowledge transfer	28
▶ Entrepreneurial fear of failure	16

IT integration	Rank
E-Government	57
Public-private partnerships	22
Cyber security	40
▷ Software piracy	61

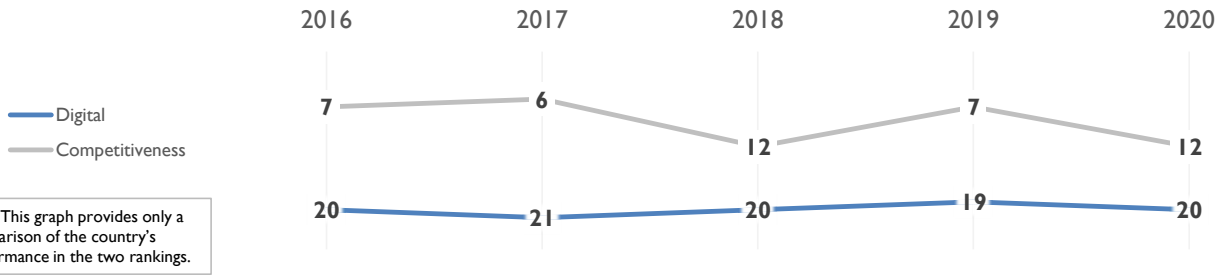
IRELAND

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	20	21	20	19	20
Knowledge	25	25	22	24	24
Technology	27	25	29	28	30
Future readiness	12	10	13	5	14

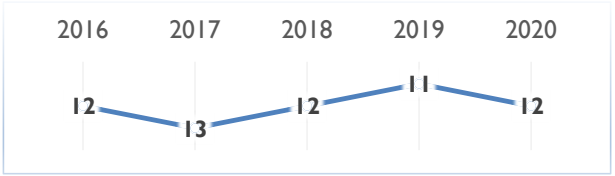
COMPETITIVENESS & DIGITAL RANKINGS



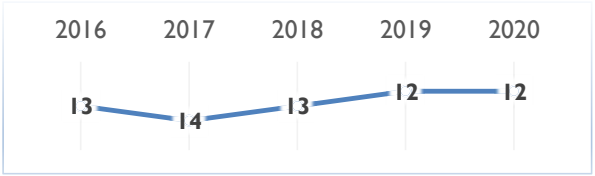
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



IRELAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	18	15	14	10	19
Training & education	25	34	34	30	35
Scientific concentration	32	31	24	29	25

Talent	Rank
Educational assessment PISA - Math	20
International experience	9
Foreign highly-skilled personnel	10
Management of cities	42
Digital/Technological skills	33
Net flow of international students	25

Training & education	Rank
Employee training	24
▷ Total public expenditure on education	56
Higher education achievement	11
▷ Pupil-teacher ratio (tertiary education)	50
Graduates in Sciences	32
Women with degrees	12

Scientific concentration	Rank
Total expenditure on R&D (%)	36
Total R&D personnel per capita	17
Female researchers	32
R&D productivity by publication	43
Scientific and technical employment	20
High-tech patent grants	11
Robots in Education and R&D	37

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	18	14	20	13	14
Capital	49	49	53	49	45
Technological framework	18	13	13	24	30

Regulatory framework	Rank
Starting a business	12
Enforcing contracts	48
▶ Immigration laws	2
Development & application of tech.	21
Scientific research legislation	11
Intellectual property rights	21

Capital	Rank
▷ IT & media stock market capitalization	50
Funding for technological development	21
Banking and financial services	25
Country credit rating	27
Venture capital	17
▷ Investment in Telecommunications	57

Technological framework	Rank
▷ Communications technology	54
Mobile Broadband subscribers	30
Wireless broadband	28
Internet users	20
Internet bandwidth speed	33
High-tech exports (%)	9

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	13	12	10	3	12
Business agility	8	2	3	9	9
IT integration	22	24	24	20	25

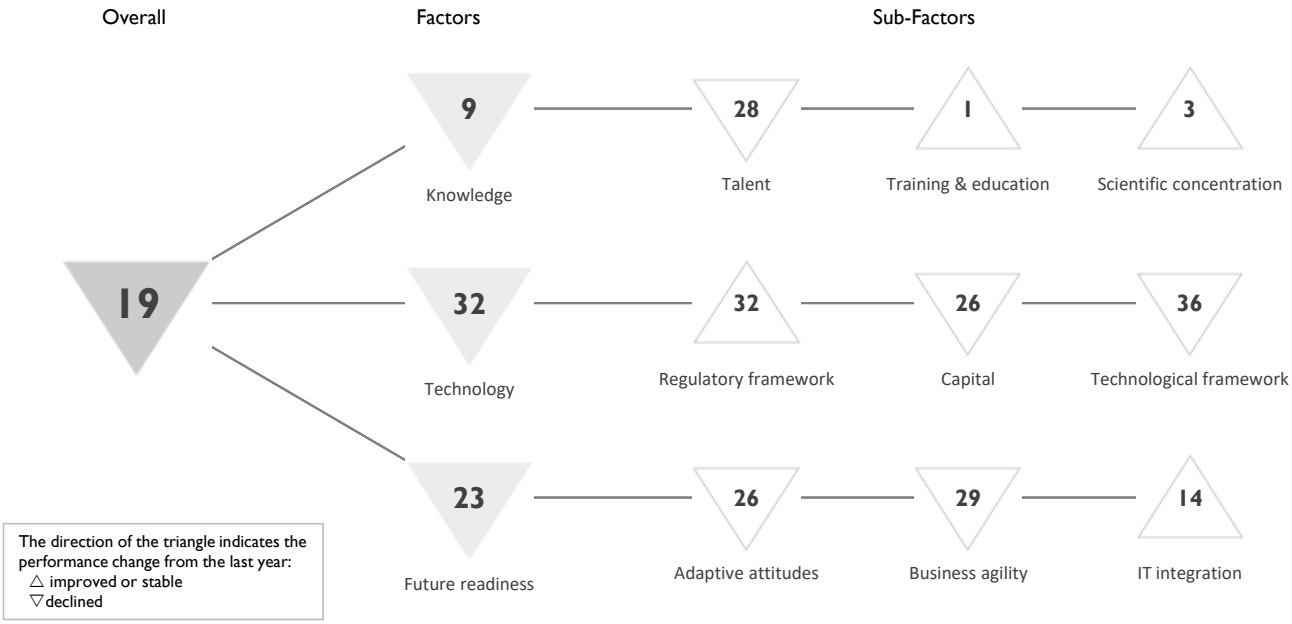
Adaptive attitudes	Rank
E-Participation	28
▶ Internet retailing	7
Tablet possession	15
Smartphone possession	10
▶ Attitudes toward globalization	7

Business agility	Rank
▶ Opportunities and threats	9
World robots distribution	43
▶ Agility of companies	5
Use of big data and analytics	18
Knowledge transfer	13
Entrepreneurial fear of failure	11

IT integration	Rank
E-Government	25
Public-private partnerships	23
Cyber security	31
Software piracy	19

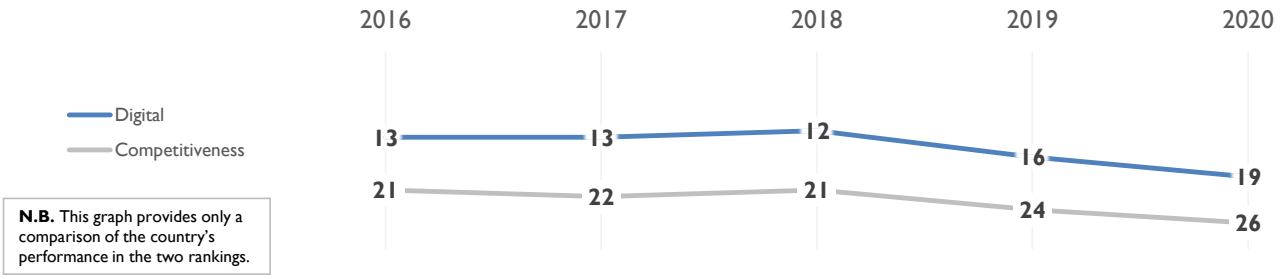
ISRAEL

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	13	13	12	16	19
Knowledge	5	7	2	8	9
Technology	24	27	25	30	32
Future readiness	9	11	7	19	23

COMPETITIVENESS & DIGITAL RANKINGS



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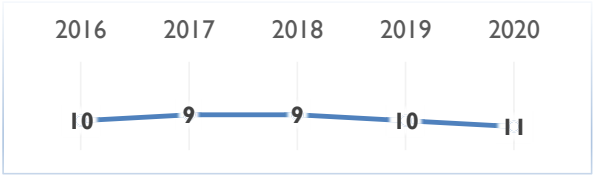
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)



ISRAEL

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	23	21	19	27	28
Training & education	6	11	2	3	1
Scientific concentration	2	2	2	5	3

Talent	Rank
Educational assessment PISA - Math	38
International experience	20
Foreign highly-skilled personnel	26
Management of cities	31
Digital/Technological skills	19
Net flow of international students	45

Training & education	Rank
Employee training	29
▶ Total public expenditure on education	3
Higher education achievement	20
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	-
Women with degrees	6

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	1
Total R&D personnel per capita	-
Female researchers	-
▷ R&D productivity by publication	56
Scientific and technical employment	8
▶ High-tech patent grants	6
Robots in Education and R&D	43

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	26	26	30	32	32
Capital	20	27	20	20	26
Technological framework	26	28	20	35	36

Regulatory framework	Rank
Starting a business	17
Enforcing contracts	47
▷ Immigration laws	51
Development & application of tech.	14
Scientific research legislation	15
Intellectual property rights	26

Capital	Rank
IT & media stock market capitalization	17
Funding for technological development	13
Banking and financial services	44
Country credit rating	25
Venture capital	9
▷ Investment in Telecommunications	55

Technological framework	Rank
Communications technology	47
Mobile Broadband subscribers	50
Wireless broadband	17
Internet users	34
Internet bandwidth speed	37
High-tech exports (%)	12

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	17	18	17	21	26
Business agility	11	9	2	19	29
IT integration	3	7	4	16	14

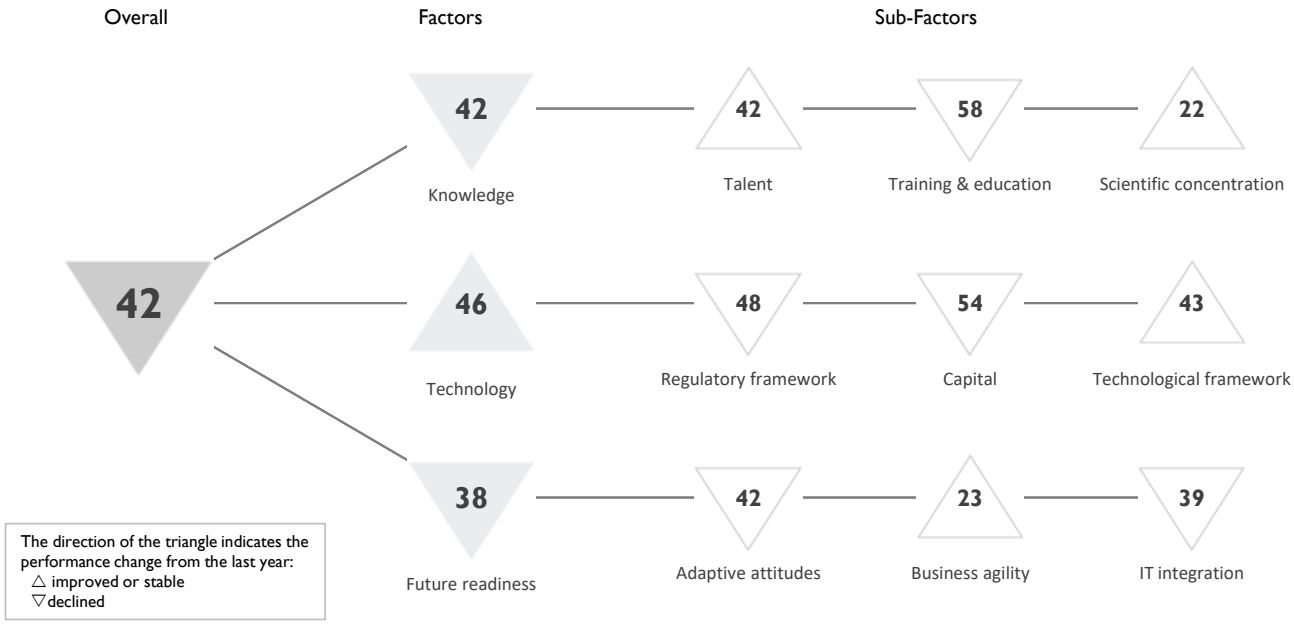
Adaptive attitudes	Rank
▷ E-Participation	51
Internet retailing	23
Tablet possession	18
Smartphone possession	15
Attitudes toward globalization	23

Business agility	Rank
Opportunities and threats	21
World robots distribution	39
Agility of companies	24
▶ Use of big data and analytics	3
Knowledge transfer	14
▷ Entrepreneurial fear of failure	51

IT integration	Rank
E-Government	28
Public-private partnerships	14
▶ Cyber security	3
Software piracy	17

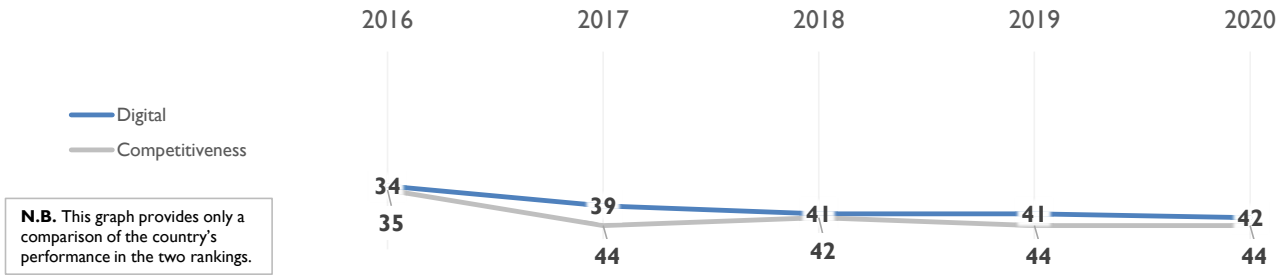
ITALY

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	34	39	41	41	42
Knowledge	40	42	42	41	42
Technology	44	45	41	46	46
Future readiness	29	30	36	31	38

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS > 20 MILLION (29 countries)

ITALY

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	44	44	41	44	42
Training & education	48	46	56	57	58
Scientific concentration	29	32	28	23	22

Talent	Rank
Educational assessment PISA - Math	30
International experience	50
Foreign highly-skilled personnel	52
Management of cities	44
Digital/Technological skills	51
Net flow of international students	33

Training & education	Rank
▷ Employee training	60
Total public expenditure on education	41
Higher education achievement	52
Pupil-teacher ratio (tertiary education)	49
Graduates in Sciences	26
Women with degrees	48

Scientific concentration	Rank
Total expenditure on R&D (%)	27
Total R&D personnel per capita	25
Female researchers	37
▶ R&D productivity by publication	6
▶ Scientific and technical employment	16
High-tech patent grants	48
▶ Robots in Education and R&D	11

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	41	42	41	44	48
Capital	51	53	49	53	54
Technological framework	43	42	44	46	43

Regulatory framework	Rank
Starting a business	42
▷ Enforcing contracts	56
Immigration laws	21
Development & application of tech.	52
Scientific research legislation	47
Intellectual property rights	31

Capital	Rank
IT & media stock market capitalization	39
Funding for technological development	47
▷ Banking and financial services	54
Country credit rating	48
Venture capital	52
Investment in Telecommunications	24

Technological framework	Rank
Communications technology	49
Mobile Broadband subscribers	49
Wireless broadband	26
Internet users	24
Internet bandwidth speed	43
High-tech exports (%)	46

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	27	27	36	35	42
Business agility	16	30	32	31	23
IT integration	33	35	32	34	39

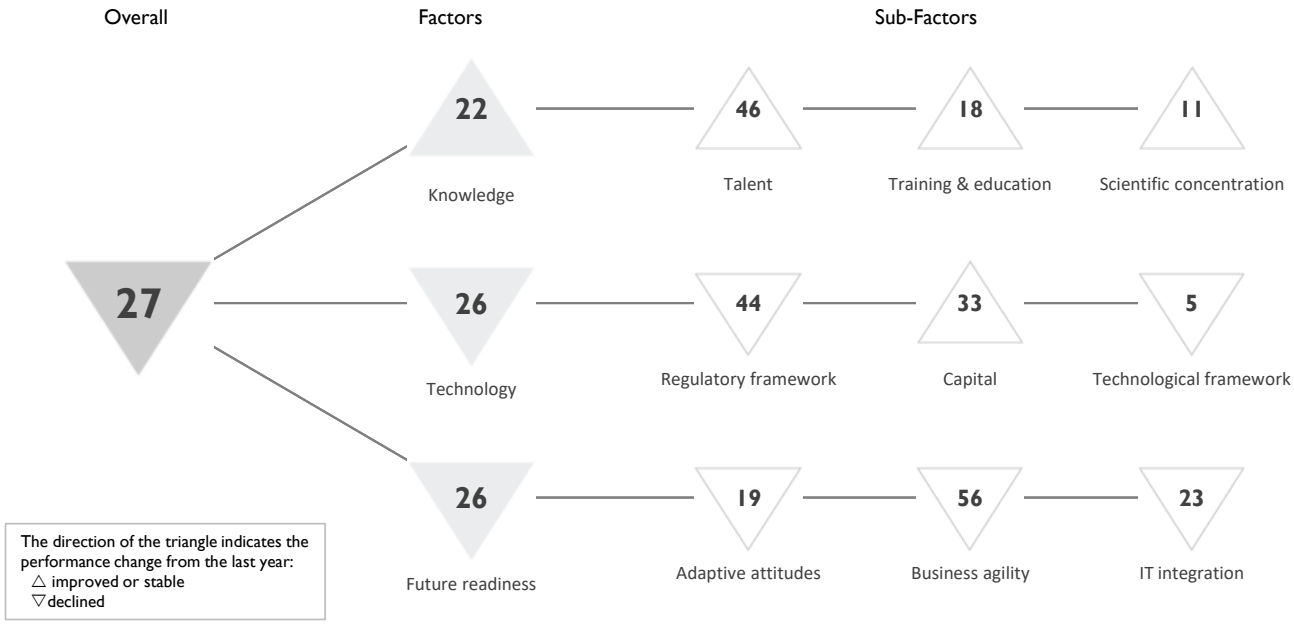
Adaptive attitudes	Rank
E-Participation	35
Internet retailing	27
Tablet possession	42
Smartphone possession	51
▷ Attitudes toward globalization	55

Business agility	Rank
Opportunities and threats	25
▶ World robots distribution	6
Agility of companies	45
▷ Use of big data and analytics	59
Knowledge transfer	33
▶ Entrepreneurial fear of failure	4

IT integration	Rank
E-Government	34
Public-private partnerships	48
Cyber security	47
Software piracy	33

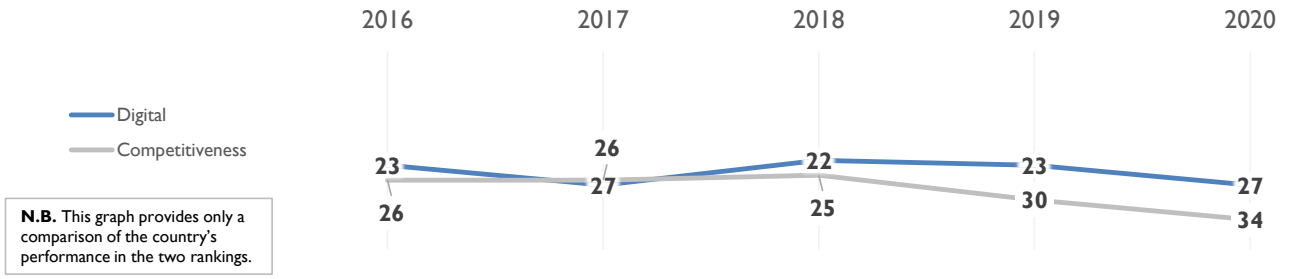
JAPAN

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	23	27	22	23	27
Knowledge	23	29	18	25	22
Technology	19	23	23	24	26
Future readiness	23	25	25	24	26

COMPETITIVENESS & DIGITAL RANKINGS



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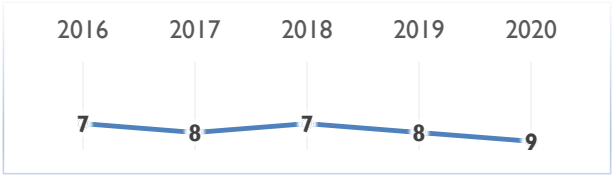
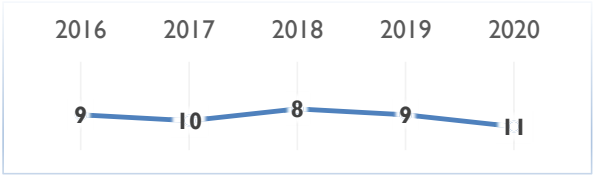
PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



JAPAN

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

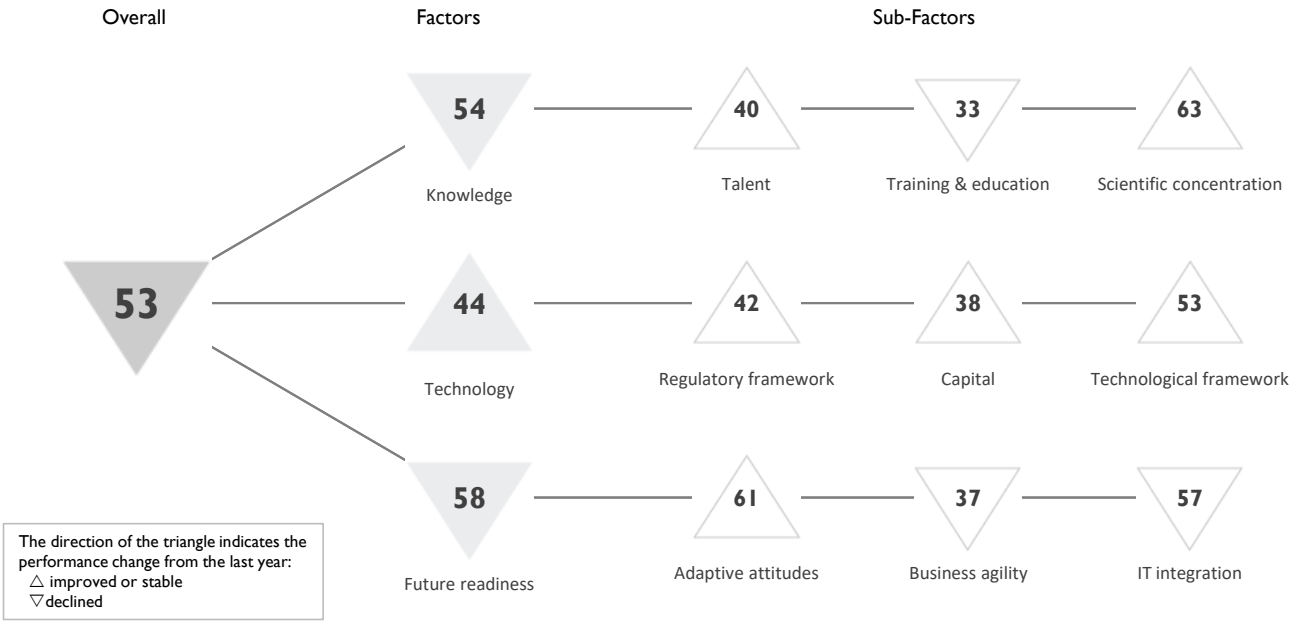
	Adaptive attitudes	Rank
	E-Participation	4
	Internet retailing	16
	Tablet possession	21
	Smartphone possession	21
	Attitudes toward globalization	50

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

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

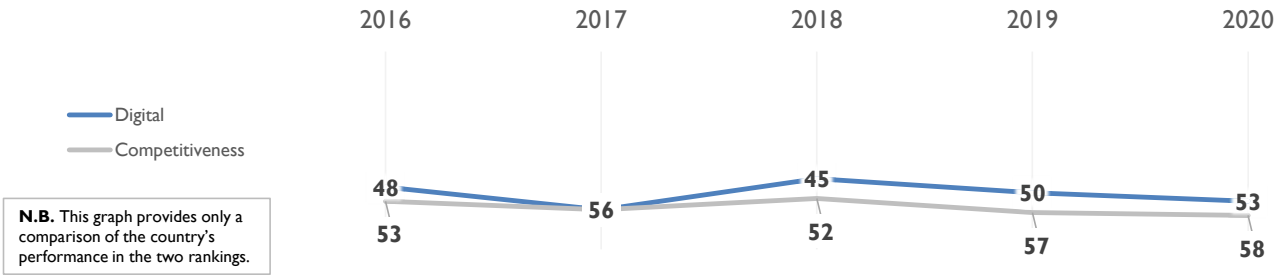
JORDAN

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	48	56	45	50	53
Knowledge	59	61	56	49	54
Technology	45	50	48	53	44
Future readiness	37	48	41	52	58

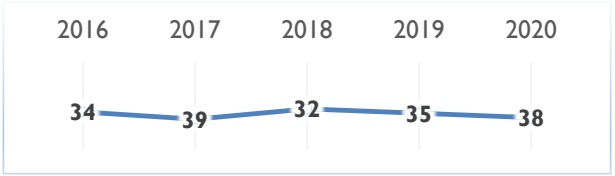
COMPETITIVENESS & DIGITAL RANKINGS



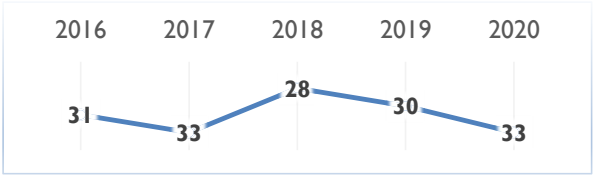
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



JORDAN

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	40	55	39	43	40
Training & education	59	58	41	32	33
Scientific concentration	61	62	63	63	63

Talent	Rank
Educational assessment PISA - Math	53
International experience	24
Foreign highly-skilled personnel	36
Management of cities	45
Digital/Technological skills	29
▶ Net flow of international students	21

Training & education	Rank
Employee training	23
Total public expenditure on education	49
Higher education achievement	-
Pupil-teacher ratio (tertiary education)	23
Graduates in Sciences	23
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	54
Total R&D personnel per capita	56
Female researchers	55
R&D productivity by publication	46
Scientific and technical employment	-
High-tech patent grants	51
Robots in Education and R&D	-

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	50	53	43	47	42
Capital	24	30	39	41	38
Technological framework	50	53	54	55	53

Regulatory framework	Rank
Starting a business	50
Enforcing contracts	53
Immigration laws	47
Development & application of tech.	27
Scientific research legislation	32
Intellectual property rights	30

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	28
Banking and financial services	28
Country credit rating	59
Venture capital	28
▶ Investment in Telecommunications	20

Technological framework	Rank
Communications technology	40
Mobile Broadband subscribers	26
Wireless broadband	45
▷ Internet users	60
Internet bandwidth speed	47
▷ High-tech exports (%)	60

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	43	55	58	61	61
Business agility	31	34	23	22	37
IT integration	40	50	42	54	57

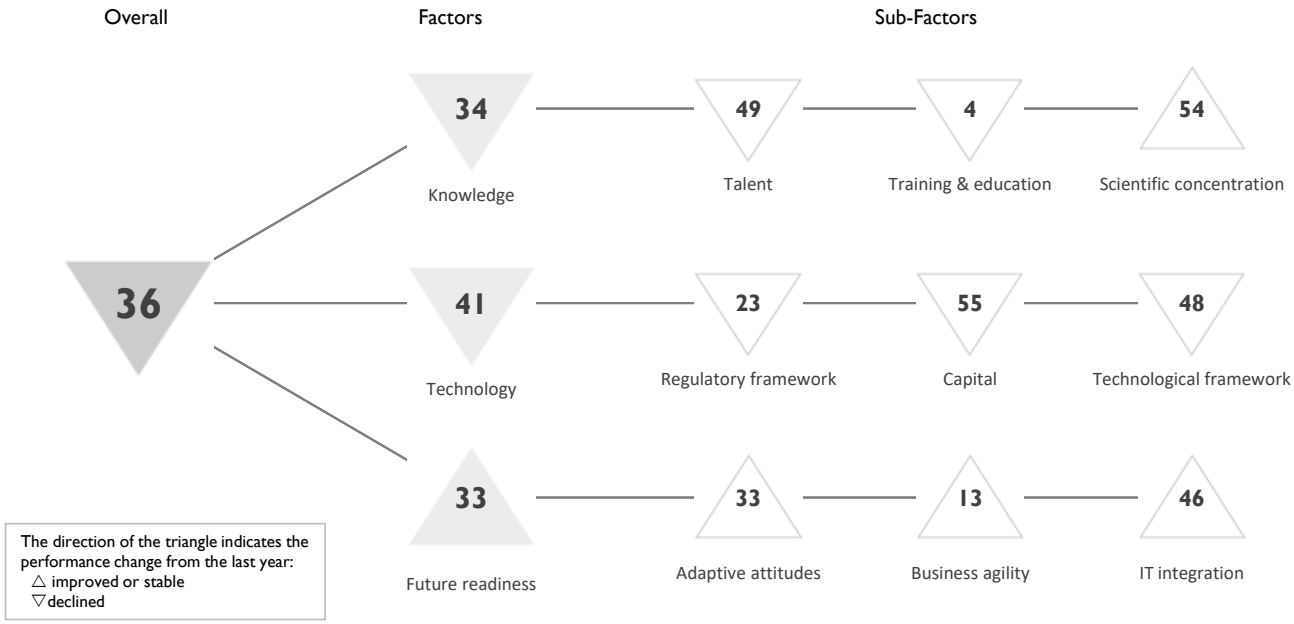
Adaptive attitudes	Rank
▷ E-Participation	60
▷ Internet retailing	60
Tablet possession	54
Smartphone possession	25
Attitudes toward globalization	41

Business agility	Rank
Opportunities and threats	40
World robots distribution	-
Agility of companies	37
▶ Use of big data and analytics	11
▶ Knowledge transfer	22
Entrepreneurial fear of failure	50

IT integration	Rank
▷ E-Government	60
Public-private partnerships	33
▶ Cyber security	20
Software piracy	46

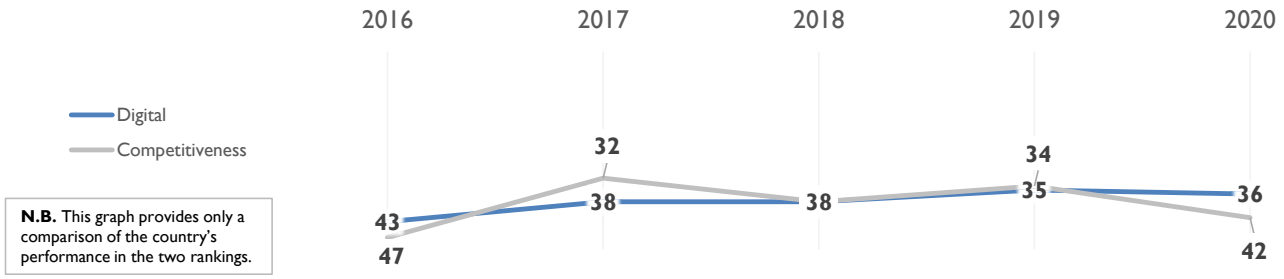
KAZAKHSTAN

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	43	38	38	35	36
Knowledge	47	40	35	32	34
Technology	42	35	39	39	41
Future readiness	41	38	40	35	33

COMPETITIVENESS & DIGITAL RANKINGS



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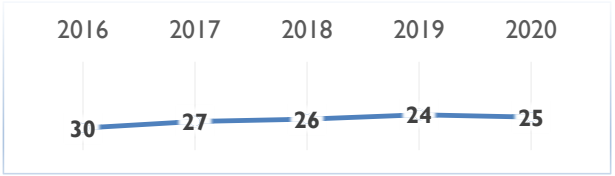
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)

KAZAKHSTAN

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	45	36	44	39	49
Training & education	31	21	6	1	4
Scientific concentration	55	56	55	55	54

Talent	Rank
Educational assessment PISA - Math	47
International experience	36
Foreign highly-skilled personnel	31
Management of cities	34
Digital/Technological skills	55
▷ Net flow of international students	57

Training & education	Rank
Employee training	21
Total public expenditure on education	54
▶ Higher education achievement	1
Pupil-teacher ratio (tertiary education)	37
Graduates in Sciences	31
▶ Women with degrees	1

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	61
Total R&D personnel per capita	51
▶ Female researchers	3
R&D productivity by publication	25
Scientific and technical employment	46
▷ High-tech patent grants	58
Robots in Education and R&D	-

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	27	18	22	16	23
Capital	56	51	59	54	55
Technological framework	37	35	42	43	48

Regulatory framework	Rank
Starting a business	11
▶ Enforcing contracts	4
Immigration laws	19
Development & application of tech.	36
Scientific research legislation	39
Intellectual property rights	46

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	37
Banking and financial services	41
Country credit rating	49
Venture capital	44
▷ Investment in Telecommunications	62

Technological framework	Rank
Communications technology	48
Mobile Broadband subscribers	33
Wireless broadband	53
Internet users	52
Internet bandwidth speed	50
High-tech exports (%)	15

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	41	48	47	39	33
Business agility	36	27	43	15	13
IT integration	45	39	44	46	46

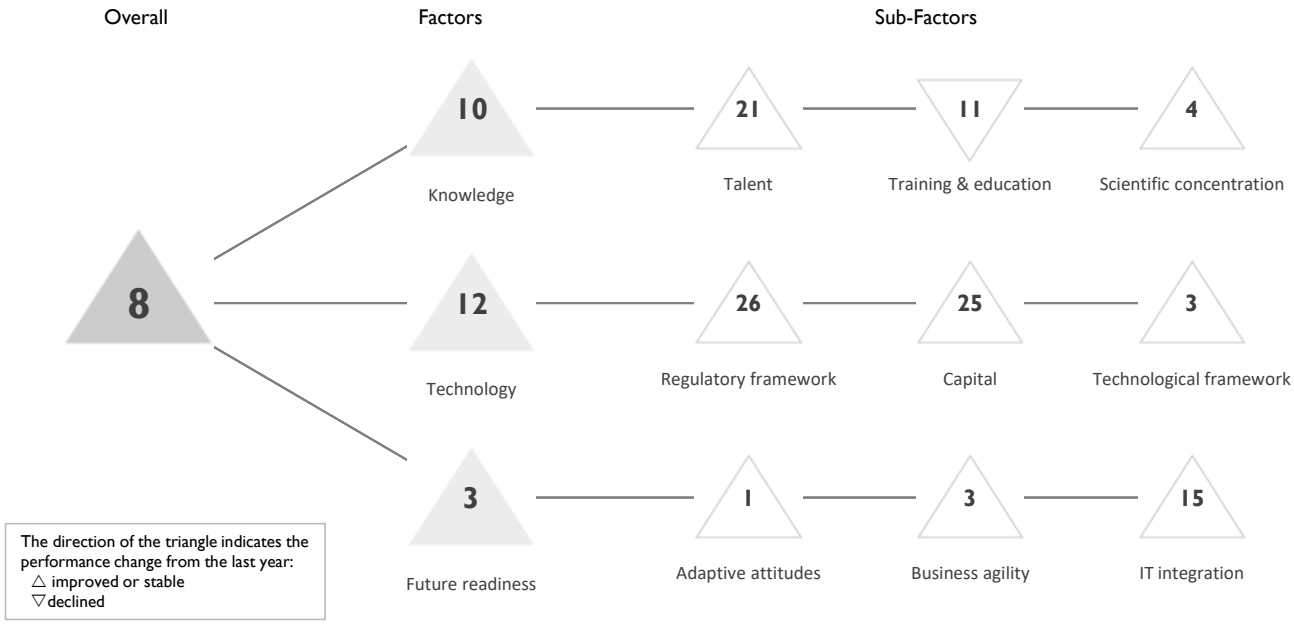
Adaptive attitudes	Rank
E-Participation	25
Internet retailing	53
Tablet possession	44
Smartphone possession	28
Attitudes toward globalization	35

Business agility	Rank
Opportunities and threats	41
World robots distribution	-
Agility of companies	41
Use of big data and analytics	13
Knowledge transfer	38
▶ Entrepreneurial fear of failure	1

IT integration	Rank
E-Government	27
Public-private partnerships	28
Cyber security	43
▷ Software piracy	59

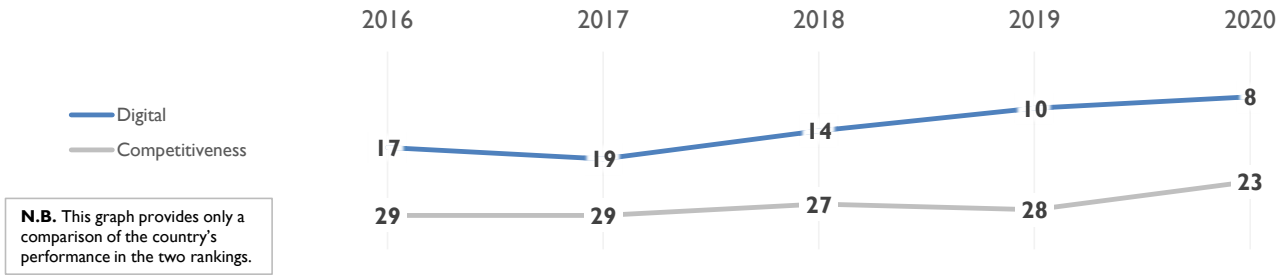
KOREA REP.

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	17	19	14	10	8
Knowledge	15	14	11	11	10
Technology	13	17	17	17	12
Future readiness	25	24	17	4	3

COMPETITIVENESS & DIGITAL RANKINGS



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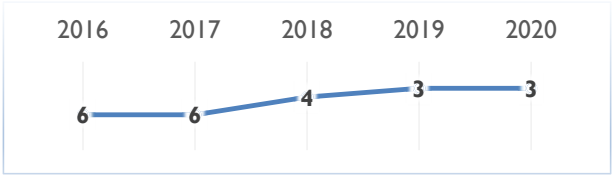
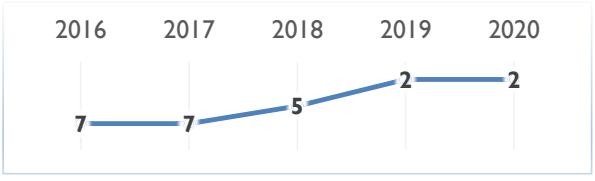
PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



KOREA REP.

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

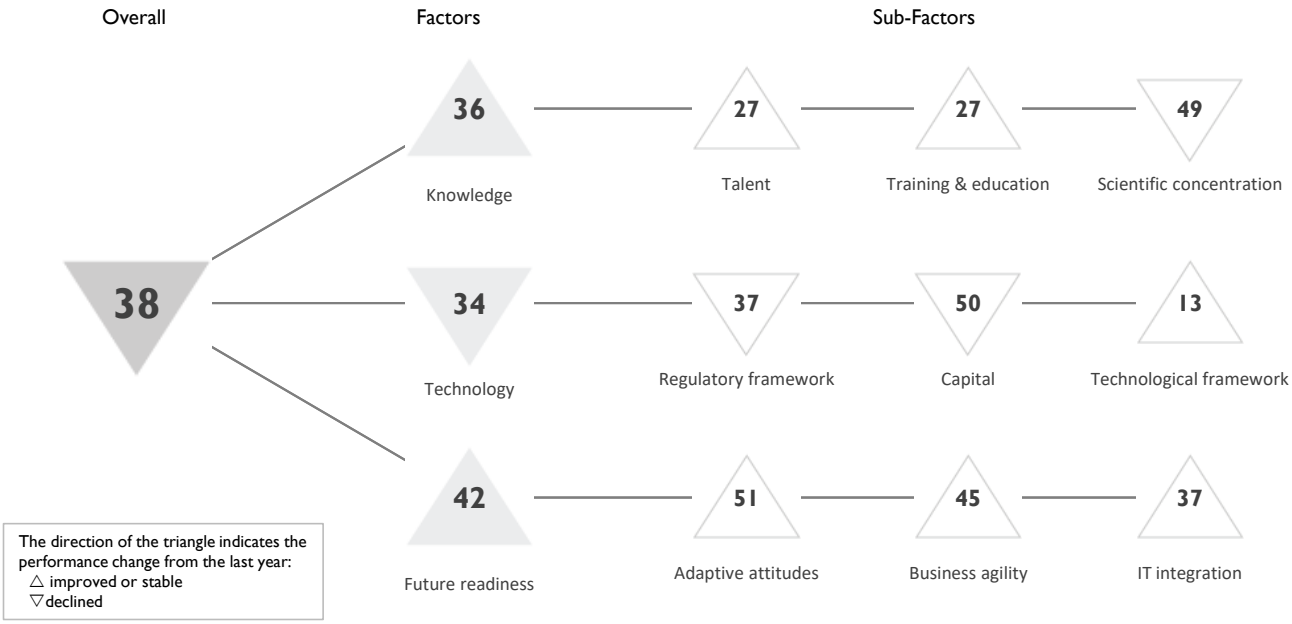
Adaptive attitudes	Rank
▶ E-Participation	1
▶ Internet retailing	1
Tablet possession	20
Smartphone possession	16
Attitudes toward globalization	14

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

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

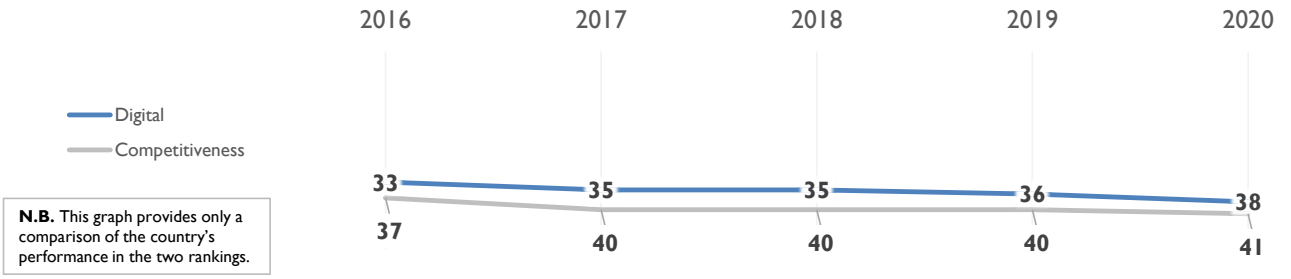
LATVIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	33	35	35	36	38
Knowledge	33	34	34	36	36
Technology	33	32	32	23	34
Future readiness	39	41	39	45	42

COMPETITIVENESS & DIGITAL RANKINGS



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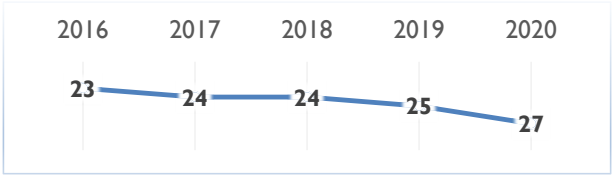
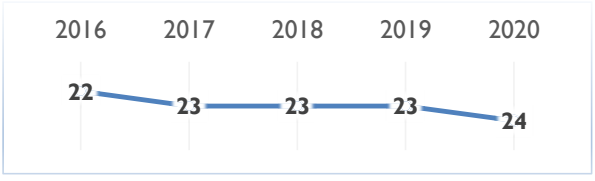
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



LATVIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	28	29	28	32	27
Training & education	12	20	28	27	27
Scientific concentration	48	47	46	47	49

Talent	Rank
Educational assessment PISA - Math	23
International experience	29
Foreign highly-skilled personnel	40
Management of cities	32
Digital/Technological skills	26
Net flow of international students	32

Training & education	Rank
Employee training	39
▶ Total public expenditure on education	12
Higher education achievement	32
Pupil-teacher ratio (tertiary education)	18
Graduates in Sciences	46
Women with degrees	25

Scientific concentration	Rank
Total expenditure on R&D (%)	46
Total R&D personnel per capita	37
▶ Female researchers	4
▷ R&D productivity by publication	53
Scientific and technical employment	39
High-tech patent grants	34
Robots in Education and R&D	49

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	35	34	31	30	37
Capital	45	31	36	35	50
Technological framework	23	24	26	14	13

Regulatory framework	Rank
Starting a business	15
▶ Enforcing contracts	14
▷ Immigration laws	61
Development & application of tech.	35
Scientific research legislation	44
Intellectual property rights	39

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	40
Banking and financial services	52
Country credit rating	36
Venture capital	39
▷ Investment in Telecommunications	54

Technological framework	Rank
Communications technology	25
Mobile Broadband subscribers	20
▶ Wireless broadband	13
▶ Internet users	14
Internet bandwidth speed	18
High-tech exports (%)	20

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	38	46	52	52	51
Business agility	46	41	41	47	45
IT integration	38	36	37	44	37

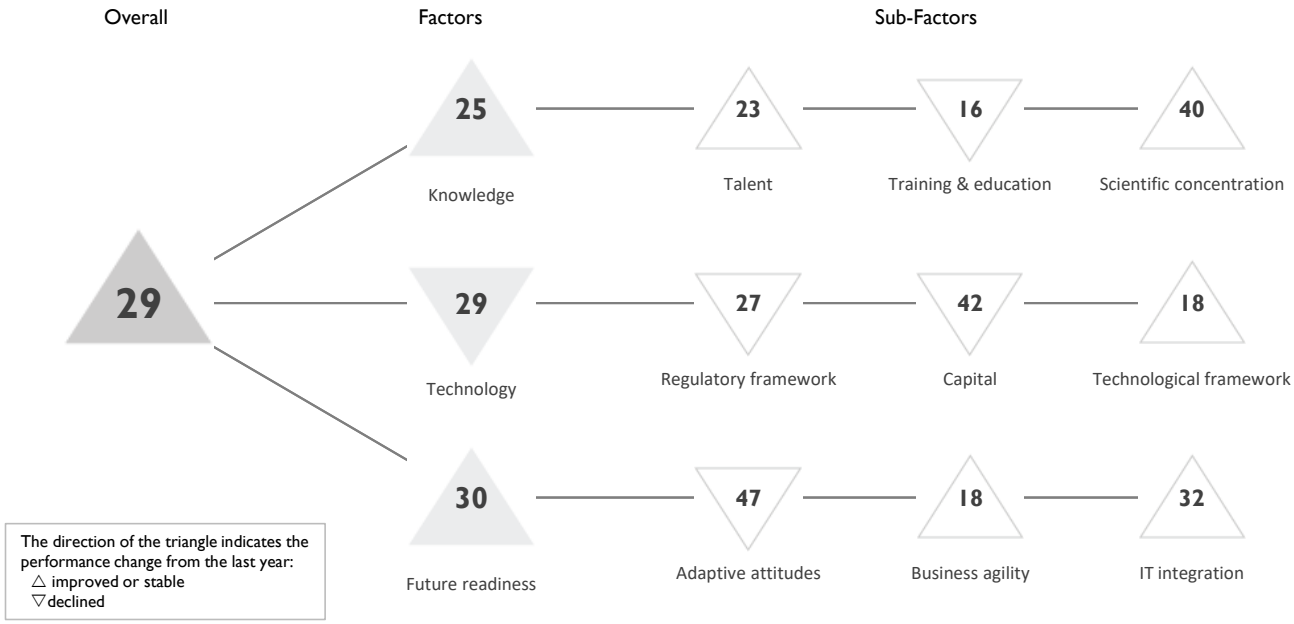
Adaptive attitudes	Rank
▷ E-Participation	59
Internet retailing	34
Tablet possession	28
Smartphone possession	49
Attitudes toward globalization	45

Business agility	Rank
Opportunities and threats	39
▷ World robots distribution	58
Agility of companies	42
Use of big data and analytics	30
Knowledge transfer	41
Entrepreneurial fear of failure	41

IT integration	Rank
E-Government	43
Public-private partnerships	49
Cyber security	14
Software piracy	40

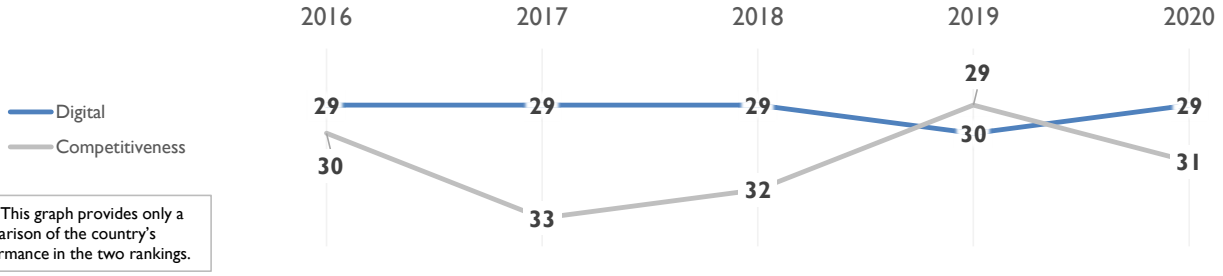
LITHUANIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	29	29	29	30	29
Knowledge	18	21	23	26	25
Technology	29	29	30	25	29
Future readiness	33	31	33	32	30

COMPETITIVENESS & DIGITAL RANKINGS



N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)

LITHUANIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	29	33	27	23	23
Training & education	5	6	16	13	16
Scientific concentration	24	28	31	41	40

Talent	Rank
Educational assessment PISA - Math	34
International experience	21
Foreign highly-skilled personnel	38
Management of cities	28
▶ Digital/Technological skills	3
▷ Net flow of international students	54

Training & education	Rank
Employee training	17
Total public expenditure on education	32
Higher education achievement	12
Pupil-teacher ratio (tertiary education)	12
Graduates in Sciences	25
Women with degrees	15

Scientific concentration	Rank
Total expenditure on R&D (%)	41
Total R&D personnel per capita	34
Female researchers	7
▷ R&D productivity by publication	54
Scientific and technical employment	32
High-tech patent grants	29
Robots in Education and R&D	47

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	24	27	28	24	27
Capital	37	42	35	36	42
Technological framework	25	17	22	21	18

Regulatory framework	Rank
Starting a business	20
▶ Enforcing contracts	7
▷ Immigration laws	57
Development & application of tech.	29
Scientific research legislation	25
Intellectual property rights	27

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	29
Banking and financial services	47
Country credit rating	34
Venture capital	25
▷ Investment in Telecommunications	59

Technological framework	Rank
▶ Communications technology	6
Mobile Broadband subscribers	22
Wireless broadband	21
Internet users	32
Internet bandwidth speed	17
High-tech exports (%)	33

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	37	35	41	45	47
Business agility	39	28	24	18	18
IT integration	29	29	31	32	32

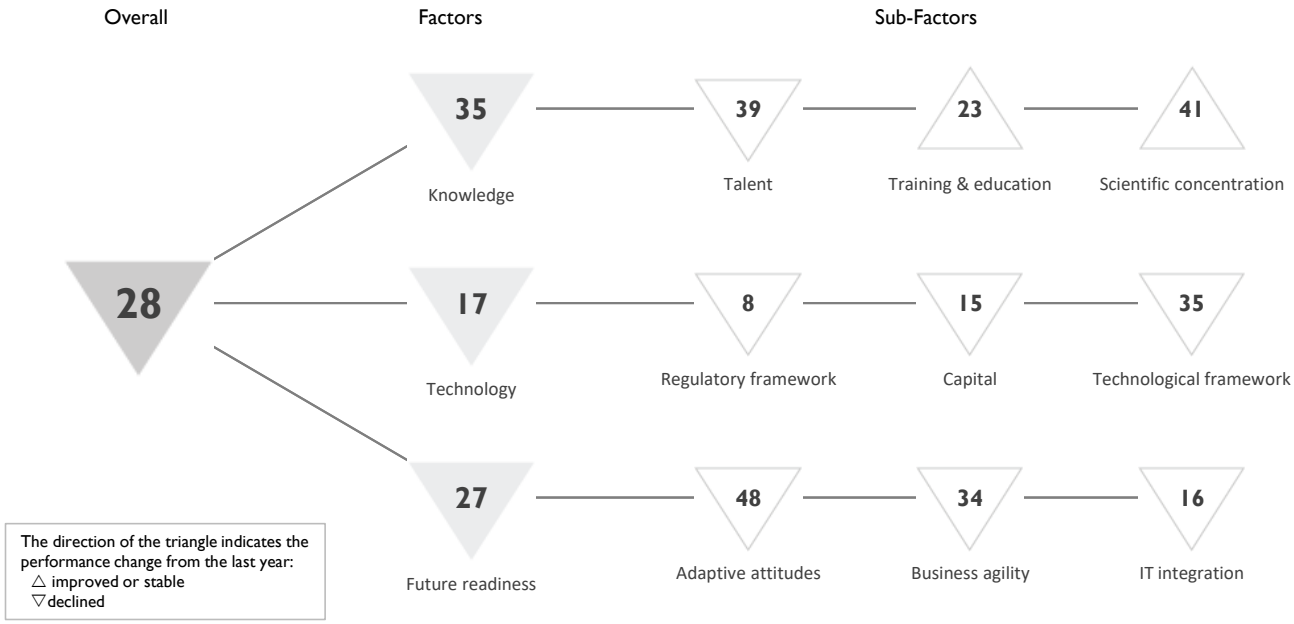
Adaptive attitudes	Rank
E-Participation	49
Internet retailing	28
Tablet possession	35
▷ Smartphone possession	54
Attitudes toward globalization	31

Business agility	Rank
▶ Opportunities and threats	6
World robots distribution	46
▶ Agility of companies	3
Use of big data and analytics	14
Knowledge transfer	34
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	20
Public-private partnerships	43
Cyber security	24
Software piracy	43

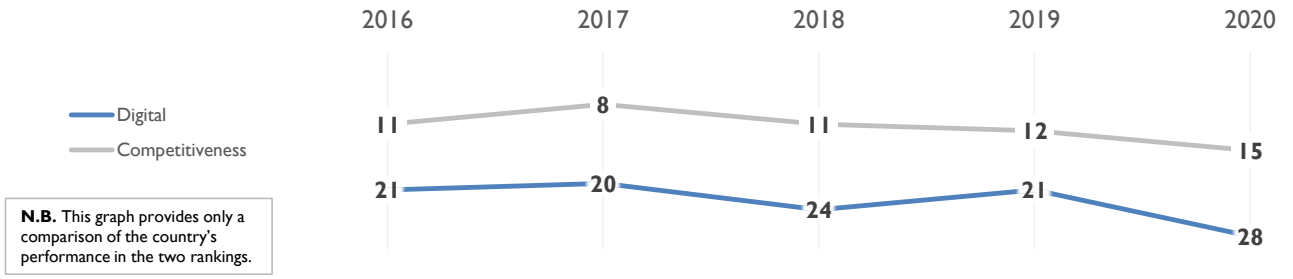
LUXEMBOURG

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	21	20	24	21	28
Knowledge	29	27	32	34	35
Technology	11	12	15	12	17
Future readiness	24	23	21	17	27

COMPETITIVENESS & DIGITAL RANKINGS



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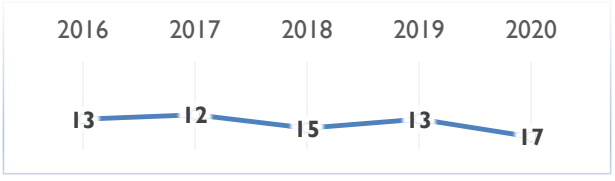
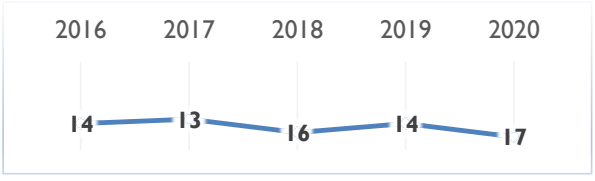
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



LUXEMBOURG

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	33	31	33	31	39
Training & education	29	30	26	24	23
Scientific concentration	25	23	44	42	41

Talent	Rank
Educational assessment PISA - Math	32
International experience	6
▶ Foreign highly-skilled personnel	4
Management of cities	21
Digital/Technological skills	37
▷ Net flow of international students	60

Training & education	Rank
Employee training	13
Total public expenditure on education	30
Higher education achievement	13
Pupil-teacher ratio (tertiary education)	8
▷ Graduates in Sciences	56
Women with degrees	23

Scientific concentration	Rank
Total expenditure on R&D (%)	34
Total R&D personnel per capita	6
Female researchers	48
▷ R&D productivity by publication	62
Scientific and technical employment	23
High-tech patent grants	25
Robots in Education and R&D	-

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	8	10	9	4	8
Capital	3	3	4	9	15
Technological framework	28	32	35	34	35

Regulatory framework	Rank
Starting a business	35
Enforcing contracts	17
▶ Immigration laws	3
Development & application of tech.	19
Scientific research legislation	8
Intellectual property rights	15

Capital	Rank
▶ IT & media stock market capitalization	3
Funding for technological development	22
Banking and financial services	29
▶ Country credit rating	1
Venture capital	26
▷ Investment in Telecommunications	60

Technological framework	Rank
Communications technology	19
Mobile Broadband subscribers	55
Wireless broadband	31
Internet users	9
Internet bandwidth speed	9
High-tech exports (%)	49

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	34	33	29	22	48
Business agility	19	16	17	20	34
IT integration	12	5	13	6	16

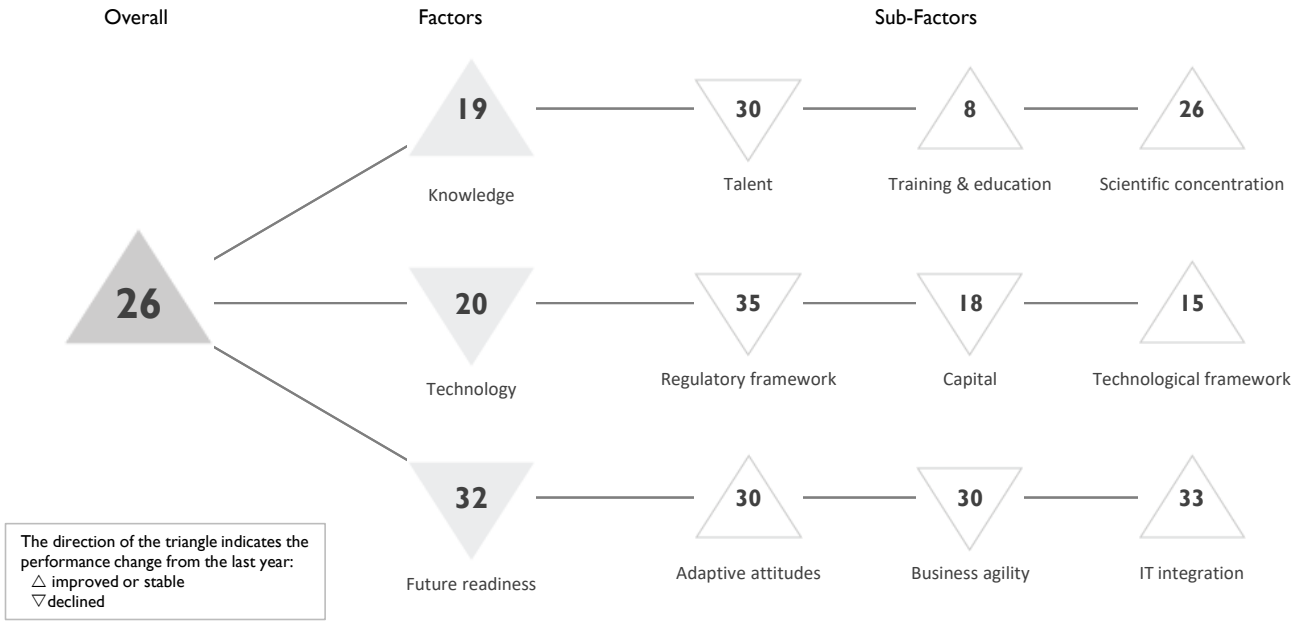
Adaptive attitudes	Rank
E-Participation	53
Internet retailing	-
Tablet possession	-
Smartphone possession	-
Attitudes toward globalization	34

Business agility	Rank
Opportunities and threats	19
▷ World robots distribution	58
Agility of companies	21
Use of big data and analytics	38
Knowledge transfer	23
Entrepreneurial fear of failure	39

IT integration	Rank
E-Government	30
Public-private partnerships	21
Cyber security	11
▶ Software piracy	4

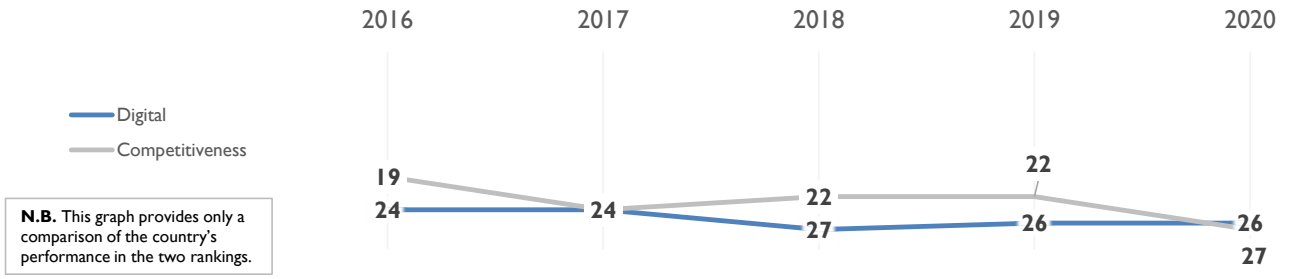
MALAYSIA

OVERALL PERFORMANCE (63 countries)



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

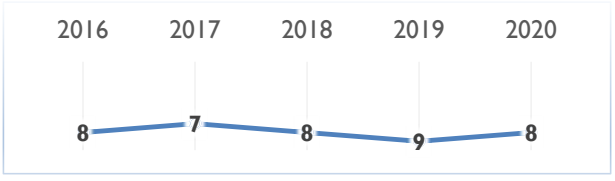
COMPETITIVENESS & DIGITAL RANKINGS



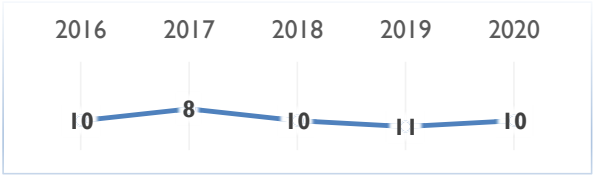
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



MALAYSIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

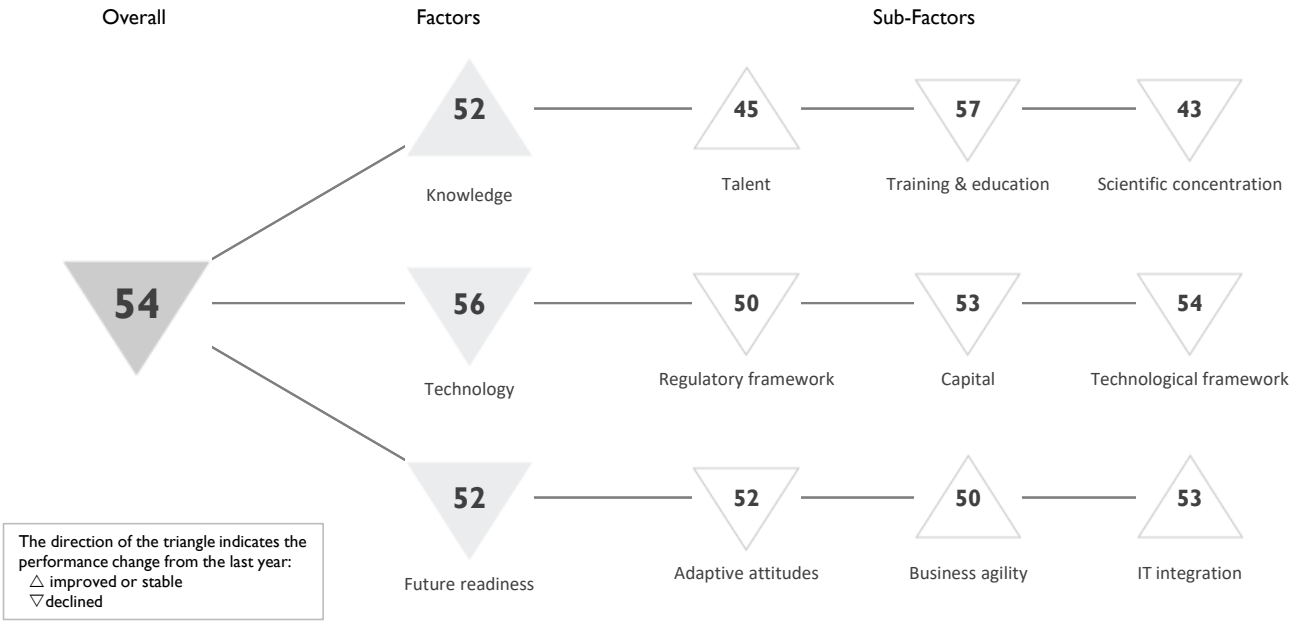
Adaptive attitudes	Rank
E-Participation	28
▷ Internet retailing	45
Tablet possession	27
Smartphone possession	26
Attitudes toward globalization	27

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

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

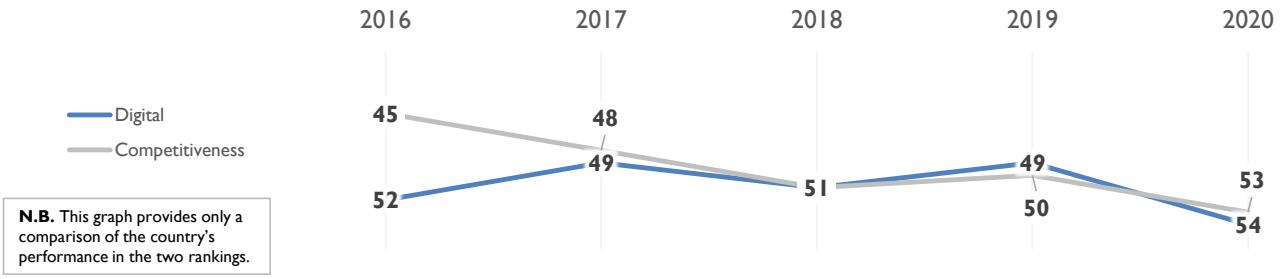
MEXICO

OVERALL PERFORMANCE (63 countries)



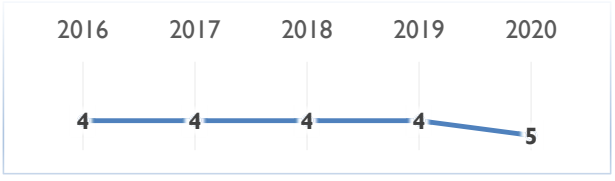
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	52	49	51	49	54
Knowledge	52	54	54	52	52
Technology	49	48	46	52	56
Future readiness	56	50	50	49	52

COMPETITIVENESS & DIGITAL RANKINGS

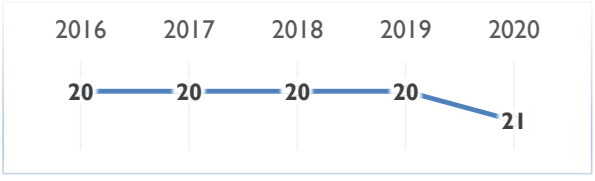


PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)



MEXICO

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	51	53	52	55	45
Training & education	42	44	51	53	57
Scientific concentration	56	57	53	40	43

Talent	Rank
Educational assessment PISA - Math	51
International experience	22
Foreign highly-skilled personnel	33
Management of cities	55
Digital/Technological skills	48
Net flow of international students	38

Training & education	Rank
Employee training	43
Total public expenditure on education	57
Higher education achievement	54
▶ Pupil-teacher ratio (tertiary education)	17
Graduates in Sciences	29
Women with degrees	52

Scientific concentration	Rank
Total expenditure on R&D (%)	55
Total R&D personnel per capita	54
Female researchers	31
▶ R&D productivity by publication	7
Scientific and technical employment	49
High-tech patent grants	50
▶ Robots in Education and R&D	12

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	42	39	45	48	50
Capital	44	45	42	47	53
Technological framework	52	52	50	53	54

Regulatory framework	Rank
Starting a business	45
Enforcing contracts	33
Immigration laws	50
Development & application of tech.	51
▷ Scientific research legislation	58
Intellectual property rights	52

Capital	Rank
▶ IT & media stock market capitalization	16
▷ Funding for technological development	58
Banking and financial services	46
Country credit rating	41
Venture capital	51
Investment in Telecommunications	47

Technological framework	Rank
Communications technology	57
Mobile Broadband subscribers	45
Wireless broadband	57
▷ Internet users	57
Internet bandwidth speed	53
High-tech exports (%)	17

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	53	40	40	47	52
Business agility	58	55	57	51	50
IT integration	49	52	53	53	53

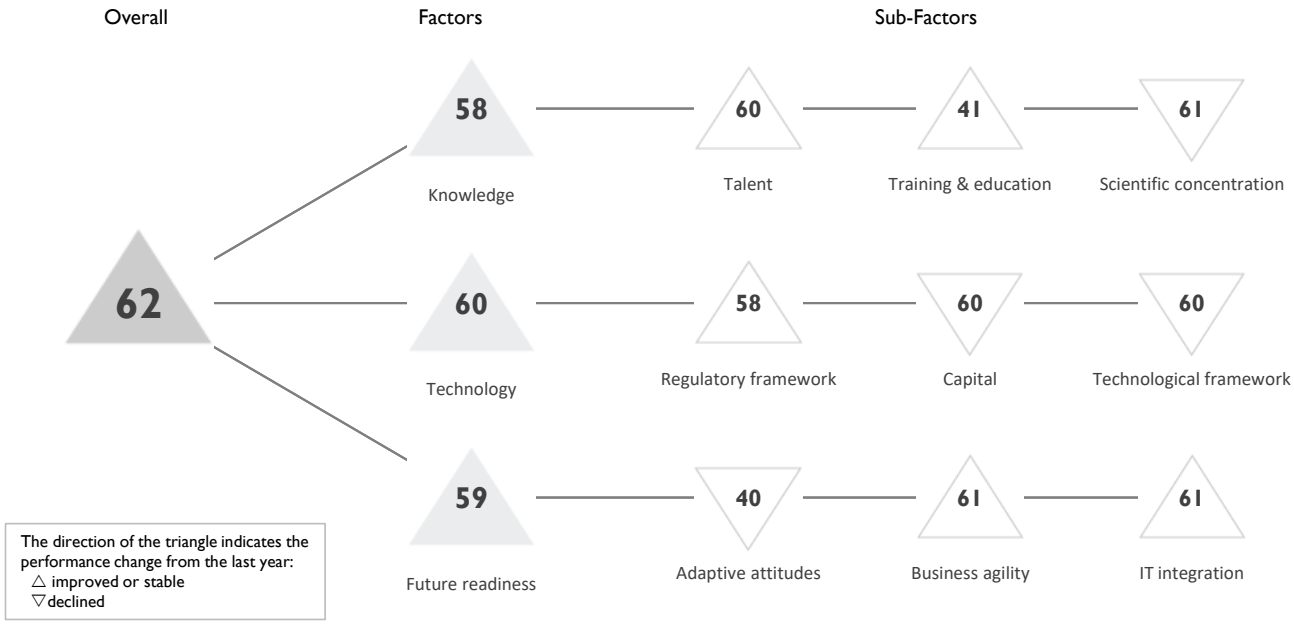
Adaptive attitudes	Rank
E-Participation	35
Internet retailing	46
Tablet possession	49
▷ Smartphone possession	58
Attitudes toward globalization	29

Business agility	Rank
Opportunities and threats	52
▶ World robots distribution	10
Agility of companies	50
Use of big data and analytics	51
Knowledge transfer	48
Entrepreneurial fear of failure	44

IT integration	Rank
E-Government	50
Public-private partnerships	50
▷ Cyber security	59
Software piracy	42

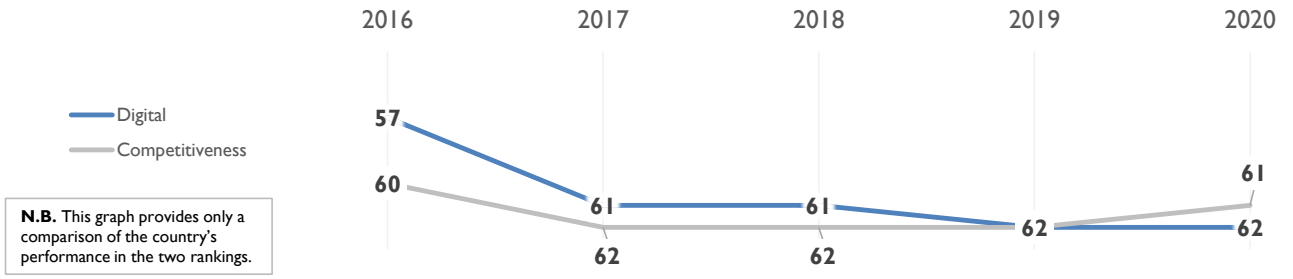
MONGOLIA

OVERALL PERFORMANCE (63 countries)



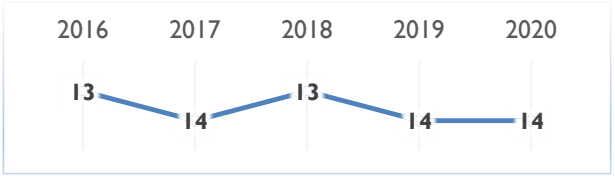
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	57	61	61	62	62
Knowledge	55	59	53	62	58
Technology	55	61	62	62	60
Future readiness	52	60	59	61	59

COMPETITIVENESS & DIGITAL RANKINGS

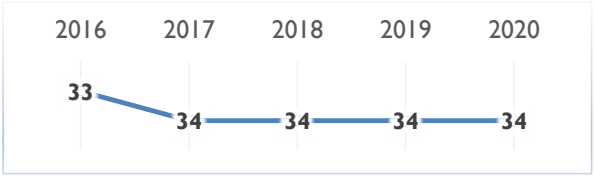


PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS < 20 MILLION (34 countries)



MONGOLIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	57	62	60	60	60
Training & education	36	38	24	45	41
Scientific concentration	60	60	60	60	61

Talent	Rank
Educational assessment PISA - Math	-
International experience	59
Foreign highly-skilled personnel	51
Management of cities	62
Digital/Technological skills	57
Net flow of international students	56

Training & education	Rank
▶ Employee training	9
Total public expenditure on education	37
Higher education achievement	39
Pupil-teacher ratio (tertiary education)	52
Graduates in Sciences	27
▶ Women with degrees	21

Scientific concentration	Rank
Total expenditure on R&D (%)	59
Total R&D personnel per capita	47
▶ Female researchers	9
R&D productivity by publication	61
Scientific and technical employment	-
▷ High-tech patent grants	63
Robots in Education and R&D	-

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	53	57	58	62	58
Capital	52	61	55	58	60
Technological framework	53	59	61	58	60

Regulatory framework	Rank
Starting a business	43
Enforcing contracts	44
Immigration laws	54
Development & application of tech.	60
Scientific research legislation	62
▷ Intellectual property rights	62

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	61
Banking and financial services	61
Country credit rating	61
Venture capital	60
▶ Investment in Telecommunications	9

Technological framework	Rank
Communications technology	56
Mobile Broadband subscribers	56
Wireless broadband	44
▷ Internet users	62
Internet bandwidth speed	52
High-tech exports (%)	56

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	32	39	31	31	40
Business agility	54	63	61	63	61
IT integration	58	62	62	62	61

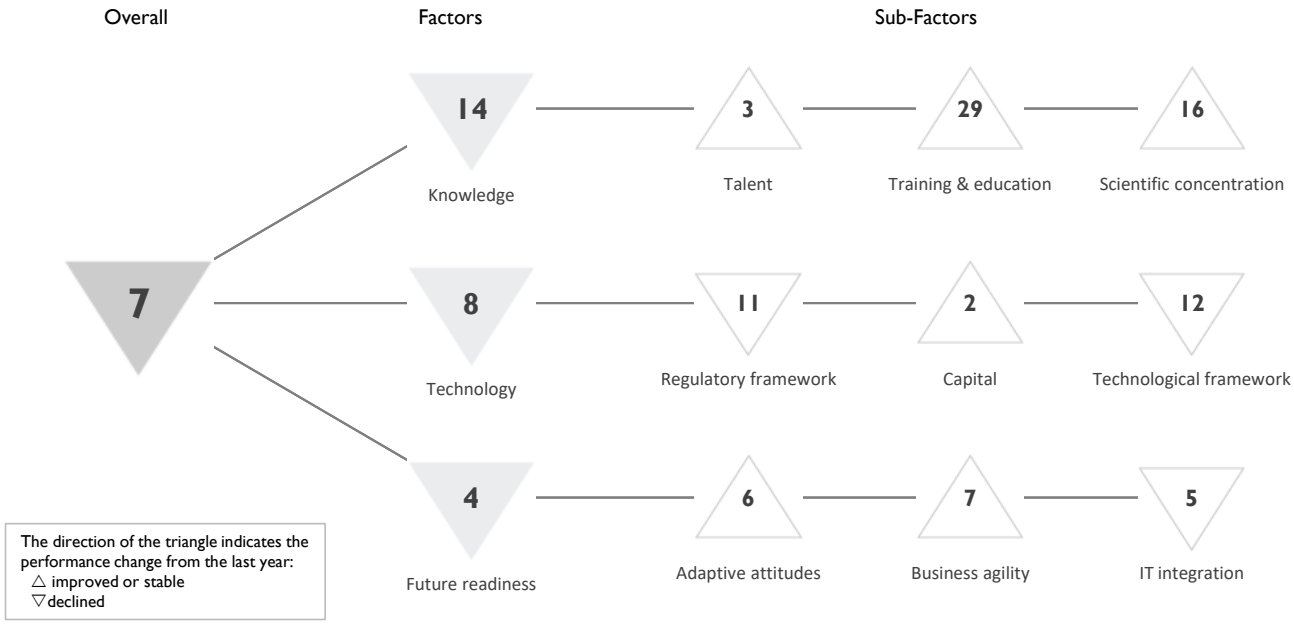
Adaptive attitudes	Rank
E-Participation	58
Internet retailing	-
Tablet possession	-
▶ Smartphone possession	9
Attitudes toward globalization	56

Business agility	Rank
Opportunities and threats	60
World robots distribution	-
Agility of companies	59
Use of big data and analytics	53
▷ Knowledge transfer	63
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	58
Public-private partnerships	61
▷ Cyber security	62
Software piracy	-

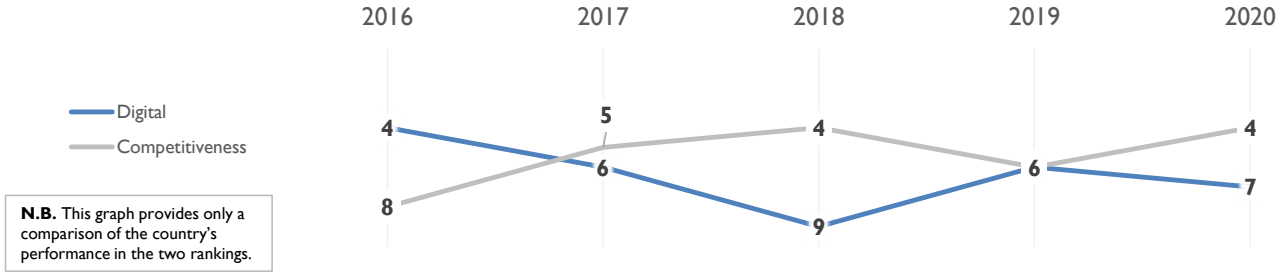
NETHERLANDS

OVERALL PERFORMANCE (63 countries)



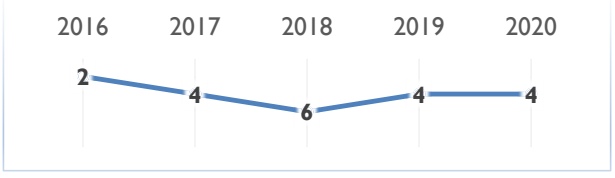
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	4	6	9	6	7
Knowledge	13	11	12	13	14
Technology	10	9	8	6	8
Future readiness	2	3	4	3	4

COMPETITIVENESS & DIGITAL RANKINGS

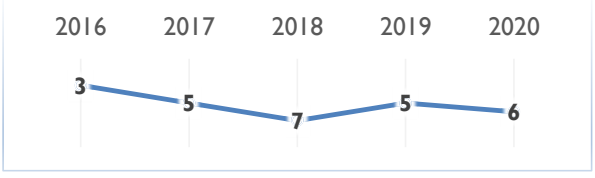


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



NETHERLANDS

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	4	3	3	3	3
Training & education	33	32	31	36	29
Scientific concentration	16	18	16	19	16

Talent	Rank
Educational assessment PISA - Math	8
▶ International experience	3
Foreign highly-skilled personnel	6
Management of cities	9
Digital/Technological skills	10
Net flow of international students	9

Training & education	Rank
Employee training	7
Total public expenditure on education	23
Higher education achievement	21
Pupil-teacher ratio (tertiary education)	25
▷ Graduates in Sciences	58
Women with degrees	31

Scientific concentration	Rank
Total expenditure on R&D (%)	14
Total R&D personnel per capita	8
▷ Female researchers	51
R&D productivity by publication	24
Scientific and technical employment	12
High-tech patent grants	14
Robots in Education and R&D	26

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	14	9	10	6	11
Capital	9	5	7	5	2
Technological framework	13	14	14	10	12

Regulatory framework	Rank
Starting a business	13
▷ Enforcing contracts	45
Immigration laws	11
Development & application of tech.	7
Scientific research legislation	10
Intellectual property rights	6

Capital	Rank
IT & media stock market capitalization	4
Funding for technological development	4
Banking and financial services	15
▶ Country credit rating	1
▶ Venture capital	2
▷ Investment in Telecommunications	43

Technological framework	Rank
Communications technology	9
Mobile Broadband subscribers	15
▷ Wireless broadband	32
Internet users	4
Internet bandwidth speed	16
High-tech exports (%)	13

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	3	5	7	9	6
Business agility	2	7	12	7	7
IT integration	2	3	7	3	5

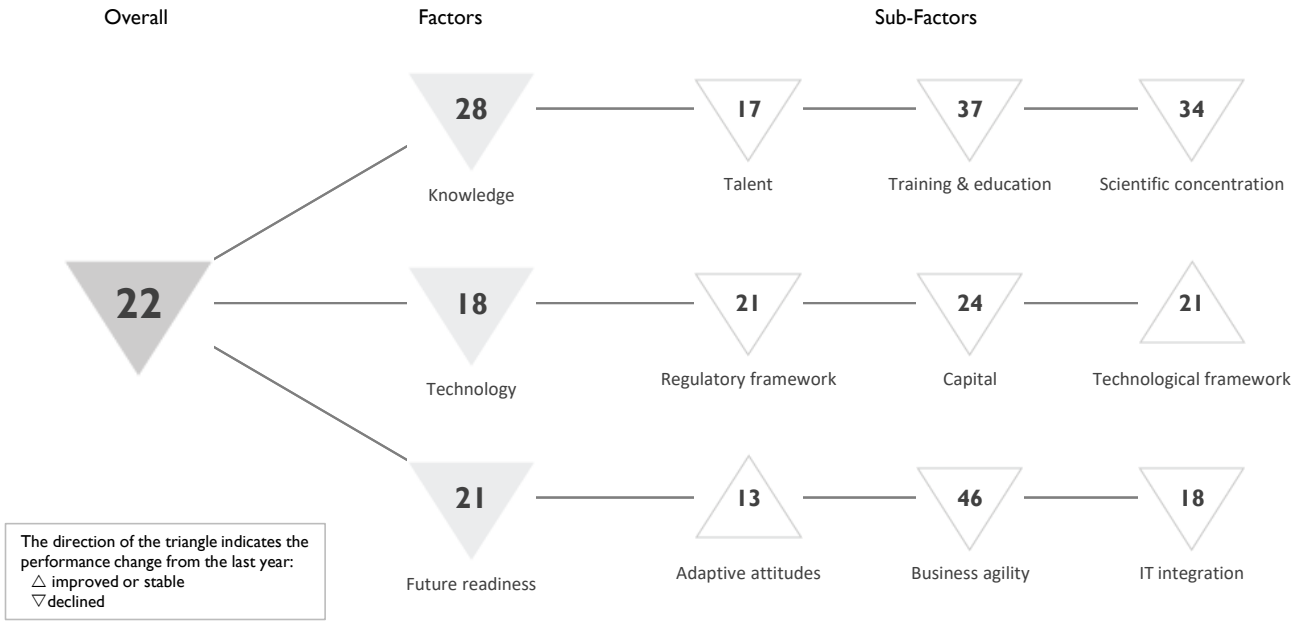
Adaptive attitudes	Rank
E-Participation	9
Internet retailing	5
Tablet possession	13
Smartphone possession	24
Attitudes toward globalization	9

Business agility	Rank
Opportunities and threats	13
World robots distribution	21
Agility of companies	16
Use of big data and analytics	20
▶ Knowledge transfer	2
▶ Entrepreneurial fear of failure	3

IT integration	Rank
E-Government	10
Public-private partnerships	6
Cyber security	18
Software piracy	13

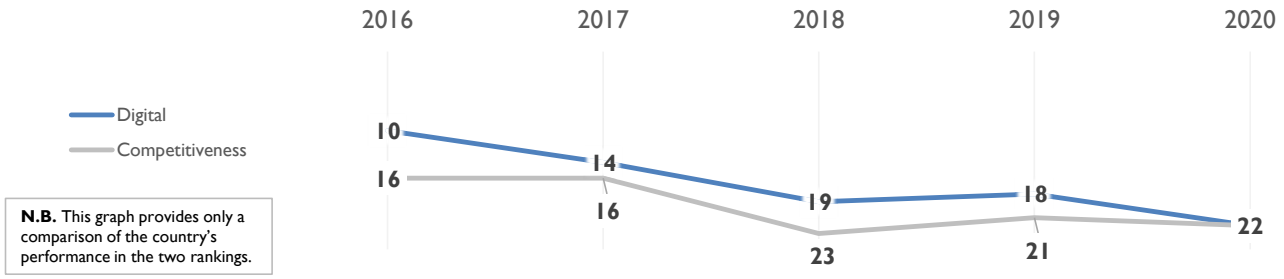
NEW ZEALAND

OVERALL PERFORMANCE (63 countries)



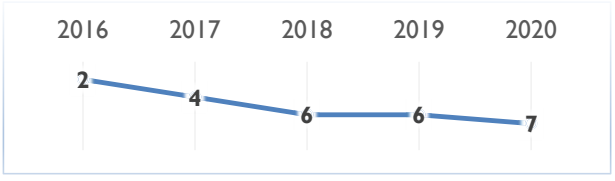
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	10	14	19	18	22
Knowledge	14	20	21	21	28
Technology	6	11	16	15	18
Future readiness	15	20	18	20	21

COMPETITIVENESS & DIGITAL RANKINGS

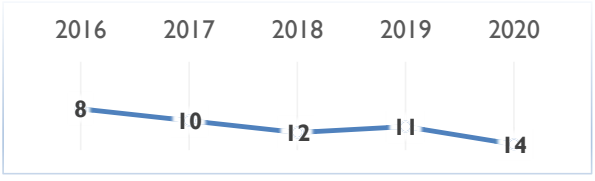


PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS < 20 MILLION (34 countries)



NEW ZEALAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	9	14	16	11	17
Training & education	32	36	37	34	37
Scientific concentration	17	20	15	26	34

	Talent	Rank
	Educational assessment PISA - Math	26
	International experience	40
	Foreign highly-skilled personnel	12
▷	Management of cities	49
▷	Digital/Technological skills	50
▶	Net flow of international students	2

	Training & education	Rank
▷	Employee training	51
	Total public expenditure on education	13
	Higher education achievement	26
	Pupil-teacher ratio (tertiary education)	36
	Graduates in Sciences	41
	Women with degrees	26

	Scientific concentration	Rank
	Total expenditure on R&D (%)	28
	Total R&D personnel per capita	16
	Female researchers	-
	R&D productivity by publication	44
	Scientific and technical employment	10
▷	High-tech patent grants	49
	Robots in Education and R&D	47

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	1	7	13	11	21
Capital	4	4	14	15	24
Technological framework	20	20	25	25	21

	Regulatory framework	Rank
▶	Starting a business	1
	Enforcing contracts	20
	Immigration laws	49
	Development & application of tech.	25
	Scientific research legislation	29
	Intellectual property rights	16

	Capital	Rank
	IT & media stock market capitalization	31
	Funding for technological development	43
	Banking and financial services	20
	Country credit rating	14
	Venture capital	33
	Investment in Telecommunications	19

	Technological framework	Rank
	Communications technology	28
	Mobile Broadband subscribers	35
	Wireless broadband	15
	Internet users	22
	Internet bandwidth speed	21
	High-tech exports (%)	41

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	24	20	14	13	13
Business agility	14	26	35	32	46
IT integration	6	17	17	10	18

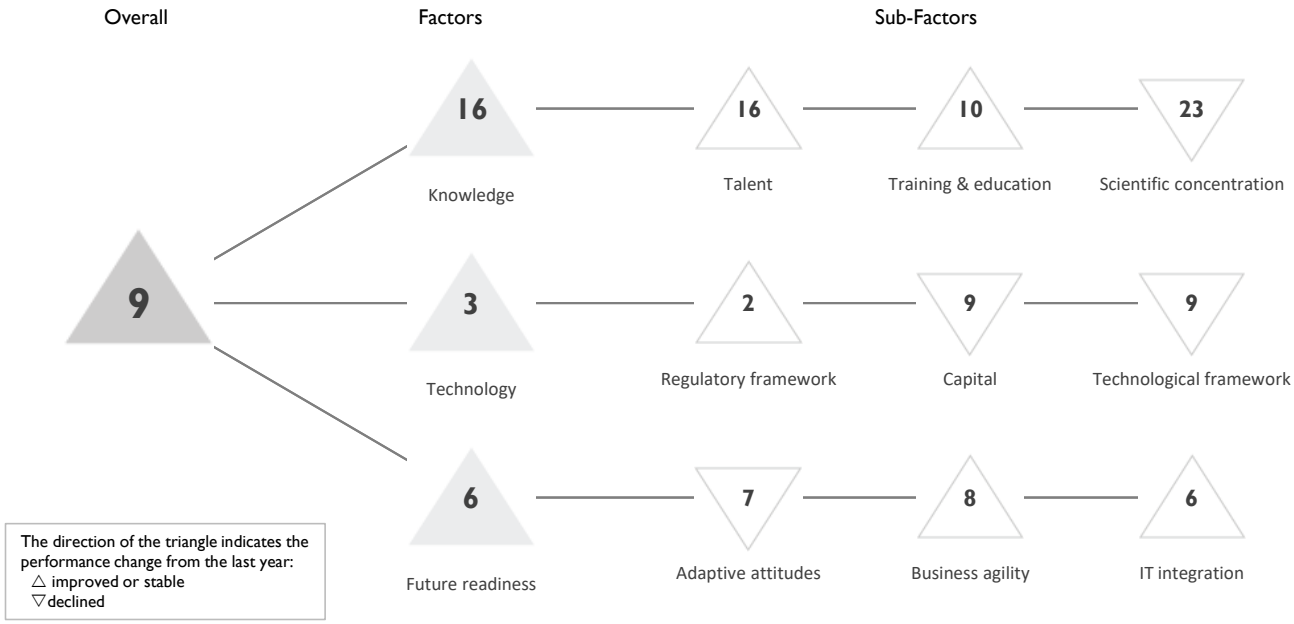
	Adaptive attitudes	Rank
▶	E-Participation	4
	Internet retailing	17
	Tablet possession	12
	Smartphone possession	18
	Attitudes toward globalization	20

	Business agility	Rank
	Opportunities and threats	37
	World robots distribution	41
	Agility of companies	44
	Use of big data and analytics	48
	Knowledge transfer	39
	Entrepreneurial fear of failure	-

	IT integration	Rank
▶	E-Government	8
▷	Public-private partnerships	53
	Cyber security	39
▶	Software piracy	2

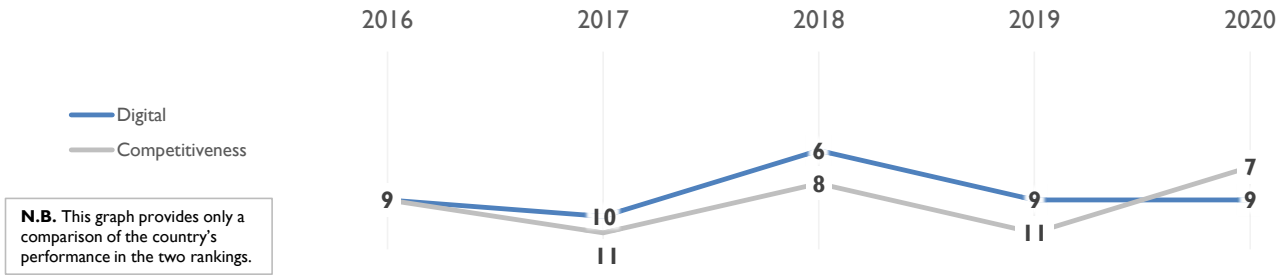
NORWAY

OVERALL PERFORMANCE (63 countries)



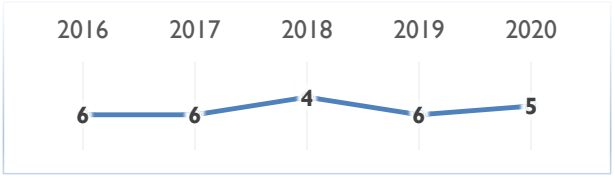
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	9	10	6	9	9
Knowledge	17	15	16	16	16
Technology	3	2	2	3	3
Future readiness	13	12	6	8	6

COMPETITIVENESS & DIGITAL RANKINGS

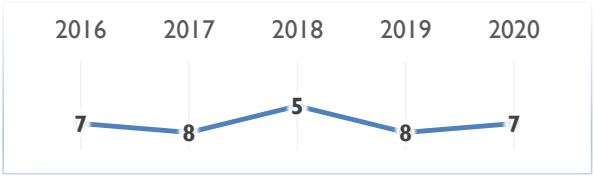


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



NORWAY

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	20	20	20	16	16
Training & education	15	12	11	17	10
Scientific concentration	23	22	20	21	23

Talent	Rank
Educational assessment PISA - Math	18
International experience	25
Foreign highly-skilled personnel	15
Management of cities	13
Digital/Technological skills	11
▷ Net flow of international students	55

Training & education	Rank
Employee training	4
Total public expenditure on education	16
Higher education achievement	18
Pupil-teacher ratio (tertiary education)	5
▷ Graduates in Sciences	40
Women with degrees	17

Scientific concentration	Rank
Total expenditure on R&D (%)	16
Total R&D personnel per capita	11
Female researchers	26
▷ R&D productivity by publication	45
Scientific and technical employment	24
High-tech patent grants	28
Robots in Education and R&D	30

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	5	3	1	3	2
Capital	8	7	2	7	9
Technological framework	4	3	3	6	9

Regulatory framework	Rank
Starting a business	14
▶ Enforcing contracts	3
Immigration laws	7
Development & application of tech.	10
Scientific research legislation	6
Intellectual property rights	19

Capital	Rank
IT & media stock market capitalization	18
Funding for technological development	10
Banking and financial services	13
▶ Country credit rating	1
Venture capital	14
▷ Investment in Telecommunications	30

Technological framework	Rank
Communications technology	12
Mobile Broadband subscribers	6
Wireless broadband	29
▶ Internet users	2
Internet bandwidth speed	8
High-tech exports (%)	16

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	7	8	8	5	7
Business agility	28	20	14	23	8
IT integration	9	14	9	9	6

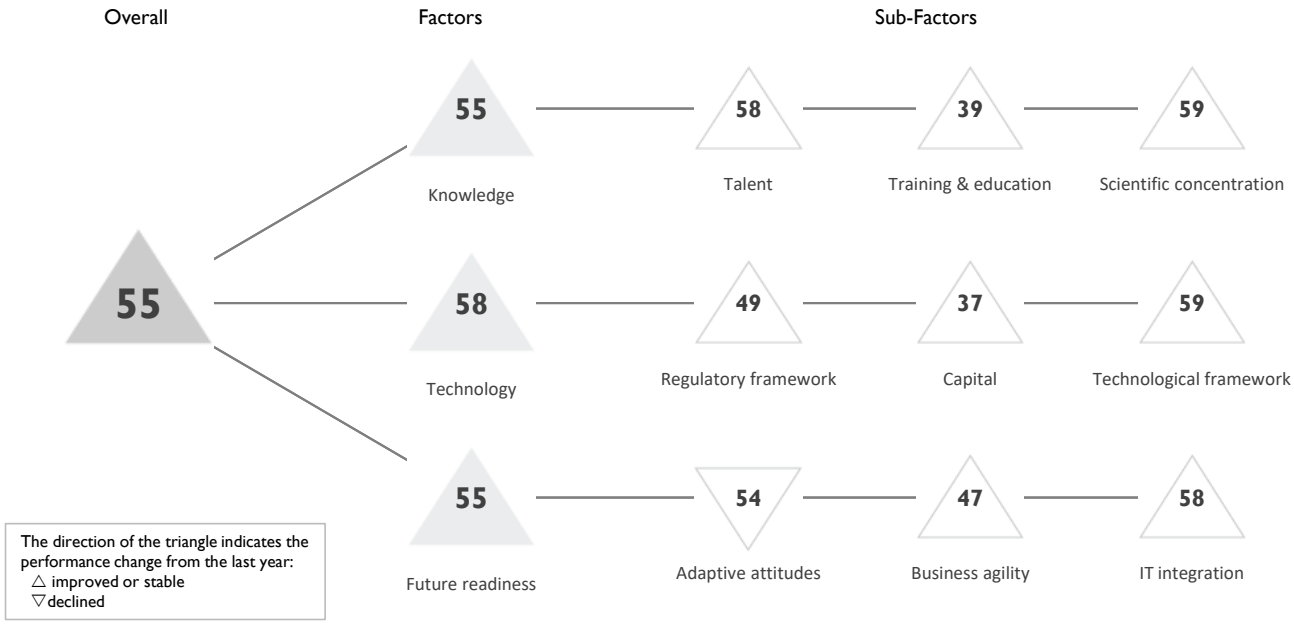
Adaptive attitudes	Rank
E-Participation	18
Internet retailing	8
▶ Tablet possession	3
▶ Smartphone possession	4
Attitudes toward globalization	24

Business agility	Rank
Opportunities and threats	12
▷ World robots distribution	42
Agility of companies	8
Use of big data and analytics	6
Knowledge transfer	12
Entrepreneurial fear of failure	8

IT integration	Rank
E-Government	13
Public-private partnerships	7
Cyber security	16
Software piracy	10

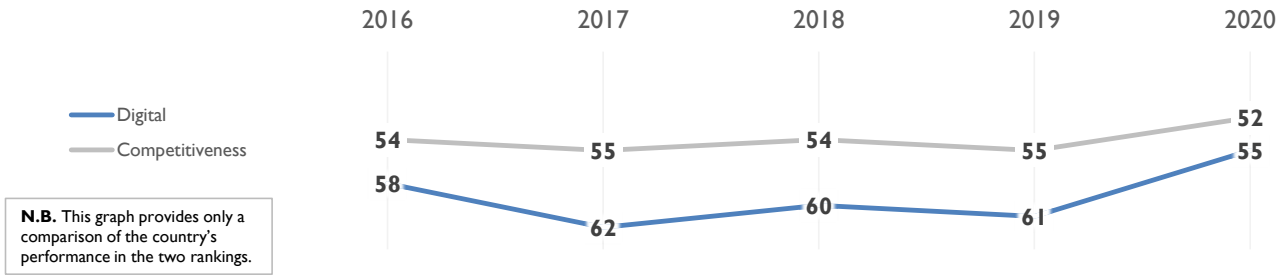
PERU

OVERALL PERFORMANCE (63 countries)



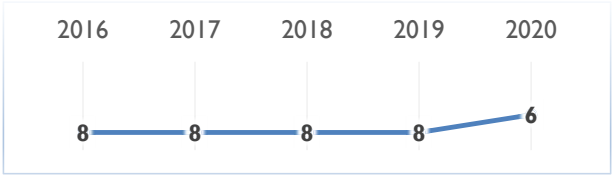
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	58	62	60	61	55
Knowledge	61	62	60	61	55
Technology	53	57	57	58	58
Future readiness	55	58	60	59	55

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)

PERU

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	60	61	58	59	58
Training & education	58	60	43	42	39
Scientific concentration	59	63	62	62	59

Talent	Rank
Educational assessment PISA - Math	52
International experience	26
Foreign highly-skilled personnel	22
▷ Management of cities	61
Digital/Technological skills	58
Net flow of international students	-

Training & education	Rank
Employee training	49
Total public expenditure on education	47
▶ Higher education achievement	7
Pupil-teacher ratio (tertiary education)	43
▶ Graduates in Sciences	9
Women with degrees	40

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	60
Total R&D personnel per capita	58
Female researchers	41
R&D productivity by publication	29
Scientific and technical employment	28
▷ High-tech patent grants	59
Robots in Education and R&D	41

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	49	51	49	50	49
Capital	40	48	47	45	37
Technological framework	60	61	59	61	59

Regulatory framework	Rank
Starting a business	55
Enforcing contracts	46
▶ Immigration laws	13
Development & application of tech.	56
Scientific research legislation	54
Intellectual property rights	56

Capital	Rank
IT & media stock market capitalization	35
Funding for technological development	54
Banking and financial services	38
Country credit rating	39
Venture capital	36
▶ Investment in Telecommunications	15

Technological framework	Rank
Communications technology	58
Mobile Broadband subscribers	54
▷ Wireless broadband	59
Internet users	55
▷ Internet bandwidth speed	59
High-tech exports (%)	57

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	52	61	59	49	54
Business agility	49	50	50	59	47
IT integration	56	59	59	59	58

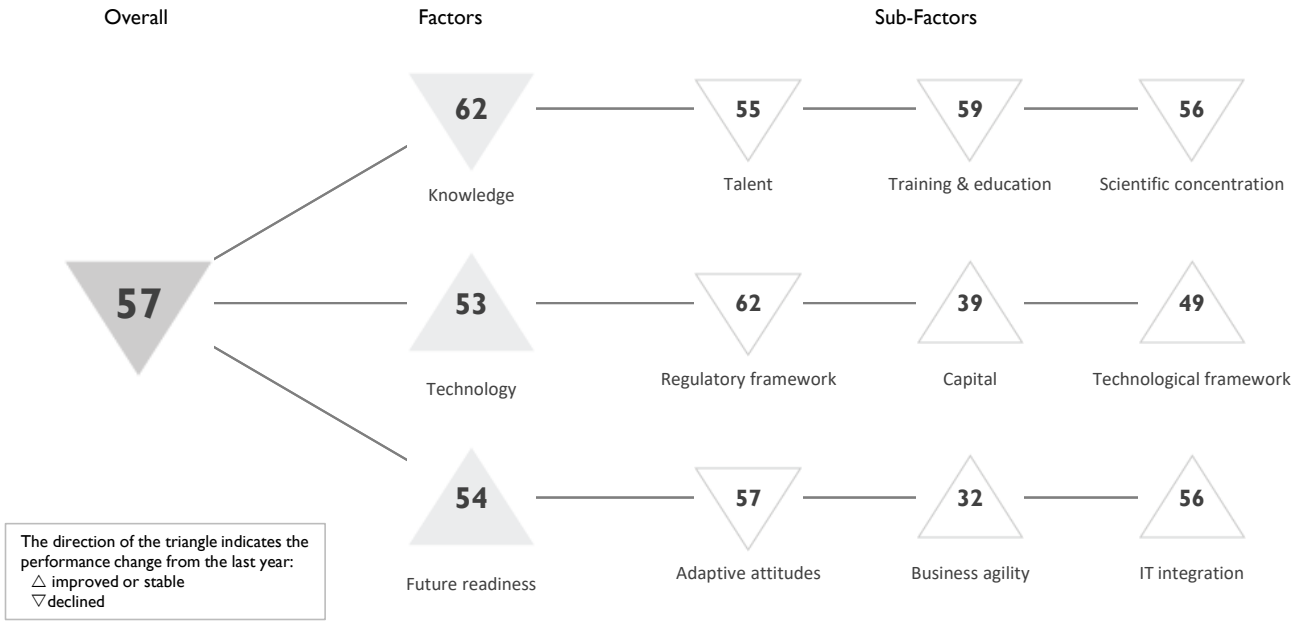
Adaptive attitudes	Rank
E-Participation	44
Internet retailing	57
Tablet possession	52
Smartphone possession	46
Attitudes toward globalization	28

Business agility	Rank
Opportunities and threats	49
World robots distribution	54
Agility of companies	52
Use of big data and analytics	54
Knowledge transfer	56
▶ Entrepreneurial fear of failure	7

IT integration	Rank
E-Government	54
Public-private partnerships	42
Cyber security	55
Software piracy	53

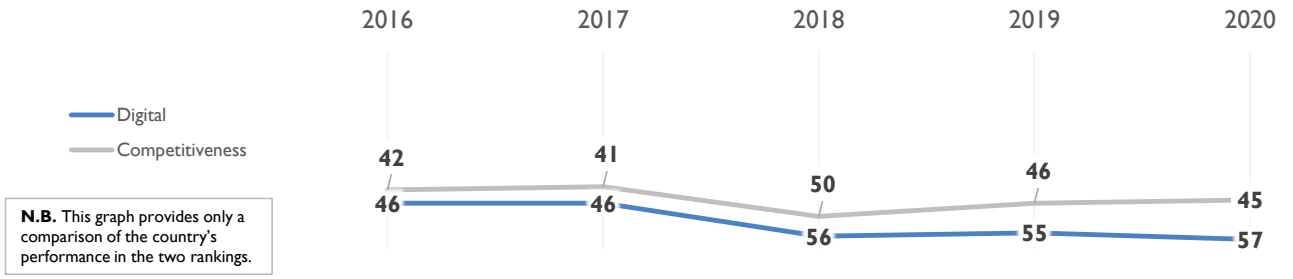
PHILIPPINES

OVERALL PERFORMANCE (63 countries)



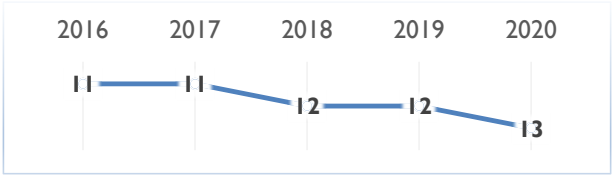
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	46	46	56	55	57
Knowledge	50	53	50	51	62
Technology	50	51	58	55	53
Future readiness	40	43	52	54	54

COMPETITIVENESS & DIGITAL RANKINGS

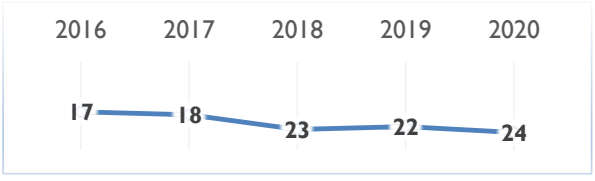


PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



PHILIPPINES

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	32	39	48	41	55
Training & education	55	54	52	54	59
Scientific concentration	49	53	50	54	56

	Talent	Rank
▷	Educational assessment PISA - Math	59
	International experience	38
	Foreign highly-skilled personnel	37
	Management of cities	48
	Digital/Technological skills	52
	Net flow of international students	37

	Training & education	Rank
	Employee training	37
	Total public expenditure on education	52
	Higher education achievement	55
	Pupil-teacher ratio (tertiary education)	53
▶	Graduates in Sciences	12
	Women with degrees	49

	Scientific concentration	Rank
	Total expenditure on R&D (%)	58
	Total R&D personnel per capita	57
▶	Female researchers	5
	R&D productivity by publication	30
	Scientific and technical employment	55
▶	High-tech patent grants	16
	Robots in Education and R&D	53

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	59	62	61	60	62
Capital	28	29	43	40	39
Technological framework	48	50	52	51	49

	Regulatory framework	Rank
▷	Starting a business	62
▷	Enforcing contracts	61
	Immigration laws	41
	Development & application of tech.	46
	Scientific research legislation	48
	Intellectual property rights	54

	Capital	Rank
	IT & media stock market capitalization	41
	Funding for technological development	51
	Banking and financial services	24
	Country credit rating	43
	Venture capital	47
▶	Investment in Telecommunications	10

	Technological framework	Rank
▷	Communications technology	62
	Mobile Broadband subscribers	52
	Wireless broadband	33
	Internet users	58
▷	Internet bandwidth speed	61
▶	High-tech exports (%)	2

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	46	50	60	53	57
Business agility	23	23	31	42	32
IT integration	57	57	57	58	56

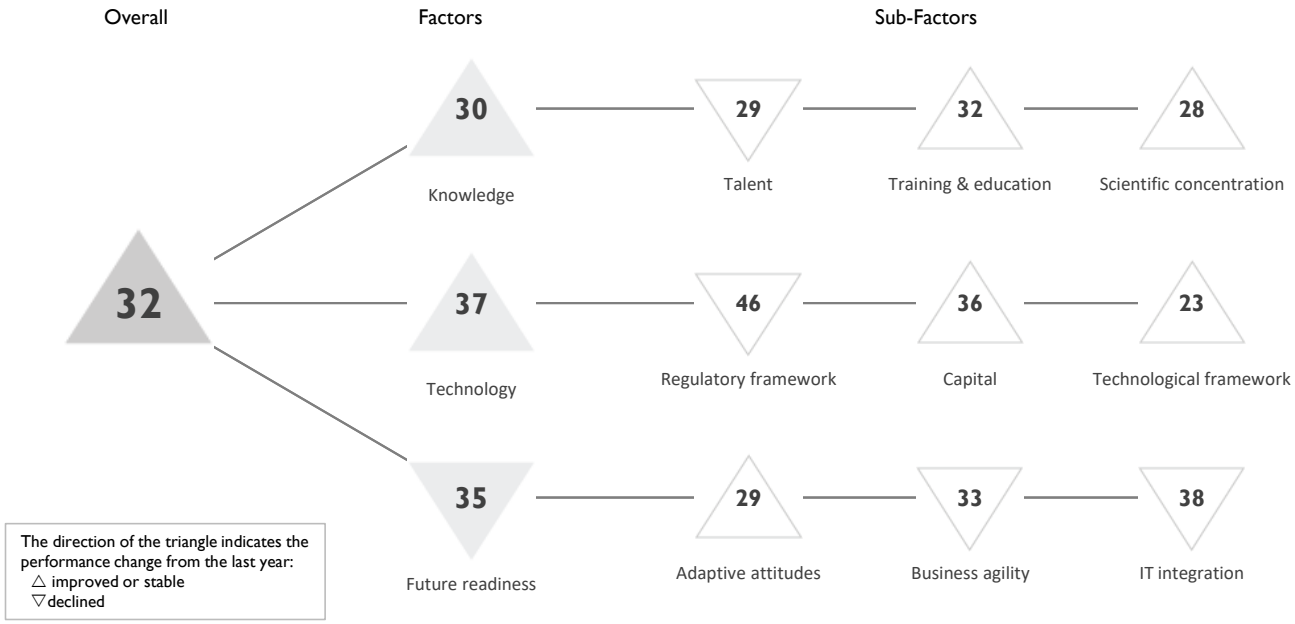
Adaptive attitudes	Rank
E-Participation	45
Internet retailing	58
Tablet possession	56
Smartphone possession	56
Attitudes toward globalization	17

Business agility	Rank
Opportunities and threats	29
World robots distribution	40
Agility of companies	28
Use of big data and analytics	34
Knowledge transfer	46
Entrepreneurial fear of failure	20

IT integration	Rank
E-Government	55
Public-private partnerships	35
Cyber security	50
Software piracy	55

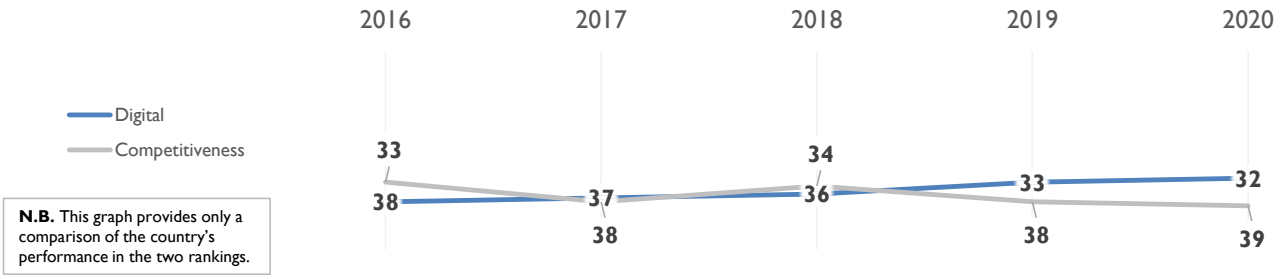
POLAND

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	38	37	36	33	32
Knowledge	27	32	33	33	30
Technology	36	39	37	37	37
Future readiness	51	39	37	33	35

COMPETITIVENESS & DIGITAL RANKINGS

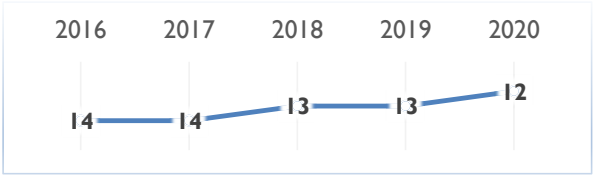


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS > 20 MILLION (29 countries)



POLAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	17	28	30	28	29
Training & education	22	23	35	35	32
Scientific concentration	39	40	38	31	28

	Talent	Rank
▶	Educational assessment PISA - Math	9
	International experience	35
	Foreign highly-skilled personnel	45
	Management of cities	35
	Digital/Technological skills	43
	Net flow of international students	27

Training & education	Rank
Employee training	22
Total public expenditure on education	25
Higher education achievement	30
Pupil-teacher ratio (tertiary education)	32
Graduates in Sciences	37
Women with degrees	34

	Scientific concentration	Rank
	Total expenditure on R&D (%)	33
	Total R&D personnel per capita	33
	Female researchers	25
▶	R&D productivity by publication	14
	Scientific and technical employment	36
	High-tech patent grants	35
	Robots in Education and R&D	16

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	45	47	46	45	46
Capital	32	32	32	38	36
Technological framework	39	39	37	30	23

	Regulatory framework	Rank
▷	Starting a business	54
	Enforcing contracts	39
▷	Immigration laws	46
▷	Development & application of tech.	48
	Scientific research legislation	41
	Intellectual property rights	36

Capital	Rank
IT & media stock market capitalization	27
Funding for technological development	35
Banking and financial services	34
Country credit rating	35
Venture capital	29
Investment in Telecommunications	44

	Technological framework	Rank
	Communications technology	45
	Mobile Broadband subscribers	42
▶	Wireless broadband	3
	Internet users	38
	Internet bandwidth speed	27
	High-tech exports (%)	36

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	51	38	33	37	29
Business agility	55	45	40	28	33
IT integration	41	41	40	36	38

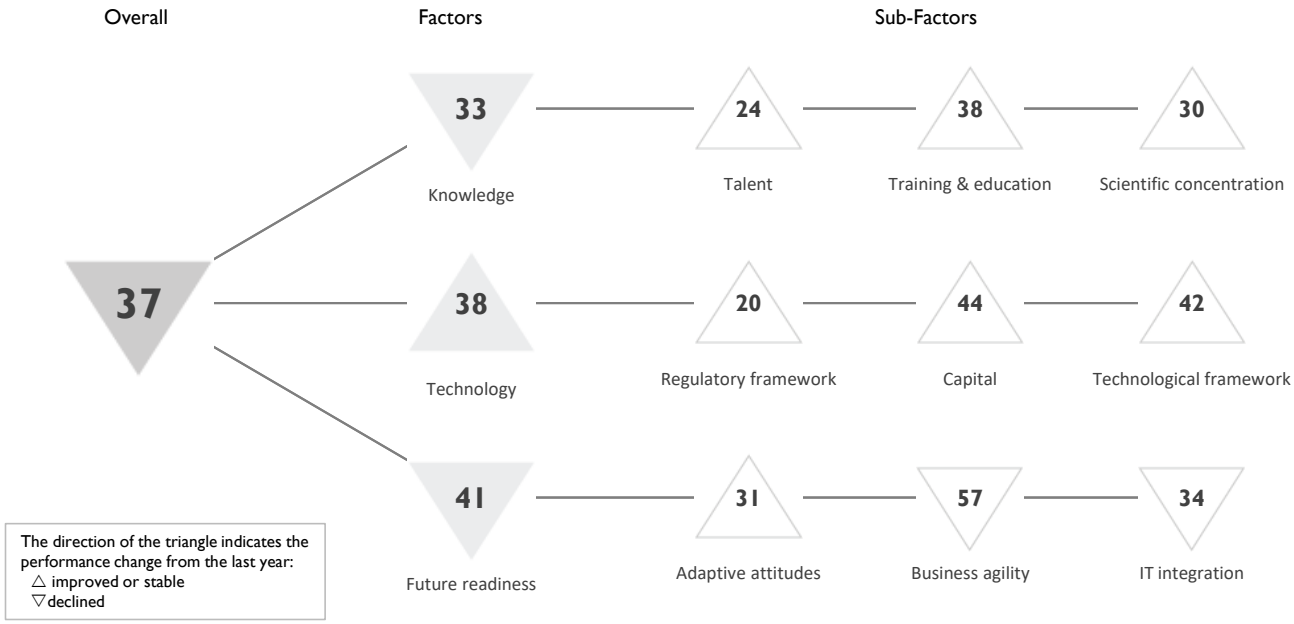
	Adaptive attitudes	Rank
▶	E-Participation	9
	Internet retailing	33
▶	Tablet possession	8
	Smartphone possession	43
▷	Attitudes toward globalization	54

Business agility	Rank
Opportunities and threats	42
World robots distribution	19
Agility of companies	25
Use of big data and analytics	22
Knowledge transfer	43
Entrepreneurial fear of failure	40

	IT integration	Rank
	E-Government	23
▷	Public-private partnerships	51
	Cyber security	46
	Software piracy	36

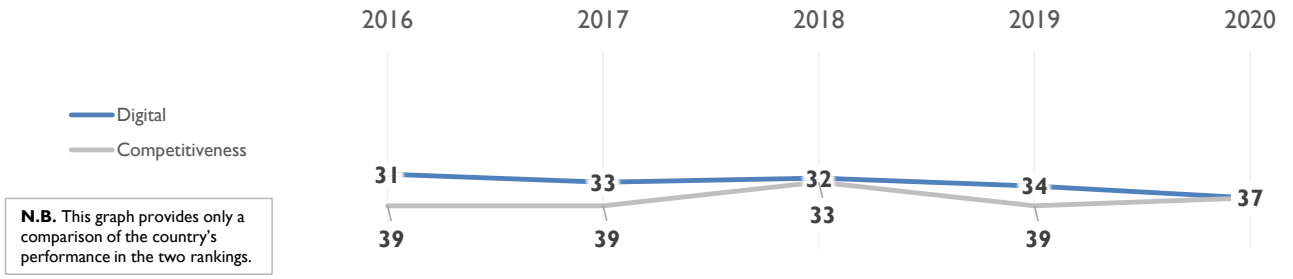
PORTUGAL

OVERALL PERFORMANCE (63 countries)



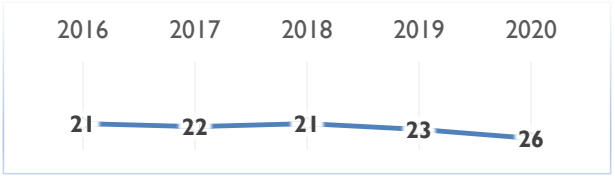
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	31	33	32	34	37
Knowledge	31	31	27	31	33
Technology	35	37	36	38	38
Future readiness	31	35	32	34	41

COMPETITIVENESS & DIGITAL RANKINGS

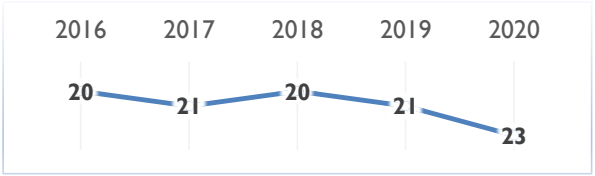


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



PORTUGAL

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	31	30	23	26	24
Training & education	21	18	27	39	38
Scientific concentration	35	36	34	32	30

Talent	Rank
Educational assessment PISA - Math	27
International experience	48
Foreign highly-skilled personnel	35
Management of cities	24
Digital/Technological skills	14
Net flow of international students	28

Training & education	Rank
▷ Employee training	58
Total public expenditure on education	31
Higher education achievement	42
▶ Pupil-teacher ratio (tertiary education)	13
▶ Graduates in Sciences	13
Women with degrees	39

Scientific concentration	Rank
Total expenditure on R&D (%)	29
Total R&D personnel per capita	23
Female researchers	18
R&D productivity by publication	32
Scientific and technical employment	33
High-tech patent grants	41
Robots in Education and R&D	34

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	20	19	19	21	20
Capital	50	50	45	48	44
Technological framework	38	43	39	45	42

Regulatory framework	Rank
Starting a business	33
Enforcing contracts	30
▶ Immigration laws	4
Development & application of tech.	18
Scientific research legislation	30
Intellectual property rights	29

Capital	Rank
IT & media stock market capitalization	34
Funding for technological development	30
Banking and financial services	42
Country credit rating	46
Venture capital	42
Investment in Telecommunications	39

Technological framework	Rank
▶ Communications technology	5
▷ Mobile Broadband subscribers	59
Wireless broadband	52
▶ Internet users	12
Internet bandwidth speed	23
▷ High-tech exports (%)	55

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	31	34	35	32	31
Business agility	27	40	27	52	57
IT integration	32	32	30	29	34

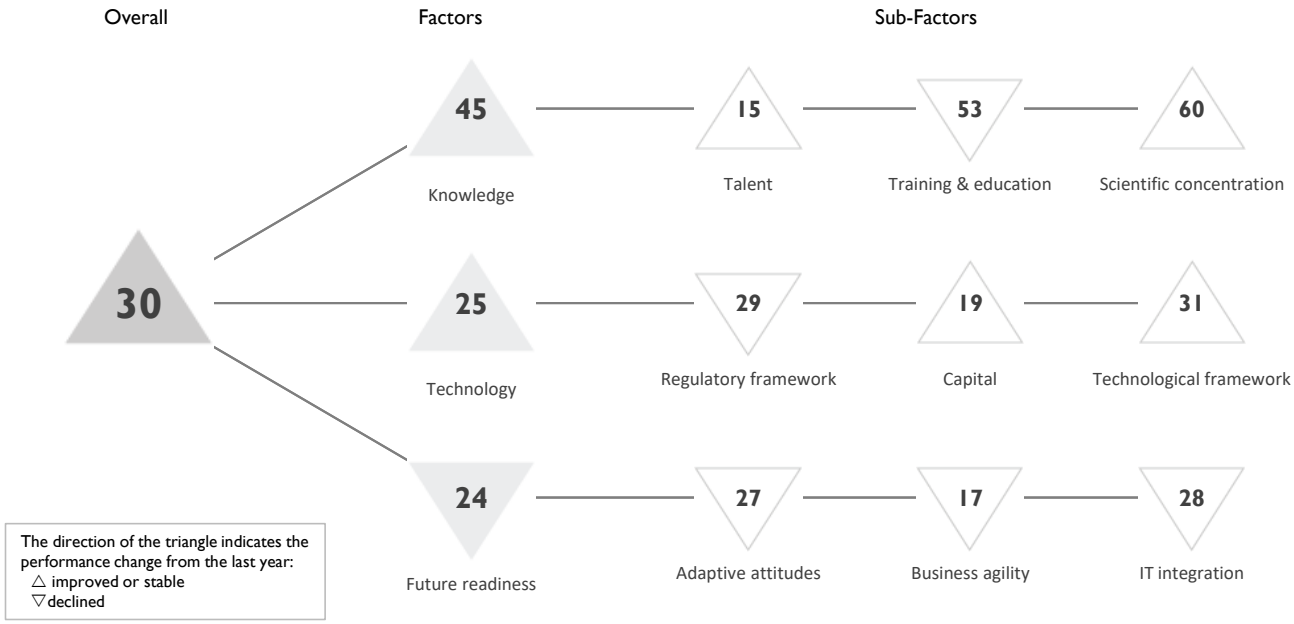
Adaptive attitudes	Rank
E-Participation	35
Internet retailing	35
Tablet possession	32
Smartphone possession	41
Attitudes toward globalization	19

Business agility	Rank
Opportunities and threats	50
World robots distribution	31
▷ Agility of companies	53
▷ Use of big data and analytics	55
Knowledge transfer	32
Entrepreneurial fear of failure	49

IT integration	Rank
E-Government	32
Public-private partnerships	41
Cyber security	41
Software piracy	28

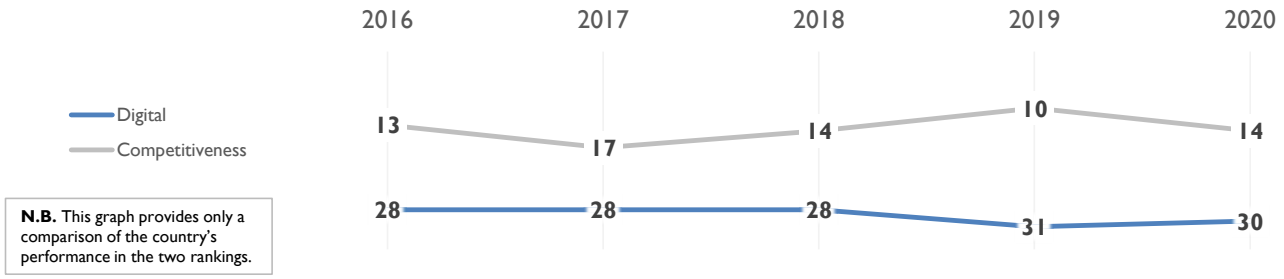
QATAR

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	28	28	28	31	30
Knowledge	37	35	37	45	45
Technology	31	31	27	33	25
Future readiness	21	19	16	22	24

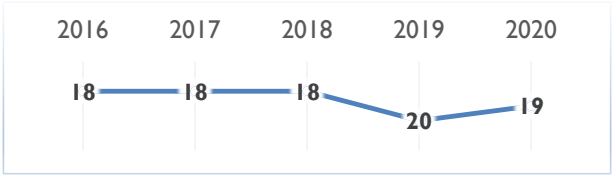
COMPETITIVENESS & DIGITAL RANKINGS



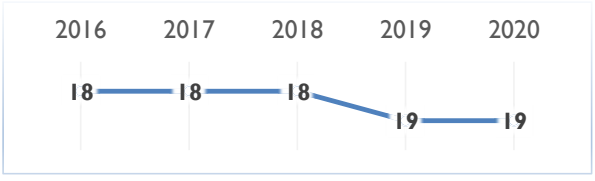
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



QATAR

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	25	19	15	15	15
Training & education	27	24	38	48	53
Scientific concentration	54	55	59	61	60

Talent	Rank
Educational assessment PISA - Math	50
▶ International experience	5
Foreign highly-skilled personnel	7
▶ Management of cities	5
Digital/Technological skills	8
Net flow of international students	19

Training & education	Rank
Employee training	10
▷ Total public expenditure on education	60
▷ Higher education achievement	57
Pupil-teacher ratio (tertiary education)	31
Graduates in Sciences	39
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	49
Total R&D personnel per capita	48
Female researchers	38
▷ R&D productivity by publication	57
Scientific and technical employment	53
High-tech patent grants	15
Robots in Education and R&D	54

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	33	31	32	28	29
Capital	18	17	24	23	19
Technological framework	42	36	30	38	31

Regulatory framework	Rank
Starting a business	46
Enforcing contracts	55
Immigration laws	16
Development & application of tech.	11
Scientific research legislation	12
Intellectual property rights	20

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	8
Banking and financial services	5
Country credit rating	22
Venture capital	11
Investment in Telecommunications	56

Technological framework	Rank
Communications technology	15
Mobile Broadband subscribers	32
Wireless broadband	12
Internet users	36
Internet bandwidth speed	32
▷ High-tech exports (%)	62

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	12	15	16	18	27
Business agility	26	15	8	12	17
IT integration	28	27	26	27	28

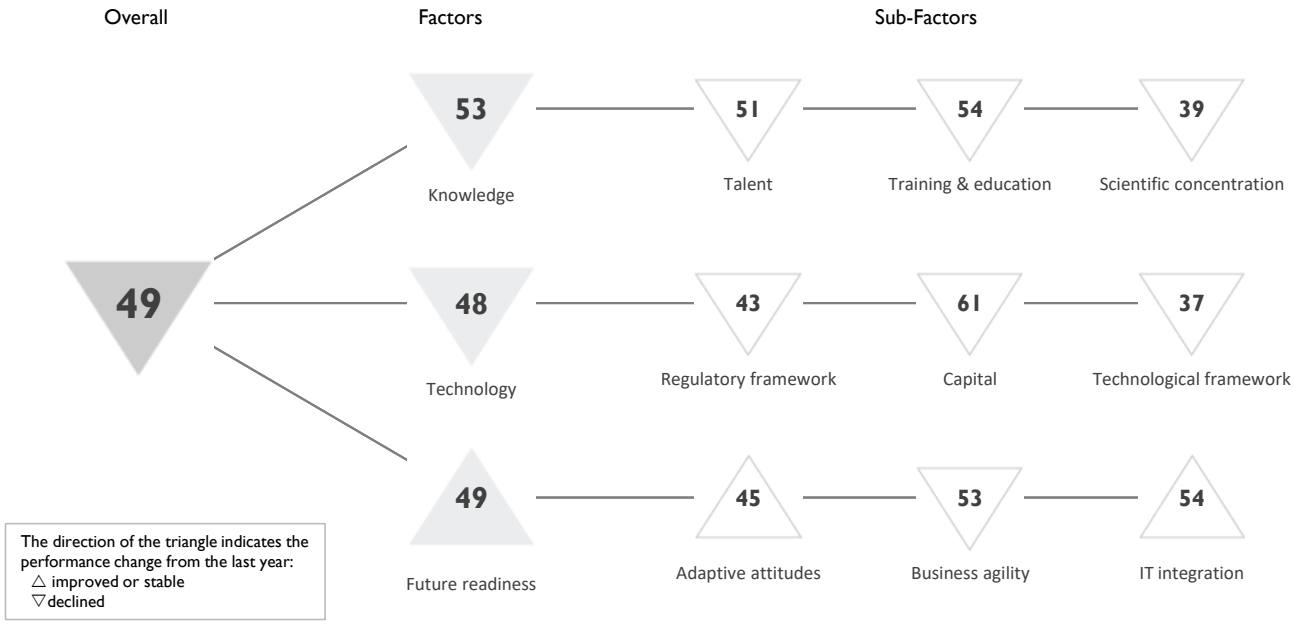
Adaptive attitudes	Rank
E-Participation	56
Internet retailing	48
▶ Tablet possession	5
Smartphone possession	6
Attitudes toward globalization	15

Business agility	Rank
Opportunities and threats	7
▷ World robots distribution	57
Agility of companies	18
▶ Use of big data and analytics	1
Knowledge transfer	6
Entrepreneurial fear of failure	38

IT integration	Rank
E-Government	51
Public-private partnerships	8
▶ Cyber security	1
Software piracy	38

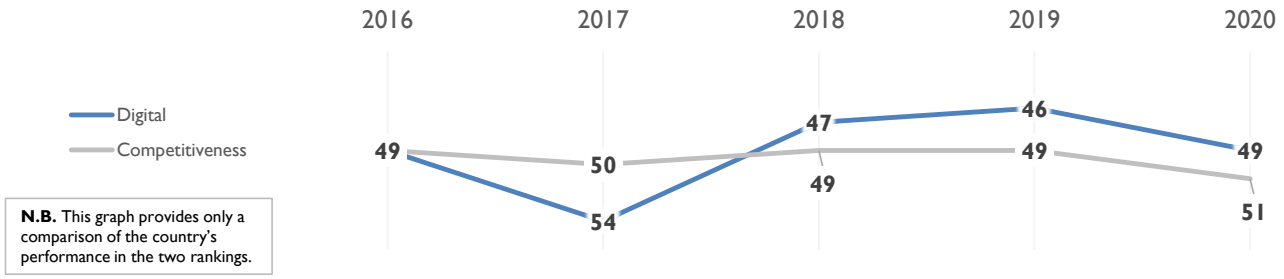
ROMANIA

OVERALL PERFORMANCE (63 countries)



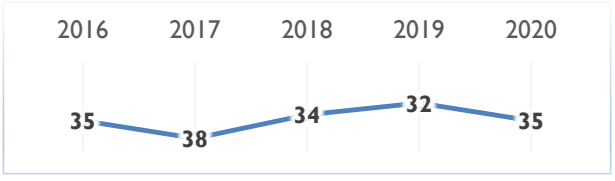
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	49	54	47	46	49
Knowledge	48	47	45	47	53
Technology	46	46	44	45	48
Future readiness	57	59	57	51	49

COMPETITIVENESS & DIGITAL RANKINGS

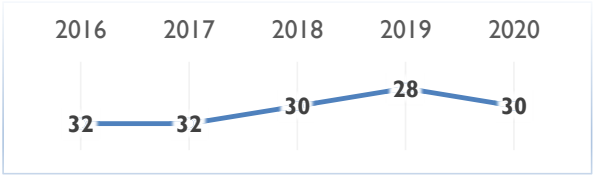


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



ROMANIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	49	45	45	48	51
Training & education	45	52	50	51	54
Scientific concentration	42	41	43	38	39

Talent	Rank
Educational assessment PISA - Math	46
International experience	53
Foreign highly-skilled personnel	49
▷ Management of cities	57
Digital/Technological skills	21
Net flow of international students	44

Training & education	Rank
Employee training	46
Total public expenditure on education	53
Higher education achievement	53
Pupil-teacher ratio (tertiary education)	48
▶ Graduates in Sciences	15
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	50
Total R&D personnel per capita	45
▶ Female researchers	13
▶ R&D productivity by publication	20
Scientific and technical employment	52
High-tech patent grants	31
Robots in Education and R&D	36

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	31	41	39	41	43
Capital	58	60	62	59	61
Technological framework	36	33	31	36	37

Regulatory framework	Rank
Starting a business	39
▶ Enforcing contracts	18
Immigration laws	36
▷ Development & application of tech.	57
Scientific research legislation	53
Intellectual property rights	50

Capital	Rank
IT & media stock market capitalization	48
Funding for technological development	53
Banking and financial services	55
Country credit rating	52
Venture capital	54
Investment in Telecommunications	51

Technological framework	Rank
Communications technology	23
Mobile Broadband subscribers	51
Wireless broadband	40
Internet users	43
▶ Internet bandwidth speed	10
High-tech exports (%)	39

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	59	60	46	48	45
Business agility	56	60	60	46	53
IT integration	42	58	58	55	54

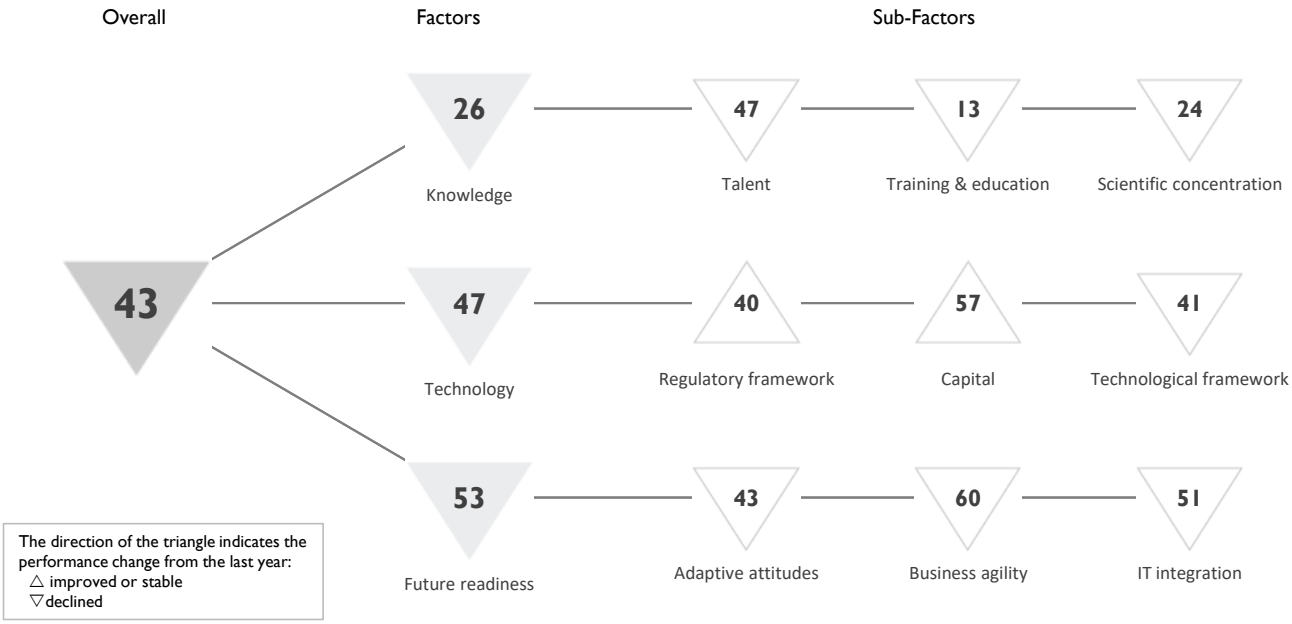
Adaptive attitudes	Rank
E-Participation	39
Internet retailing	40
Tablet possession	38
Smartphone possession	38
▷ Attitudes toward globalization	57

Business agility	Rank
Opportunities and threats	55
World robots distribution	35
Agility of companies	49
Use of big data and analytics	43
▷ Knowledge transfer	57
Entrepreneurial fear of failure	25

IT integration	Rank
E-Government	48
▷ Public-private partnerships	60
Cyber security	36
Software piracy	51

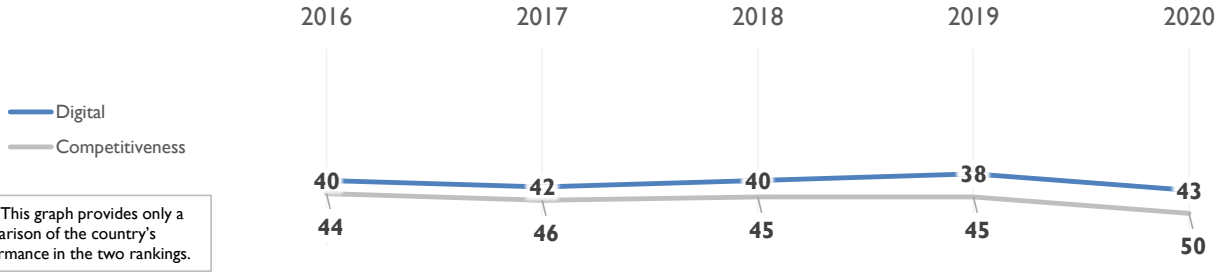
RUSSIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	40	42	40	38	43
Knowledge	28	24	24	22	26
Technology	47	44	43	43	47
Future readiness	53	52	51	42	53

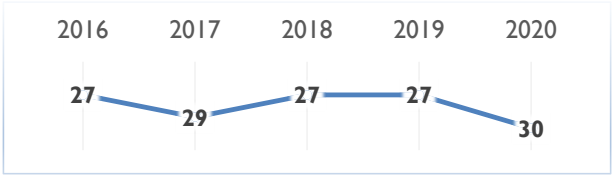
COMPETITIVENESS & DIGITAL RANKINGS



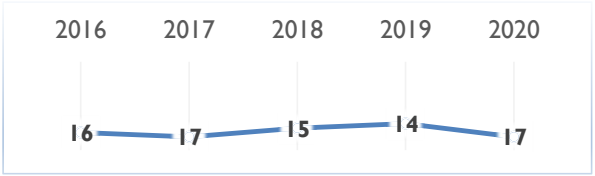
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)



RUSSIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	37	35	40	45	47
Training & education	17	14	12	9	13
Scientific concentration	26	25	23	18	24

Talent	Rank
Educational assessment PISA - Math	29
▷ International experience	61
Foreign highly-skilled personnel	55
Management of cities	53
Digital/Technological skills	46
Net flow of international students	22

Training & education	Rank
Employee training	55
Total public expenditure on education	50
▶ Higher education achievement	5
Pupil-teacher ratio (tertiary education)	10
▶ Graduates in Sciences	7
▶ Women with degrees	3

Scientific concentration	Rank
Total expenditure on R&D (%)	38
Total R&D personnel per capita	24
Female researchers	23
▶ R&D productivity by publication	4
Scientific and technical employment	43
High-tech patent grants	33
▶ Robots in Education and R&D	8

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	36	36	38	40	40
Capital	57	57	58	57	57
Technological framework	35	37	38	39	41

Regulatory framework	Rank
Starting a business	24
Enforcing contracts	19
Immigration laws	38
Development & application of tech.	49
Scientific research legislation	49
Intellectual property rights	58

Capital	Rank
IT & media stock market capitalization	45
Funding for technological development	49
▷ Banking and financial services	59
Country credit rating	49
▷ Venture capital	59
Investment in Telecommunications	25

Technological framework	Rank
Communications technology	34
Mobile Broadband subscribers	28
Wireless broadband	39
Internet users	45
Internet bandwidth speed	42
High-tech exports (%)	35

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	40	44	39	40	43
Business agility	61	59	62	54	60
IT integration	39	43	43	43	51

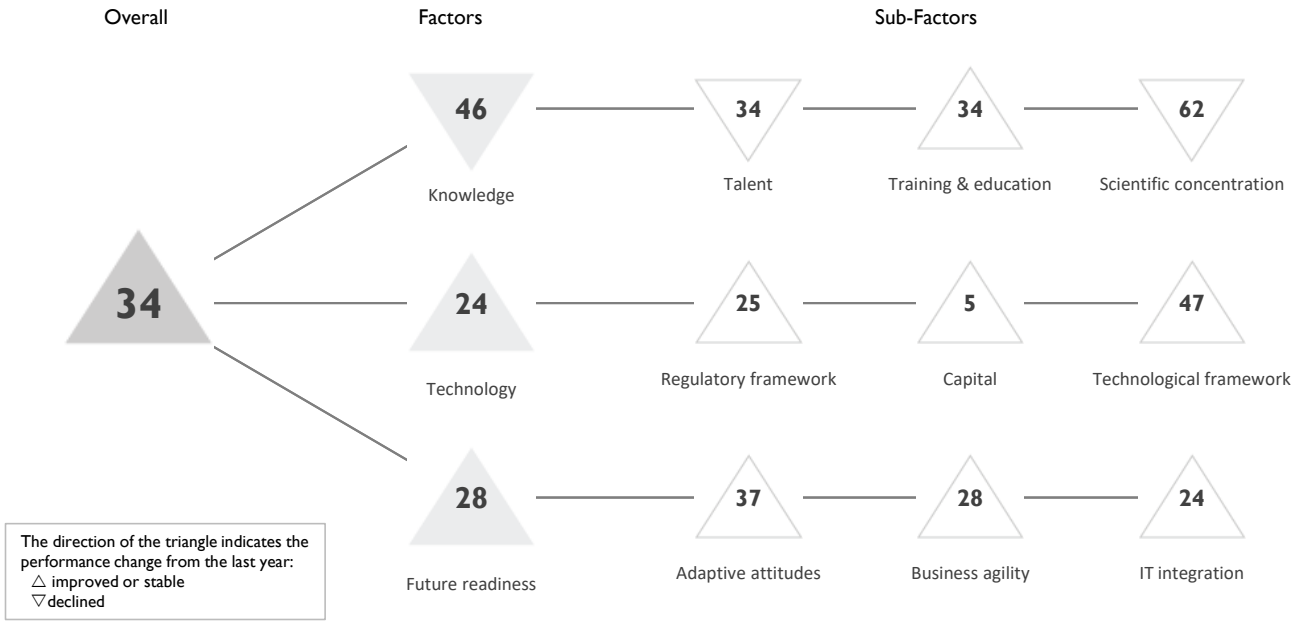
Adaptive attitudes	Rank
E-Participation	26
Internet retailing	37
Tablet possession	40
Smartphone possession	29
▷ Attitudes toward globalization	59

Business agility	Rank
Opportunities and threats	58
World robots distribution	32
▷ Agility of companies	61
Use of big data and analytics	33
Knowledge transfer	58
Entrepreneurial fear of failure	37

IT integration	Rank
E-Government	33
Public-private partnerships	58
Cyber security	48
Software piracy	53

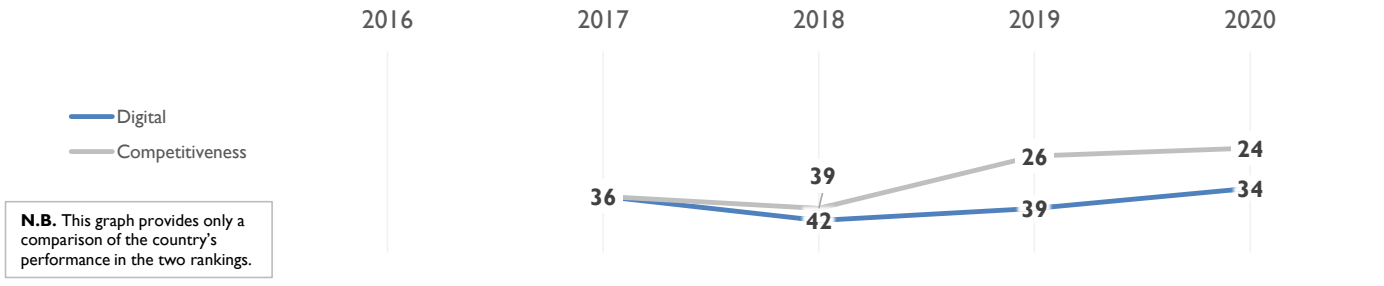
SAUDI ARABIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL		36	42	39	34
Knowledge		39	40	39	46
Technology		41	50	40	24
Future readiness		32	38	38	28

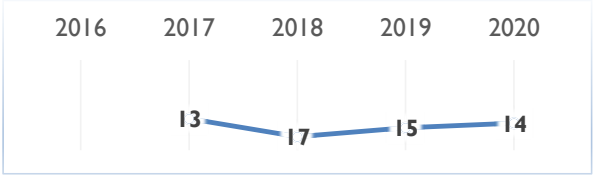
COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS > 20 MILLION (29 countries)



SAUDI ARABIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent		22	38	20	34
Training & education		16	39	38	34
Scientific concentration		61	49	59	62

	Talent	Rank
▷	Educational assessment PISA - Math	58
	International experience	11
	Foreign highly-skilled personnel	13
	Management of cities	23
	Digital/Technological skills	15
	Net flow of international students	40

	Training & education	Rank
	Employee training	34
▶	Total public expenditure on education	4
	Higher education achievement	36
	Pupil-teacher ratio (tertiary education)	44
	Graduates in Sciences	43
	Women with degrees	37

	Scientific concentration	Rank
	Total expenditure on R&D (%)	-
	Total R&D personnel per capita	-
▷	Female researchers	52
	R&D productivity by publication	35
	Scientific and technical employment	-
▷	High-tech patent grants	52
▷	Robots in Education and R&D	54

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework		48	50	39	25
Capital		36	31	13	5
Technological framework		41	56	54	47

	Regulatory framework	Rank
	Starting a business	22
	Enforcing contracts	37
	Immigration laws	28
▶	Development & application of tech.	9
	Scientific research legislation	24
	Intellectual property rights	24

	Capital	Rank
	IT & media stock market capitalization	-
▶	Funding for technological development	7
	Banking and financial services	10
	Country credit rating	27
	Venture capital	12
	Investment in Telecommunications	13

	Technological framework	Rank
	Communications technology	29
	Mobile Broadband subscribers	37
	Wireless broadband	18
	Internet users	47
	Internet bandwidth speed	48
▷	High-tech exports (%)	61

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes		29	43	50	37
Business agility		38	48	36	28
IT integration		31	33	30	24

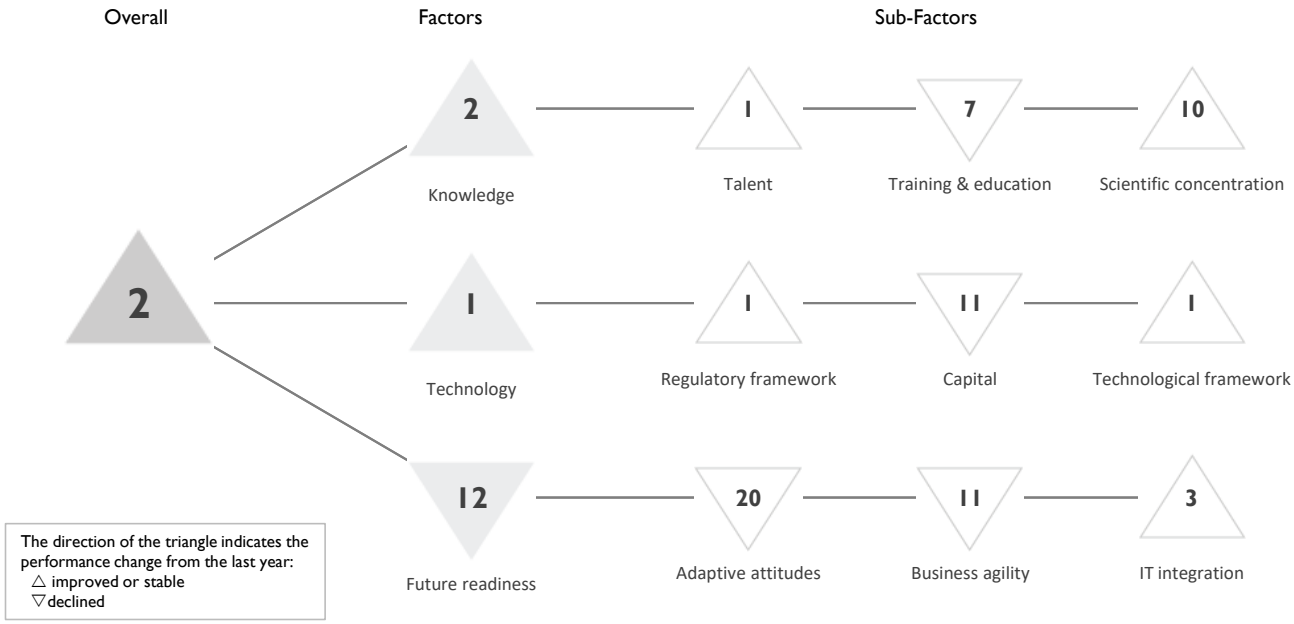
	Adaptive attitudes	Rank
	E-Participation	51
	Internet retailing	42
	Tablet possession	33
	Smartphone possession	37
	Attitudes toward globalization	18

	Business agility	Rank
	Opportunities and threats	27
	World robots distribution	52
	Agility of companies	27
	Use of big data and analytics	24
	Knowledge transfer	21
	Entrepreneurial fear of failure	28

	IT integration	Rank
	E-Government	38
▶	Public-private partnerships	4
▶	Cyber security	2
	Software piracy	38

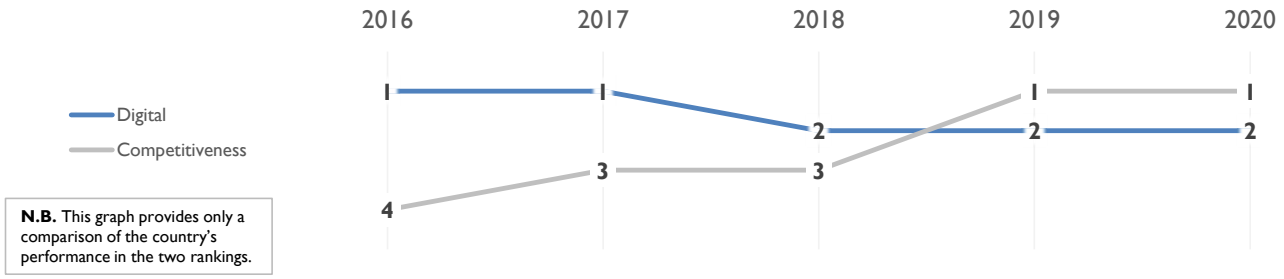
SINGAPORE

OVERALL PERFORMANCE (63 countries)



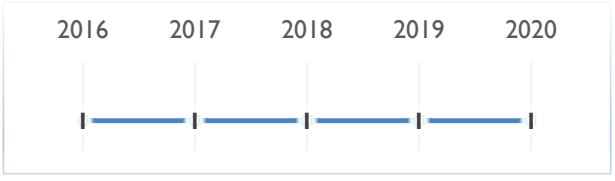
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	1	1	2	2	2
Knowledge	1	1	1	3	2
Technology	1	1	1	1	1
Future readiness	4	6	15	11	12

COMPETITIVENESS & DIGITAL RANKINGS

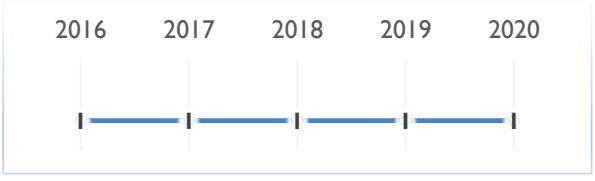


PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS < 20 MILLION (34 countries)



SINGAPORE

▶ **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

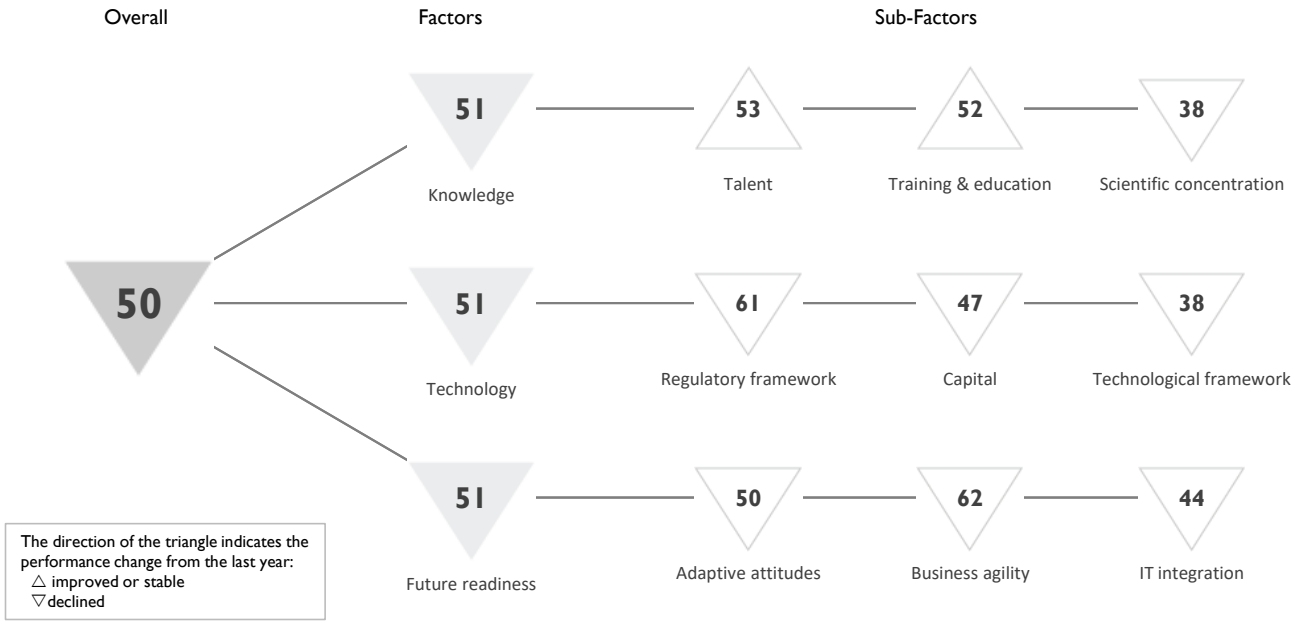
Adaptive attitudes	Rank
E-Participation	6
Internet retailing	25
Tablet possession	23
Smartphone possession	31
Attitudes toward globalization	4

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

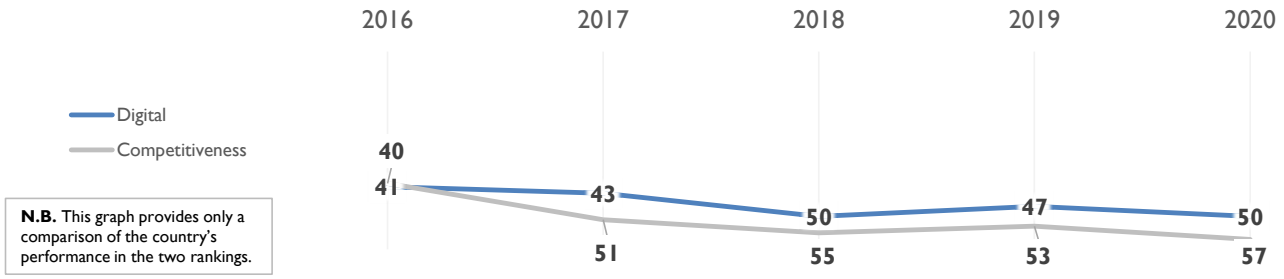
SLOVAK REPUBLIC

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	41	43	50	47	50
Knowledge	41	43	49	48	51
Technology	41	43	47	44	51
Future readiness	43	46	53	47	51

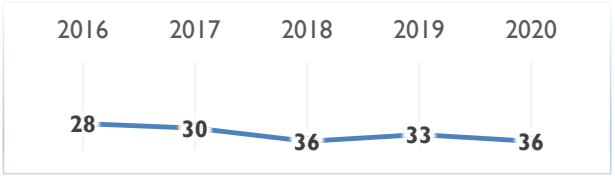
COMPETITIVENESS & DIGITAL RANKINGS



N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)

SLOVAK REPUBLIC

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	48	50	56	54	53
Training & education	35	40	47	52	52
Scientific concentration	44	39	42	36	38

Talent	Rank
Educational assessment PISA - Math	31
International experience	58
▷ Foreign highly-skilled personnel	61
Management of cities	52
Digital/Technological skills	35
Net flow of international students	58

Training & education	Rank
▷ Employee training	62
Total public expenditure on education	43
Higher education achievement	38
▶ Pupil-teacher ratio (tertiary education)	26
Graduates in Sciences	42
Women with degrees	42

Scientific concentration	Rank
Total expenditure on R&D (%)	43
Total R&D personnel per capita	35
▶ Female researchers	21
R&D productivity by publication	39
Scientific and technical employment	41
High-tech patent grants	30
Robots in Education and R&D	33

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	52	55	60	58	61
Capital	34	39	46	43	47
Technological framework	33	38	34	37	38

Regulatory framework	Rank
Starting a business	49
Enforcing contracts	35
▷ Immigration laws	62
▷ Development & application of tech.	61
Scientific research legislation	59
Intellectual property rights	59

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	59
Banking and financial services	51
Country credit rating	30
Venture capital	55
▶ Investment in Telecommunications	18

Technological framework	Rank
Communications technology	38
Mobile Broadband subscribers	46
Wireless broadband	37
▶ Internet users	26
Internet bandwidth speed	30
High-tech exports (%)	37

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	39	52	51	42	50
Business agility	53	52	58	61	62
IT integration	34	37	45	40	44

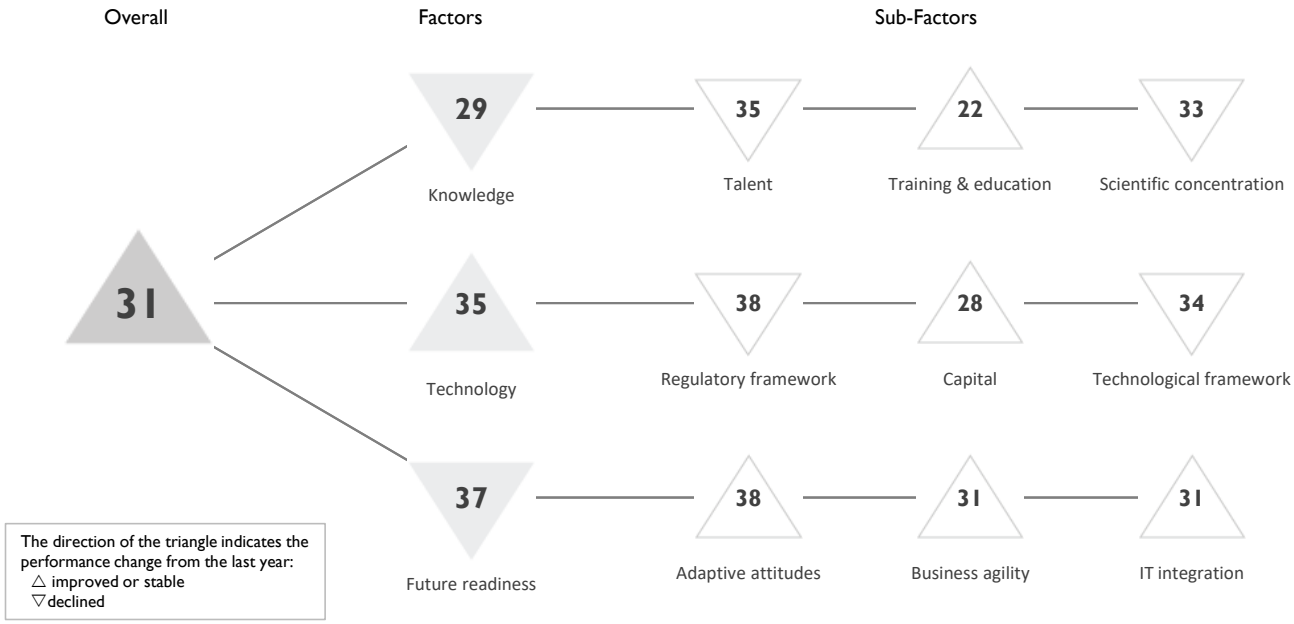
Adaptive attitudes	Rank
E-Participation	53
Internet retailing	30
Tablet possession	37
Smartphone possession	34
Attitudes toward globalization	58

Business agility	Rank
Opportunities and threats	59
World robots distribution	28
Agility of companies	56
Use of big data and analytics	52
▷ Knowledge transfer	60
Entrepreneurial fear of failure	33

IT integration	Rank
E-Government	42
Public-private partnerships	54
Cyber security	60
▶ Software piracy	26

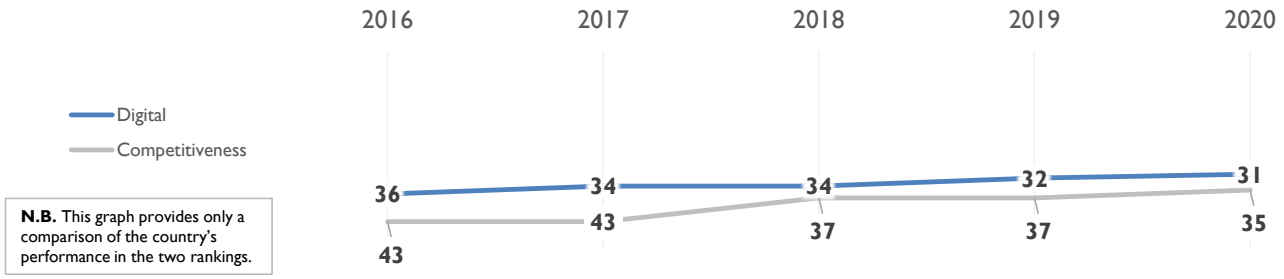
SLOVENIA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	36	34	34	32	31
Knowledge	26	26	26	27	29
Technology	40	40	38	35	35
Future readiness	35	36	35	36	37

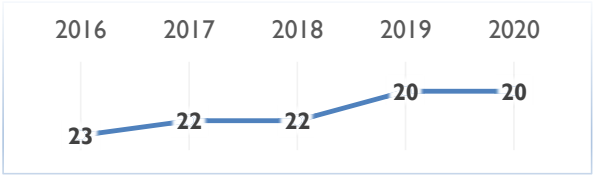
COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)



SLOVENIA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	39	37	35	33	35
Training & education	16	17	23	22	22
Scientific concentration	20	24	25	25	33

	Talent	Rank
▶	Educational assessment PISA - Math	13
	International experience	42
▷	Foreign highly-skilled personnel	53
	Management of cities	38
	Digital/Technological skills	24
	Net flow of international students	36

	Training & education	Rank
	Employee training	18
	Total public expenditure on education	26
	Higher education achievement	34
▶	Pupil-teacher ratio (tertiary education)	15
	Graduates in Sciences	21
	Women with degrees	32

	Scientific concentration	Rank
	Total expenditure on R&D (%)	18
▶	Total R&D personnel per capita	15
	Female researchers	43
▷	R&D productivity by publication	59
	Scientific and technical employment	27
	High-tech patent grants	23
	Robots in Education and R&D	31

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	44	44	42	37	38
Capital	41	40	29	31	28
Technological framework	41	44	45	33	34

	Regulatory framework	Rank
	Starting a business	25
▷	Enforcing contracts	54
	Immigration laws	34
	Development & application of tech.	37
	Scientific research legislation	36
	Intellectual property rights	28

	Capital	Rank
	IT & media stock market capitalization	40
	Funding for technological development	31
	Banking and financial services	32
	Country credit rating	32
	Venture capital	43
▶	Investment in Telecommunications	5

	Technological framework	Rank
	Communications technology	27
▶	Mobile Broadband subscribers	9
	Wireless broadband	48
	Internet users	33
	Internet bandwidth speed	28
	High-tech exports (%)	50

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	45	37	44	44	38
Business agility	37	43	30	34	31
IT integration	31	30	29	31	31

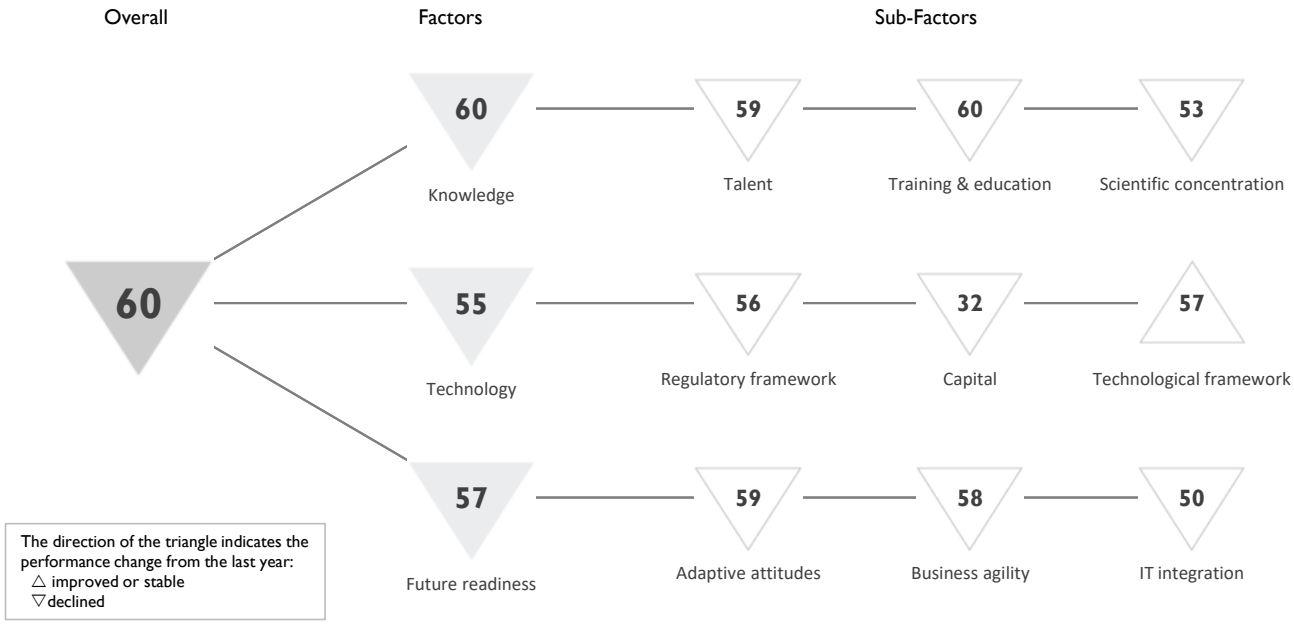
	Adaptive attitudes	Rank
	E-Participation	28
	Internet retailing	39
	Tablet possession	30
▷	Smartphone possession	52
	Attitudes toward globalization	47

	Business agility	Rank
	Opportunities and threats	33
	World robots distribution	36
	Agility of companies	22
	Use of big data and analytics	28
	Knowledge transfer	37
	Entrepreneurial fear of failure	29

	IT integration	Rank
	E-Government	22
▷	Public-private partnerships	52
	Cyber security	22
	Software piracy	30

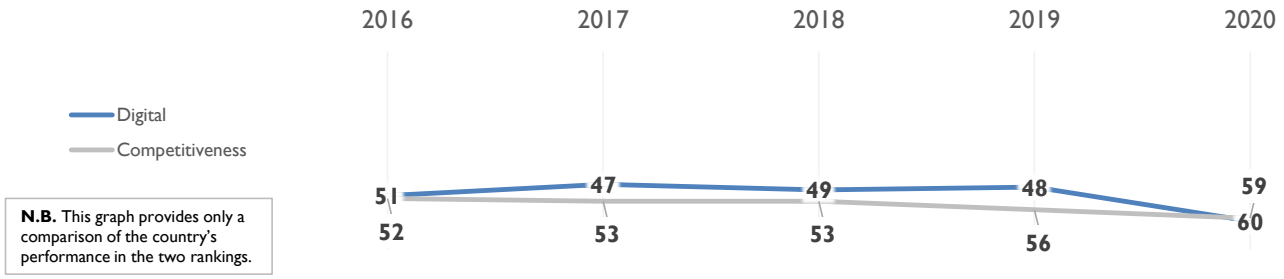
SOUTH AFRICA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	51	47	49	48	60
Knowledge	49	49	52	54	60
Technology	51	53	52	51	55
Future readiness	47	42	43	44	57

COMPETITIVENESS & DIGITAL RANKINGS

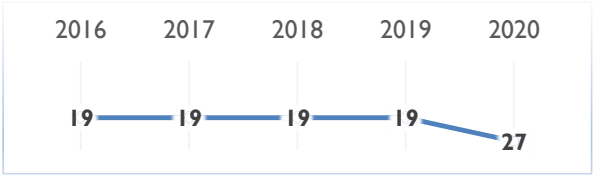


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS > 20 MILLION (29 countries)



SOUTH AFRICA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	53	52	54	49	59
Training & education	38	37	54	58	60
Scientific concentration	50	49	47	48	53

Talent	Rank
Educational assessment PISA - Math	-
International experience	55
Foreign highly-skilled personnel	44
Management of cities	58
▷ Digital/Technological skills	61
Net flow of international students	30

Training & education	Rank
Employee training	57
▶ Total public expenditure on education	1
▷ Higher education achievement	60
Pupil-teacher ratio (tertiary education)	45
Graduates in Sciences	52
Women with degrees	54

Scientific concentration	Rank
Total expenditure on R&D (%)	44
Total R&D personnel per capita	53
▶ Female researchers	16
R&D productivity by publication	27
Scientific and technical employment	-
High-tech patent grants	54
Robots in Education and R&D	38

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	54	54	53	53	56
Capital	33	35	27	30	32
Technological framework	56	57	58	59	57

Regulatory framework	Rank
Starting a business	59
Enforcing contracts	51
Immigration laws	58
Development & application of tech.	53
Scientific research legislation	43
Intellectual property rights	41

Capital	Rank
▶ IT & media stock market capitalization	7
Funding for technological development	56
Banking and financial services	50
Country credit rating	54
Venture capital	58
▶ Investment in Telecommunications	2

Technological framework	Rank
▷ Communications technology	61
Mobile Broadband subscribers	48
Wireless broadband	50
▷ Internet users	59
Internet bandwidth speed	56
High-tech exports (%)	54

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	55	54	56	55	59
Business agility	38	37	38	40	58
IT integration	47	42	39	42	50

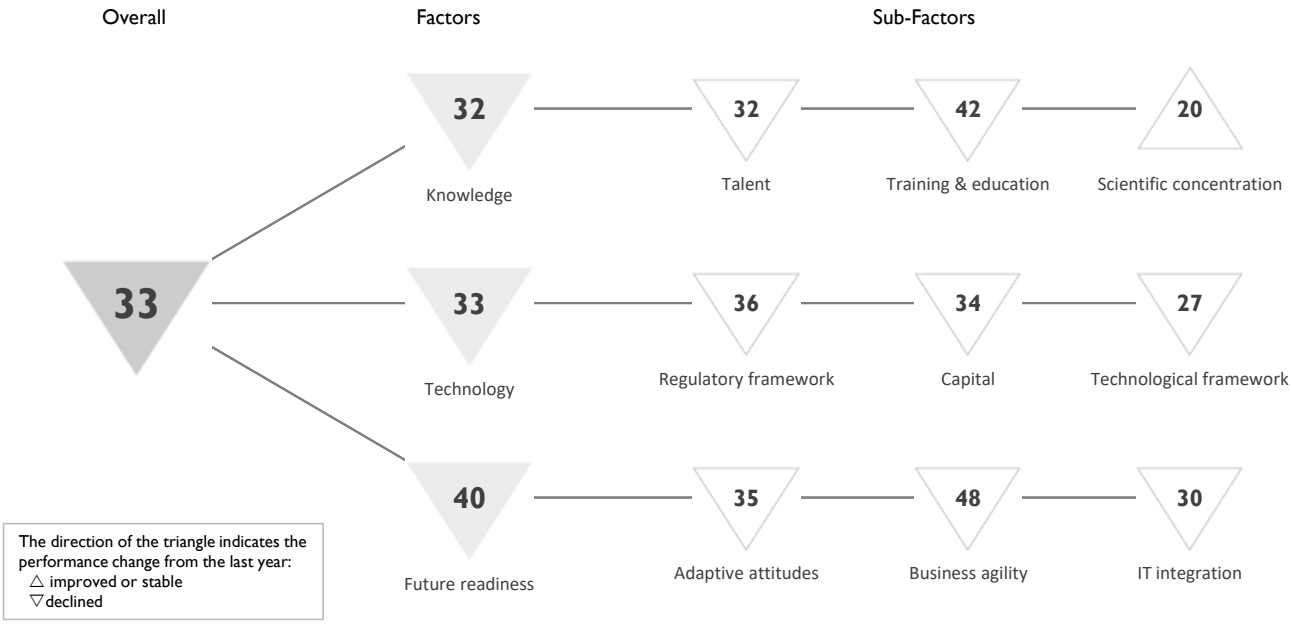
Adaptive attitudes	Rank
E-Participation	45
▷ Internet retailing	59
Tablet possession	57
Smartphone possession	45
Attitudes toward globalization	52

Business agility	Rank
Opportunities and threats	56
World robots distribution	34
Agility of companies	58
Use of big data and analytics	44
Knowledge transfer	52
Entrepreneurial fear of failure	47

IT integration	Rank
E-Government	56
Public-private partnerships	57
Cyber security	54
▶ Software piracy	20

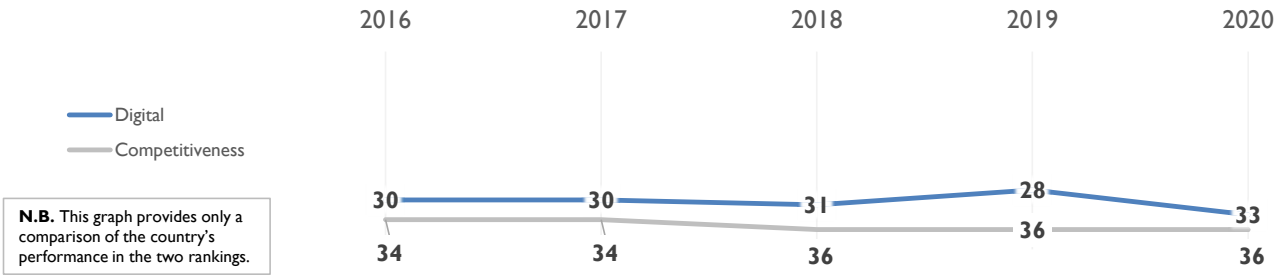
SPAIN

OVERALL PERFORMANCE (63 countries)



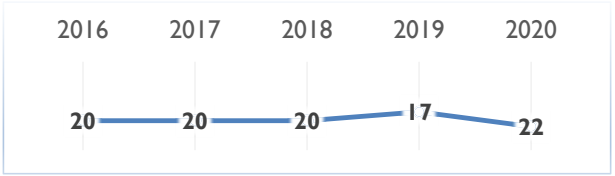
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	30	30	31	28	33
Knowledge	36	33	31	28	32
Technology	32	33	33	29	33
Future readiness	30	29	30	27	40

COMPETITIVENESS & DIGITAL RANKINGS

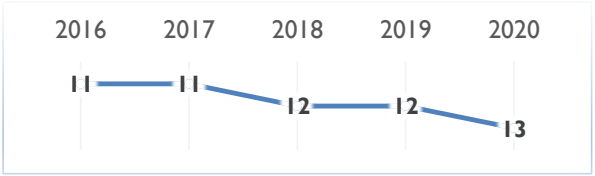


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)



SPAIN

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	34	32	32	29	32
Training & education	43	42	40	40	42
Scientific concentration	28	29	27	20	20

Talent	Rank
Educational assessment PISA - Math	33
International experience	46
Foreign highly-skilled personnel	23
Management of cities	25
Digital/Technological skills	36
Net flow of international students	31

Training & education	Rank
▷ Employee training	54
Total public expenditure on education	40
Higher education achievement	28
Pupil-teacher ratio (tertiary education)	20
Graduates in Sciences	34
Women with degrees	27

Scientific concentration	Rank
Total expenditure on R&D (%)	32
Total R&D personnel per capita	27
Female researchers	22
▶ R&D productivity by publication	8
Scientific and technical employment	26
High-tech patent grants	43
▶ Robots in Education and R&D	7

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	34	35	36	34	36
Capital	38	34	37	33	34
Technological framework	27	23	29	23	27

Regulatory framework	Rank
Starting a business	41
Enforcing contracts	23
Immigration laws	17
Development & application of tech.	43
▷ Scientific research legislation	50
Intellectual property rights	32

Capital	Rank
▶ IT & media stock market capitalization	14
Funding for technological development	44
Banking and financial services	37
Country credit rating	36
Venture capital	32
Investment in Telecommunications	32

Technological framework	Rank
Communications technology	18
Mobile Broadband subscribers	38
Wireless broadband	30
Internet users	25
▶ Internet bandwidth speed	14
High-tech exports (%)	48

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	26	24	26	25	35
Business agility	30	47	44	38	48
IT integration	26	26	27	25	30

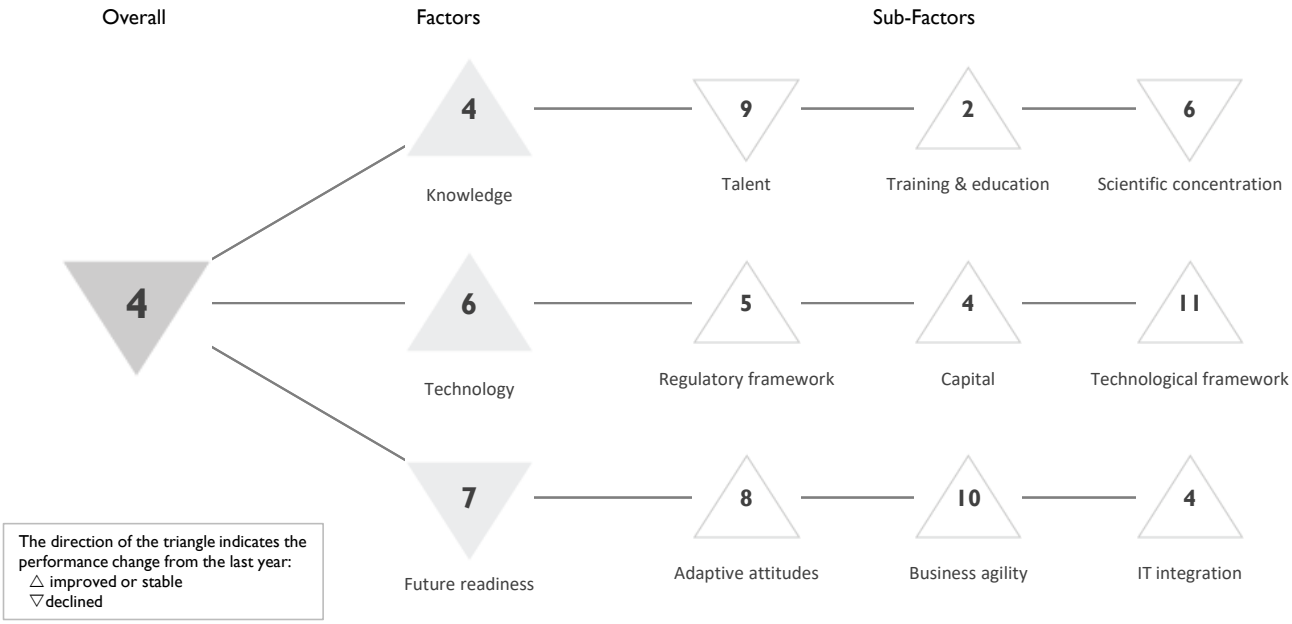
Adaptive attitudes	Rank
E-Participation	34
Internet retailing	31
Tablet possession	26
▷ Smartphone possession	57
Attitudes toward globalization	37

Business agility	Rank
Opportunities and threats	43
▶ World robots distribution	9
Agility of companies	38
▷ Use of big data and analytics	61
▷ Knowledge transfer	50
Entrepreneurial fear of failure	45

IT integration	Rank
E-Government	17
Public-private partnerships	26
Cyber security	44
Software piracy	32

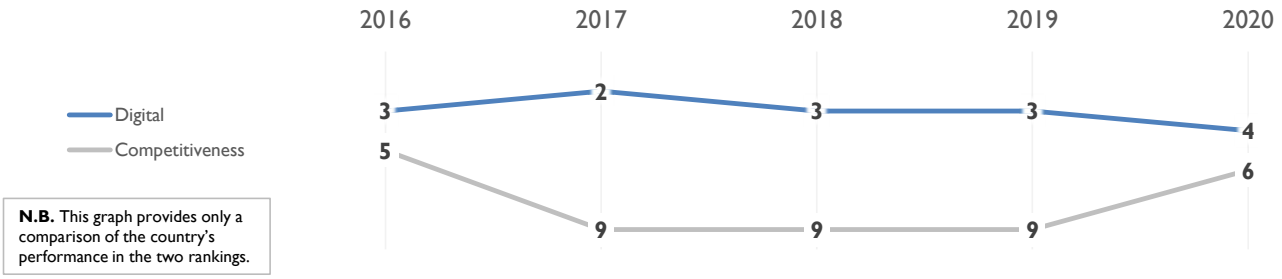
SWEDEN

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	3	2	3	3	4
Knowledge	2	2	7	4	4
Technology	4	5	5	7	6
Future readiness	8	5	5	6	7

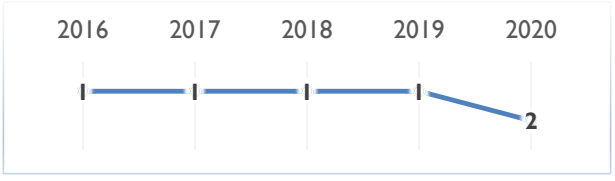
COMPETITIVENESS & DIGITAL RANKINGS



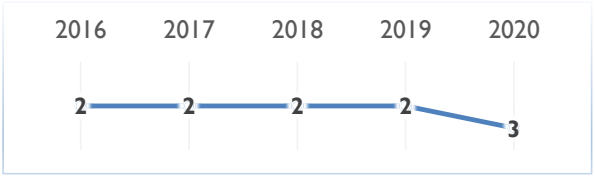
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



SWEDEN

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	14	11	10	8	9
Training & education	1	1	5	2	2
Scientific concentration	5	5	3	3	6

Talent	Rank
Educational assessment PISA - Math	16
International experience	8
Foreign highly-skilled personnel	21
Management of cities	8
▶ Digital/Technological skills	2
Net flow of international students	23

Training & education	Rank
Employee training	11
Total public expenditure on education	5
Higher education achievement	22
Pupil-teacher ratio (tertiary education)	22
Graduates in Sciences	18
Women with degrees	14

Scientific concentration	Rank
Total expenditure on R&D (%)	5
Total R&D personnel per capita	10
▷ Female researchers	42
▷ R&D productivity by publication	40
Scientific and technical employment	5
High-tech patent grants	7
Robots in Education and R&D	23

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	3	4	12	5	5
Capital	11	13	10	4	4
Technological framework	5	7	7	12	11

Regulatory framework	Rank
Starting a business	23
Enforcing contracts	31
Immigration laws	24
▶ Development & application of tech.	1
Scientific research legislation	5
Intellectual property rights	4

Capital	Rank
IT & media stock market capitalization	19
Funding for technological development	5
Banking and financial services	8
▶ Country credit rating	1
Venture capital	4
Investment in Telecommunications	27

Technological framework	Rank
Communications technology	3
Mobile Broadband subscribers	27
Wireless broadband	16
Internet users	7
Internet bandwidth speed	4
▷ High-tech exports (%)	28

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	10	7	9	8	8
Business agility	10	13	10	13	10
IT integration	11	4	11	12	4

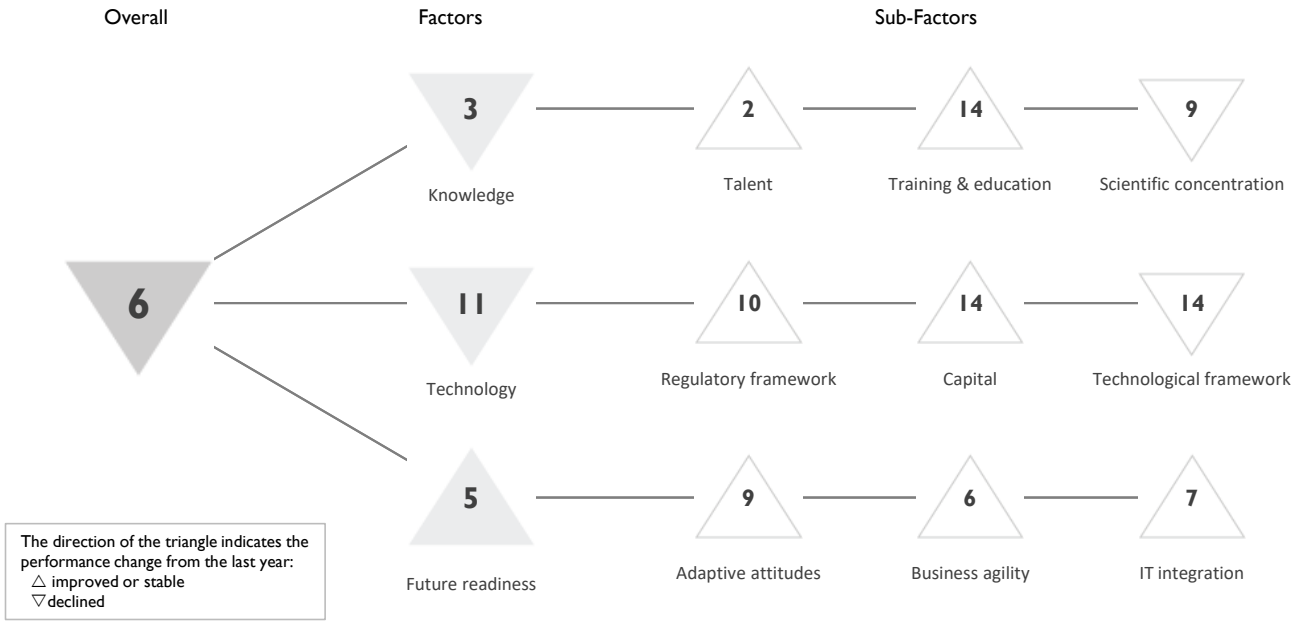
Adaptive attitudes	Rank
▷ E-Participation	35
Internet retailing	14
▶ Tablet possession	2
Smartphone possession	4
▶ Attitudes toward globalization	2

Business agility	Rank
Opportunities and threats	10
World robots distribution	18
Agility of companies	7
Use of big data and analytics	7
Knowledge transfer	5
▷ Entrepreneurial fear of failure	30

IT integration	Rank
E-Government	6
Public-private partnerships	12
Cyber security	19
Software piracy	6

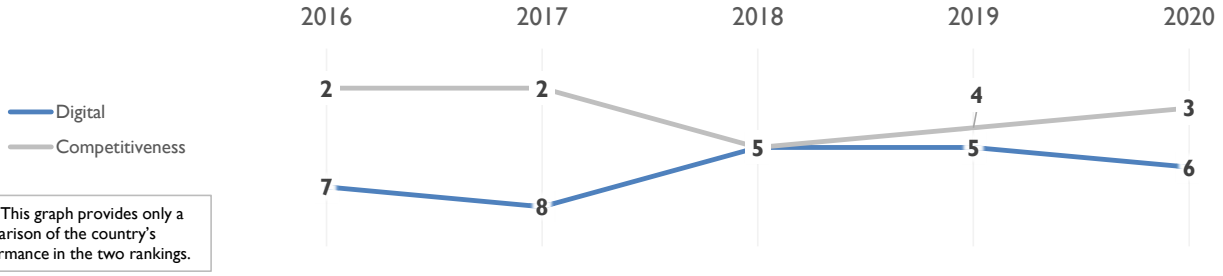
SWITZERLAND

OVERALL PERFORMANCE (63 countries)



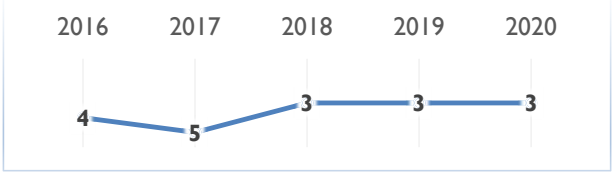
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	7	8	5	5	6
Knowledge	3	4	6	2	3
Technology	9	8	9	10	11
Future readiness	10	13	10	10	5

COMPETITIVENESS & DIGITAL RANKINGS

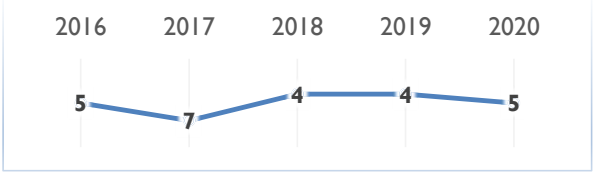


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS < 20 MILLION (34 countries)



SWITZERLAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	2	2	2	2	2
Training & education	18	25	15	15	14
Scientific concentration	13	13	6	7	9

Talent	Rank
Educational assessment PISA - Math	10
▶ International experience	1
▶ Foreign highly-skilled personnel	1
Management of cities	6
Digital/Technological skills	16
Net flow of international students	8

Training & education	Rank
Employee training	6
Total public expenditure on education	24
Higher education achievement	15
Pupil-teacher ratio (tertiary education)	6
Graduates in Sciences	30
Women with degrees	28

Scientific concentration	Rank
Total expenditure on R&D (%)	3
Total R&D personnel per capita	4
▷ Female researchers	34
▷ R&D productivity by publication	38
Scientific and technical employment	4
High-tech patent grants	32
Robots in Education and R&D	15

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	10	13	15	14	10
Capital	12	11	15	16	14
Technological framework	9	10	8	9	14

Regulatory framework	Rank
▷ Starting a business	37
▷ Enforcing contracts	41
Immigration laws	18
Development & application of tech.	6
▶ Scientific research legislation	1
Intellectual property rights	2

Capital	Rank
▷ IT & media stock market capitalization	43
Funding for technological development	9
Banking and financial services	12
▶ Country credit rating	1
Venture capital	15
Investment in Telecommunications	23

Technological framework	Rank
Communications technology	11
Mobile Broadband subscribers	14
Wireless broadband	34
Internet users	21
Internet bandwidth speed	3
High-tech exports (%)	30

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	21	23	12	11	9
Business agility	3	4	7	14	6
IT integration	14	13	16	7	7

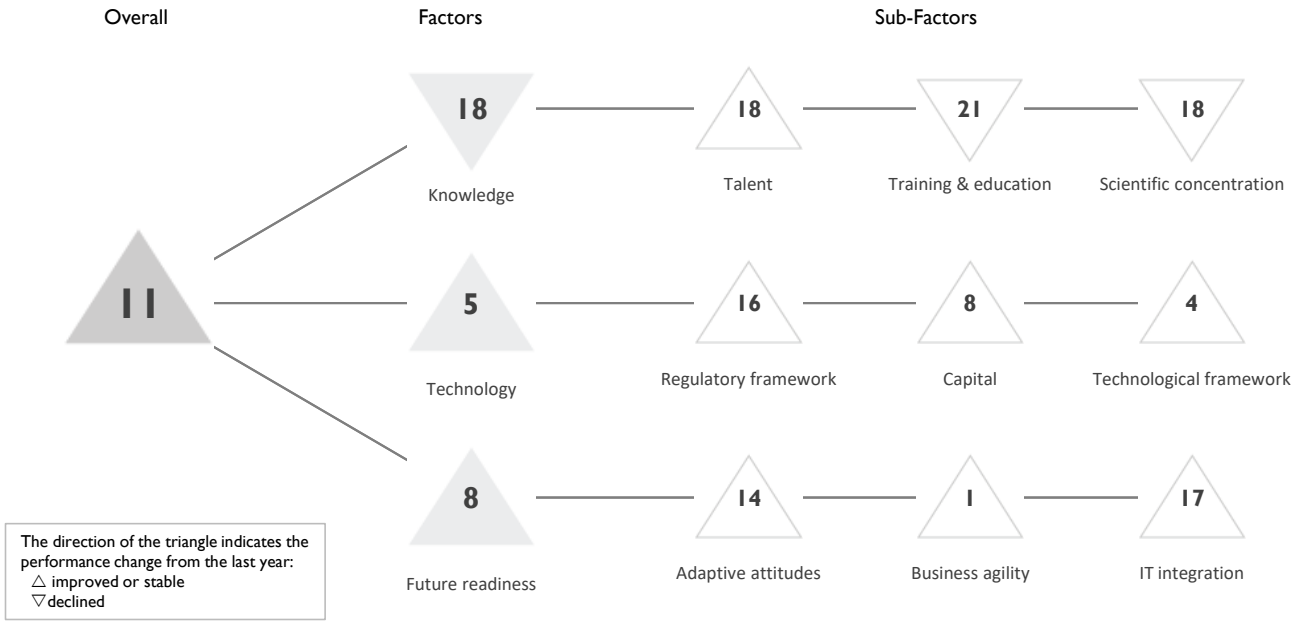
Adaptive attitudes	Rank
E-Participation	18
Internet retailing	9
Tablet possession	9
Smartphone possession	3
Attitudes toward globalization	26

Business agility	Rank
Opportunities and threats	15
World robots distribution	26
Agility of companies	17
Use of big data and analytics	25
▶ Knowledge transfer	1
Entrepreneurial fear of failure	2

IT integration	Rank
E-Government	16
Public-private partnerships	9
Cyber security	10
Software piracy	10

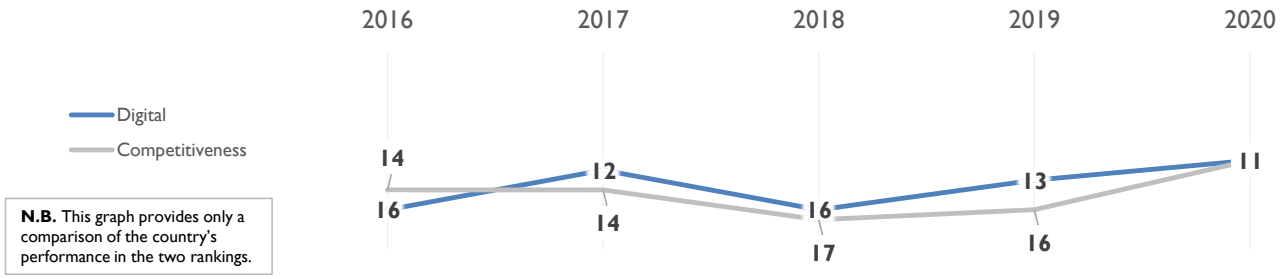
TAIWAN, CHINA

OVERALL PERFORMANCE (63 countries)



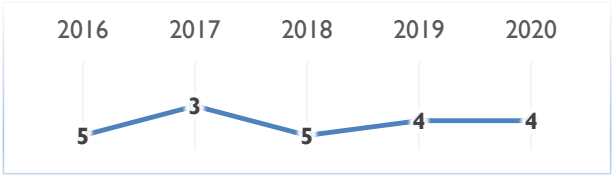
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	16	12	16	13	11
Knowledge	19	16	19	17	18
Technology	8	7	11	9	5
Future readiness	22	16	22	12	8

COMPETITIVENESS & DIGITAL RANKINGS

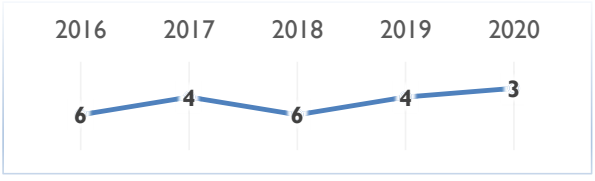


PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



TAIWAN, CHINA

▶ **Overall top strengths**
▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

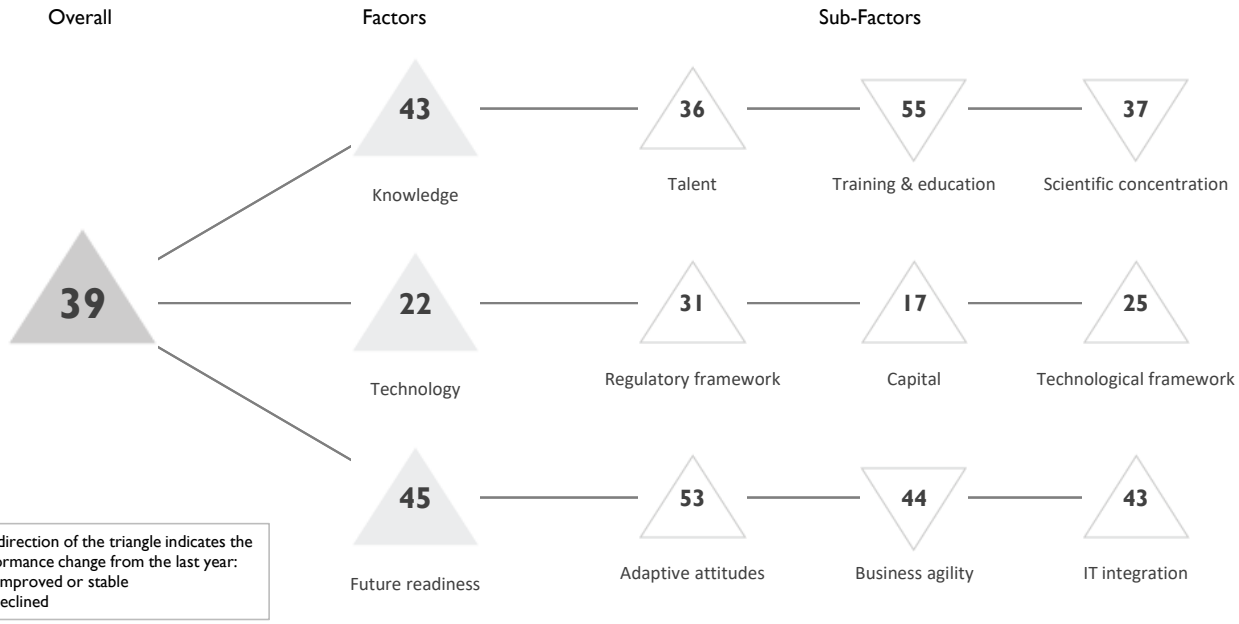
Adaptive attitudes	Rank
E-Participation	-
Internet retailing	21
Tablet possession	25
▶ Smartphone possession	2
Attitudes toward globalization	10

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

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

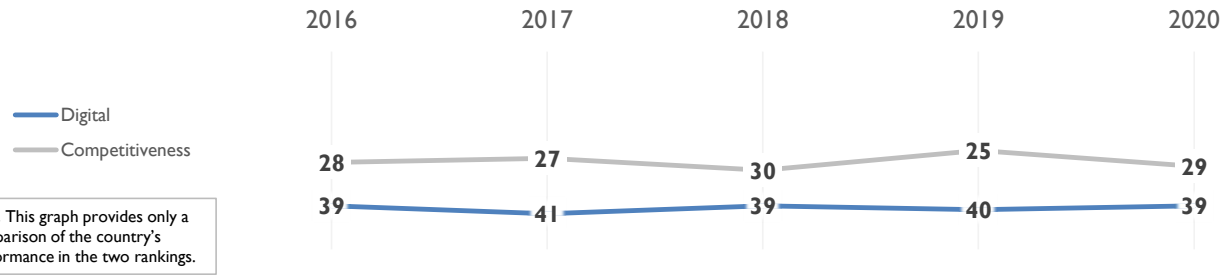
THAILAND

OVERALL PERFORMANCE (63 countries)



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

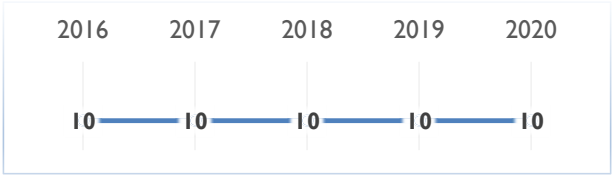
COMPETITIVENESS & DIGITAL RANKINGS



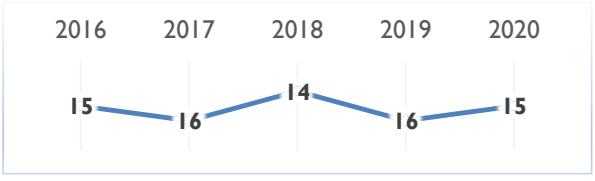
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (29 countries)



THAILAND

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

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

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

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

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

TECHNOLOGY

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

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

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

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

FUTURE READINESS

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

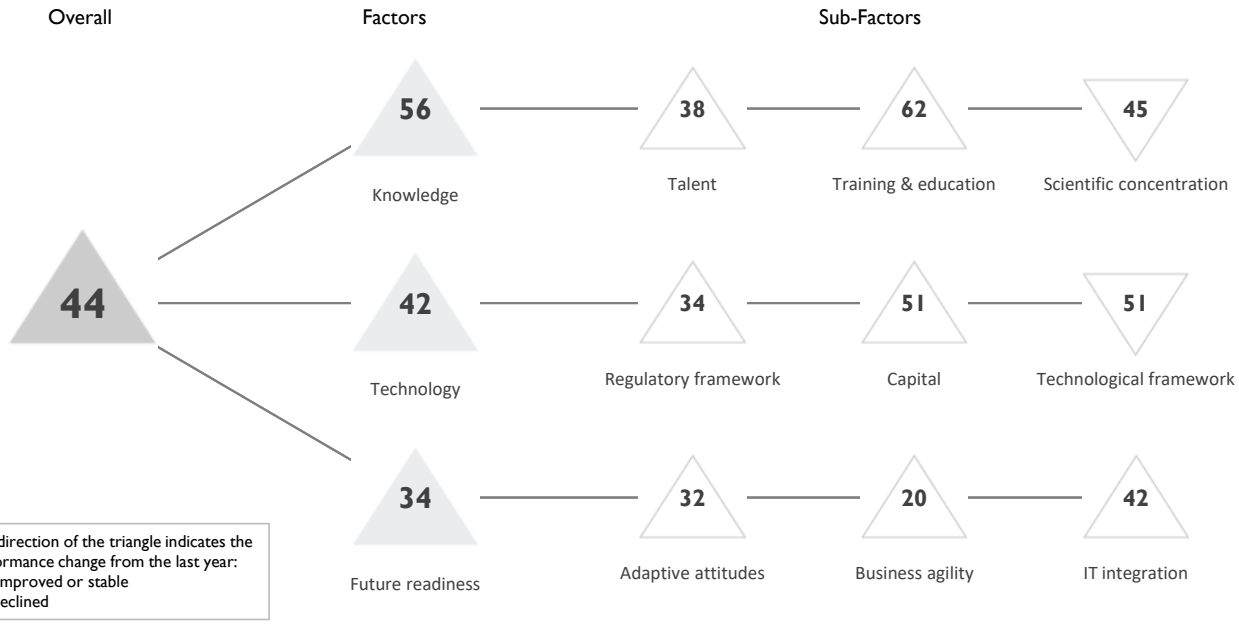
Adaptive attitudes	Rank
E-Participation	42
Internet retailing	49
▷ Tablet possession	58
Smartphone possession	47
Attitudes toward globalization	12

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

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

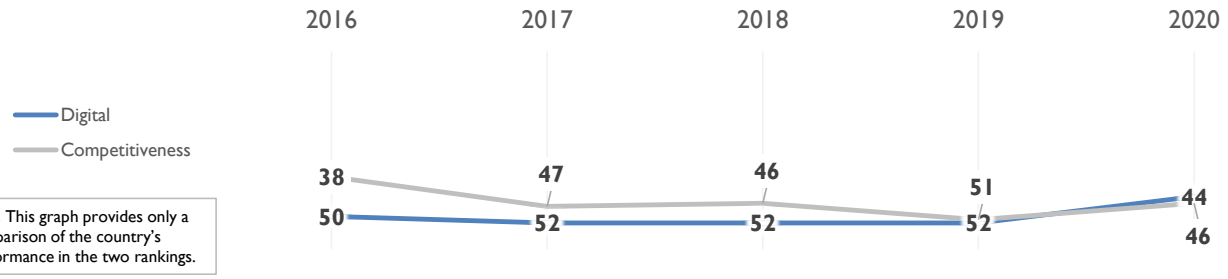
TURKEY

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	50	52	52	52	44
Knowledge	58	60	59	60	56
Technology	48	49	45	48	42
Future readiness	42	40	42	41	34

COMPETITIVENESS & DIGITAL RANKINGS



N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS > 20 MILLION (29 countries)

TURKEY

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	36	49	49	52	38
Training & education	61	63	62	63	62
Scientific concentration	52	48	48	43	45

Talent	Rank
Educational assessment PISA - Math	39
International experience	28
Foreign highly-skilled personnel	48
Management of cities	37
Digital/Technological skills	31
Net flow of international students	29

Training & education	Rank
Employee training	42
Total public expenditure on education	38
Higher education achievement	46
▷ Pupil-teacher ratio (tertiary education)	58
Graduates in Sciences	50
Women with degrees	50

Scientific concentration	Rank
Total expenditure on R&D (%)	40
Total R&D personnel per capita	41
Female researchers	30
▶ R&D productivity by publication	12
Scientific and technical employment	45
▷ High-tech patent grants	57
Robots in Education and R&D	28

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	40	40	37	38	34
Capital	46	47	41	56	51
Technological framework	51	51	51	50	51

Regulatory framework	Rank
Starting a business	36
Enforcing contracts	21
Immigration laws	31
Development & application of tech.	34
Scientific research legislation	35
Intellectual property rights	49

Capital	Rank
IT & media stock market capitalization	28
Funding for technological development	42
Banking and financial services	31
▷ Country credit rating	58
Venture capital	37
Investment in Telecommunications	49

Technological framework	Rank
Communications technology	40
▶ Mobile Broadband subscribers	12
Wireless broadband	55
Internet users	49
▷ Internet bandwidth speed	58
▷ High-tech exports (%)	59

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	35	36	42	38	32
Business agility	41	39	42	44	20
IT integration	52	51	50	48	42

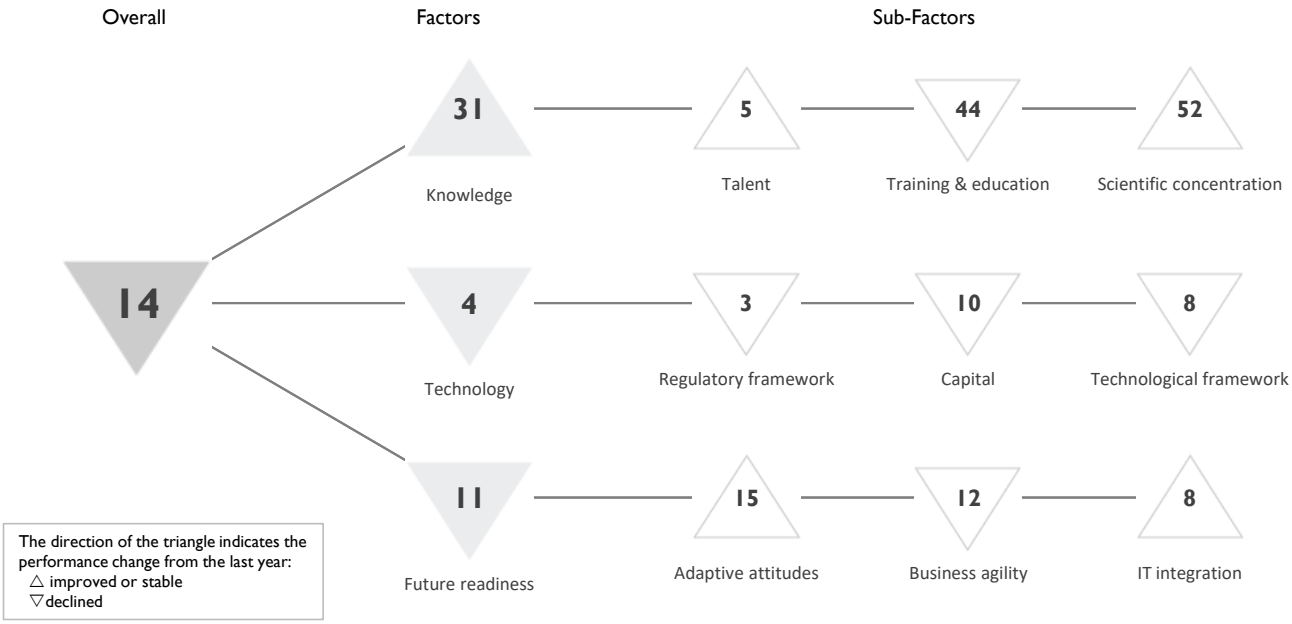
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	41
Tablet possession	43
Smartphone possession	39
Attitudes toward globalization	30

Business agility	Rank
▶ Opportunities and threats	8
World robots distribution	20
▶ Agility of companies	12
Use of big data and analytics	42
Knowledge transfer	36
▶ Entrepreneurial fear of failure	5

IT integration	Rank
E-Government	46
Public-private partnerships	36
Cyber security	35
Software piracy	48

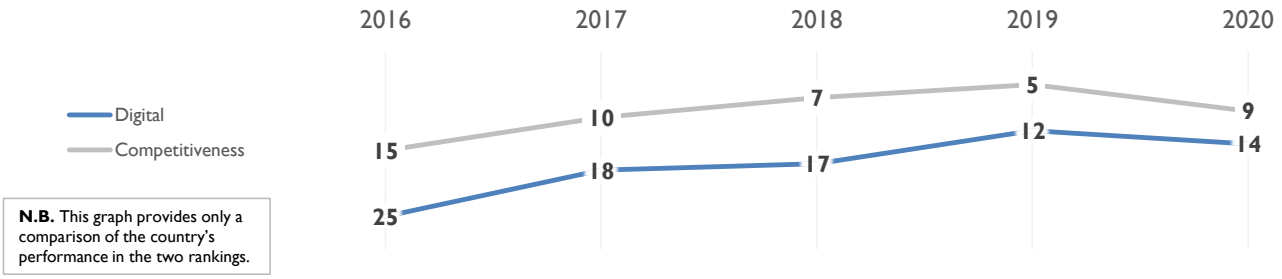
UAE

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	25	18	17	12	14
Knowledge	35	38	36	35	31
Technology	20	14	7	2	4
Future readiness	17	7	12	9	11

COMPETITIVENESS & DIGITAL RANKINGS

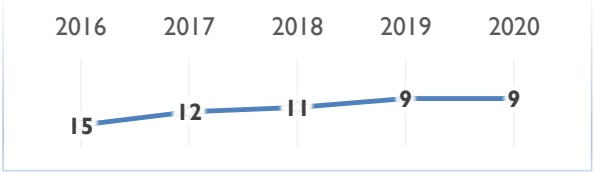


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)

POPULATIONS < 20 MILLION (34 countries)



UAE

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	5	5	4	5	5
Training & education	53	56	53	41	44
Scientific concentration	51	52	56	56	52

Talent	Rank
Educational assessment PISA - Math	45
▶ International experience	2
Foreign highly-skilled personnel	3
Management of cities	3
Digital/Technological skills	17
Net flow of international students	3

Training & education	Rank
Employee training	14
▷ Total public expenditure on education	62
Higher education achievement	47
Pupil-teacher ratio (tertiary education)	42
Graduates in Sciences	17
Women with degrees	19

Scientific concentration	Rank
Total expenditure on R&D (%)	30
Total R&D personnel per capita	32
Female researchers	39
▷ R&D productivity by publication	55
Scientific and technical employment	35
High-tech patent grants	27
Robots in Education and R&D	39

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	16	5	3	1	3
Capital	14	12	11	2	10
Technological framework	31	29	16	5	8

Regulatory framework	Rank
Starting a business	8
Enforcing contracts	9
▶ Immigration laws	1
Development & application of tech.	12
Scientific research legislation	14
Intellectual property rights	23

Capital	Rank
IT & media stock market capitalization	8
Funding for technological development	11
Banking and financial services	6
Country credit rating	16
Venture capital	6
▷ Investment in Telecommunications	50

Technological framework	Rank
Communications technology	32
Mobile Broadband subscribers	34
▶ Wireless broadband	1
Internet users	35
Internet bandwidth speed	31
▷ High-tech exports (%)	58

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	14	17	21	20	15
Business agility	18	1	1	4	12
IT integration	18	8	14	8	8

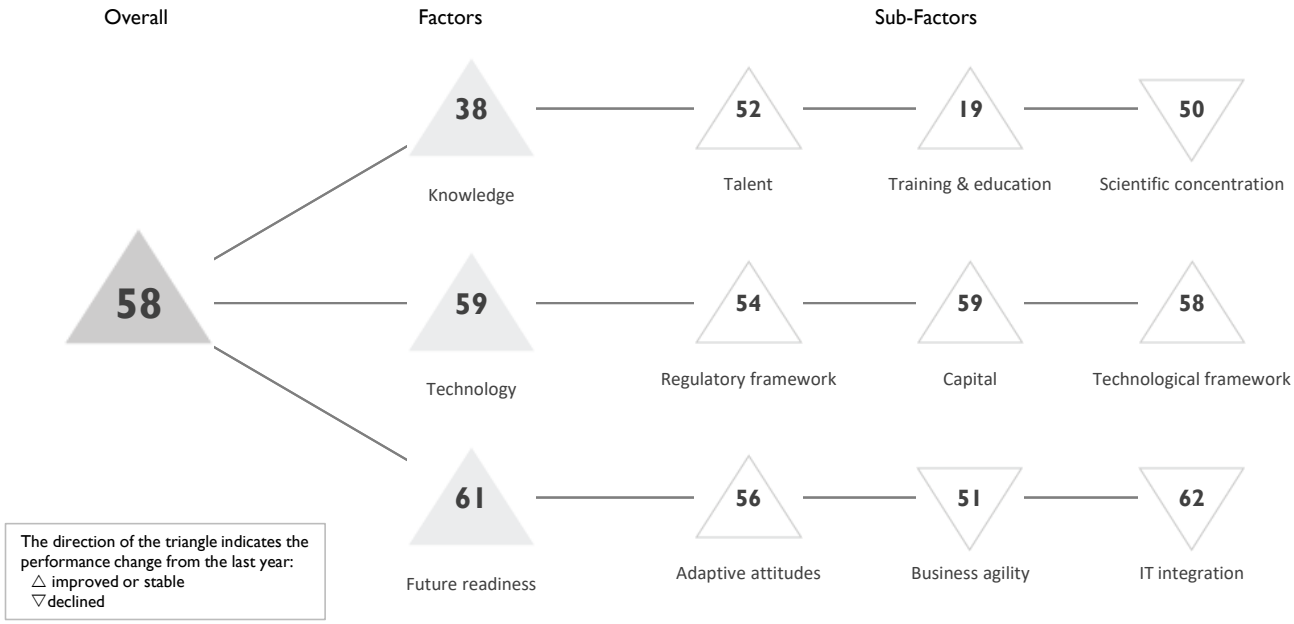
Adaptive attitudes	Rank
E-Participation	16
Internet retailing	32
Tablet possession	14
Smartphone possession	19
Attitudes toward globalization	5

Business agility	Rank
Opportunities and threats	4
▷ World robots distribution	53
Agility of companies	6
▶ Use of big data and analytics	2
Knowledge transfer	16
Entrepreneurial fear of failure	27

IT integration	Rank
E-Government	21
▶ Public-private partnerships	1
Cyber security	4
Software piracy	20

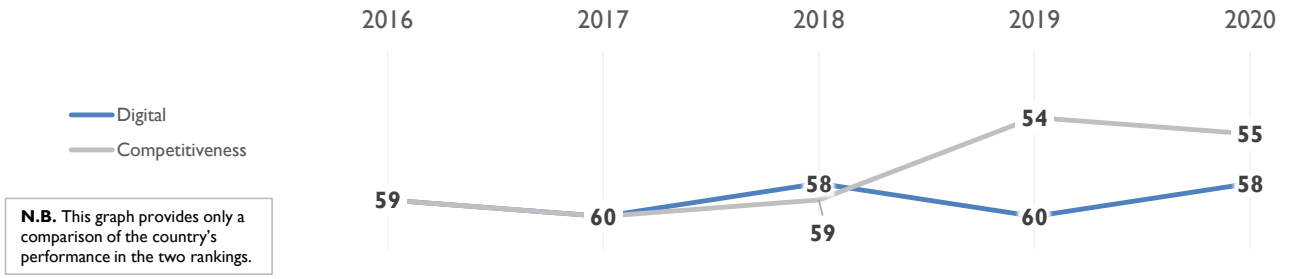
UKRAINE

OVERALL PERFORMANCE (63 countries)



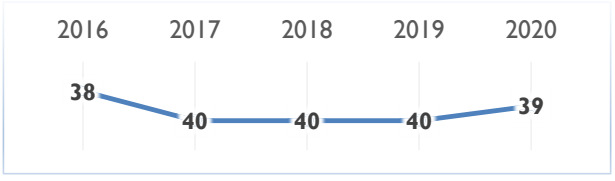
OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	59	60	58	60	58
Knowledge	44	45	39	40	38
Technology	60	62	61	61	59
Future readiness	61	61	61	62	61

COMPETITIVENESS & DIGITAL RANKINGS

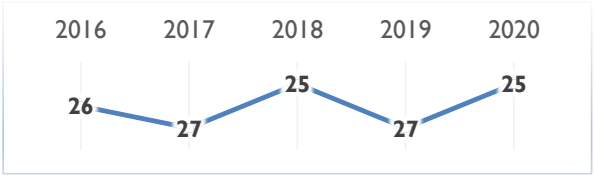


PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)



UKRAINE

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	58	57	55	57	52
Training & education	20	26	22	21	19
Scientific concentration	45	45	40	49	50

Talent	Rank
Educational assessment PISA - Math	40
International experience	60
Foreign highly-skilled personnel	59
Management of cities	56
Digital/Technological skills	27
Net flow of international students	47

Training & education	Rank
Employee training	45
▶ Total public expenditure on education	11
Higher education achievement	-
▶ Pupil-teacher ratio (tertiary education)	11
Graduates in Sciences	28
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	52
Total R&D personnel per capita	43
▶ Female researchers	17
▶ R&D productivity by publication	21
Scientific and technical employment	48
High-tech patent grants	37
Robots in Education and R&D	43

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	55	56	54	54	54
Capital	60	62	61	62	59
Technological framework	58	60	57	60	58

Regulatory framework	Rank
Starting a business	32
Enforcing contracts	43
Immigration laws	40
Development & application of tech.	59
▷ Scientific research legislation	61
▷ Intellectual property rights	61

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	60
Banking and financial services	56
Country credit rating	60
Venture capital	61
▶ Investment in Telecommunications	7

Technological framework	Rank
Communications technology	46
▷ Mobile Broadband subscribers	63
▷ Wireless broadband	62
Internet users	50
Internet bandwidth speed	44
High-tech exports (%)	52

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	60	58	53	59	56
Business agility	59	56	53	45	51
IT integration	60	60	61	61	62

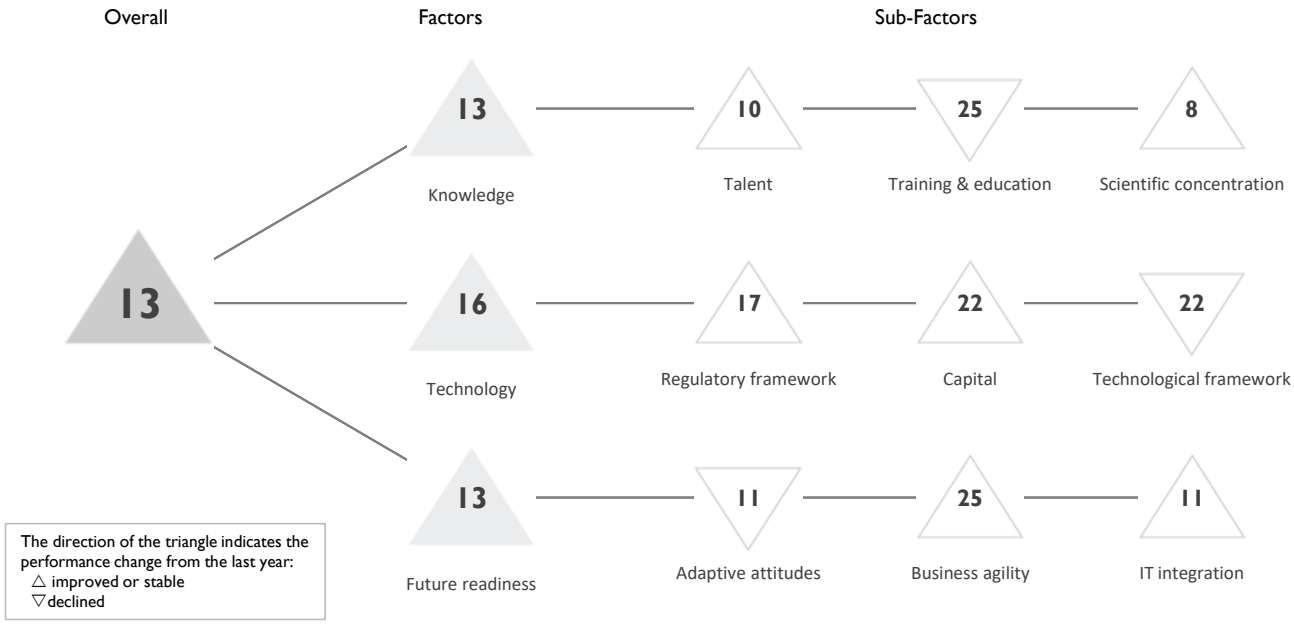
Adaptive attitudes	Rank
E-Participation	39
Internet retailing	51
Tablet possession	55
Smartphone possession	49
Attitudes toward globalization	49

Business agility	Rank
Opportunities and threats	32
World robots distribution	51
Agility of companies	33
Use of big data and analytics	40
Knowledge transfer	59
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	53
Public-private partnerships	59
▷ Cyber security	61
Software piracy	60

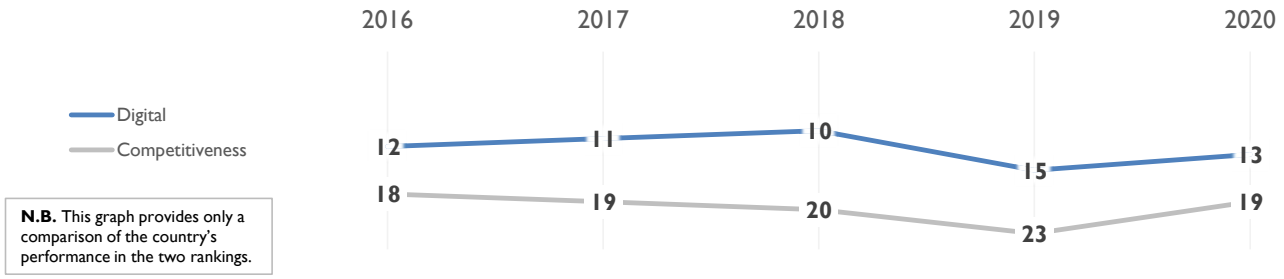
UNITED KINGDOM

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	12	11	10	15	13
Knowledge	11	10	10	14	13
Technology	18	16	13	18	16
Future readiness	11	9	3	13	13

COMPETITIVENESS & DIGITAL RANKINGS



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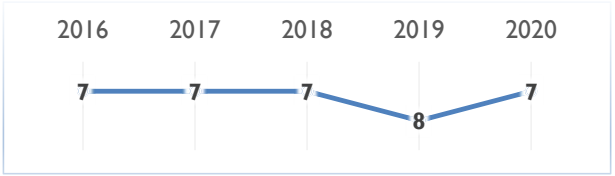
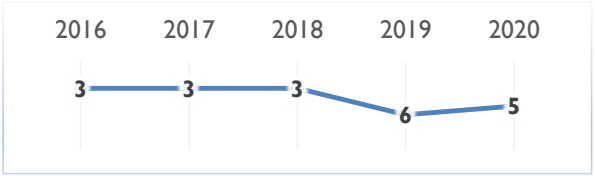
PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (40 countries)



POPULATIONS > 20 MILLION (29 countries)



UNITED KINGDOM

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	7	7	9	17	10
Training & education	19	19	20	23	25
Scientific concentration	10	11	8	8	8

Talent	Rank
Educational assessment PISA - Math	17
International experience	18
Foreign highly-skilled personnel	18
Management of cities	19
Digital/Technological skills	20
▶ Net flow of international students	5

Training & education	Rank
▷ Employee training	41
Total public expenditure on education	27
Higher education achievement	16
Pupil-teacher ratio (tertiary education)	35
Graduates in Sciences	22
Women with degrees	18

Scientific concentration	Rank
Total expenditure on R&D (%)	22
Total R&D personnel per capita	19
Female researchers	24
▶ R&D productivity by publication	5
Scientific and technical employment	9
High-tech patent grants	22
▶ Robots in Education and R&D	6

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	11	12	7	18	17
Capital	25	24	17	22	22
Technological framework	16	16	17	18	22

Regulatory framework	Rank
Starting a business	9
Enforcing contracts	27
▷ Immigration laws	43
Development & application of tech.	13
Scientific research legislation	16
Intellectual property rights	10

Capital	Rank
IT & media stock market capitalization	32
Funding for technological development	17
Banking and financial services	17
Country credit rating	18
▶ Venture capital	5
▷ Investment in Telecommunications	53

Technological framework	Rank
Communications technology	31
Mobile Broadband subscribers	19
Wireless broadband	25
Internet users	15
▷ Internet bandwidth speed	35
High-tech exports (%)	14

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	4	6	4	10	11
Business agility	25	22	16	26	25
IT integration	13	6	2	14	11

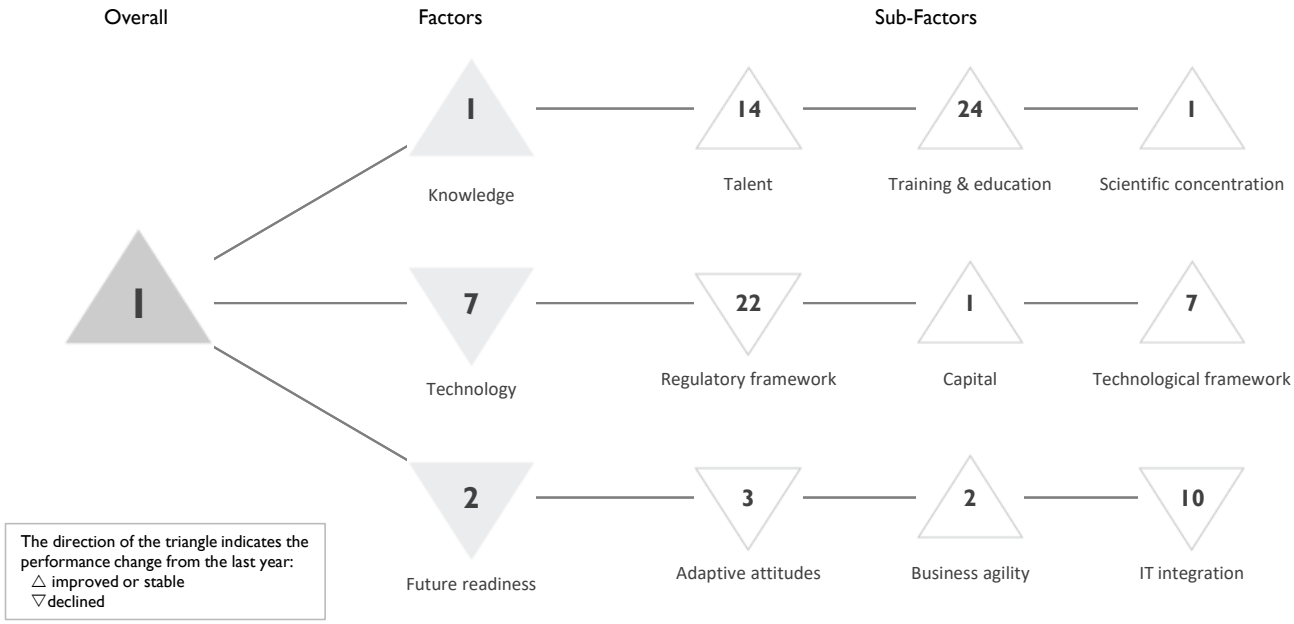
Adaptive attitudes	Rank
E-Participation	6
▶ Internet retailing	3
Tablet possession	17
Smartphone possession	22
▷ Attitudes toward globalization	39

Business agility	Rank
Opportunities and threats	28
World robots distribution	14
Agility of companies	26
Use of big data and analytics	23
Knowledge transfer	18
Entrepreneurial fear of failure	34

IT integration	Rank
E-Government	7
Public-private partnerships	18
Cyber security	27
Software piracy	10

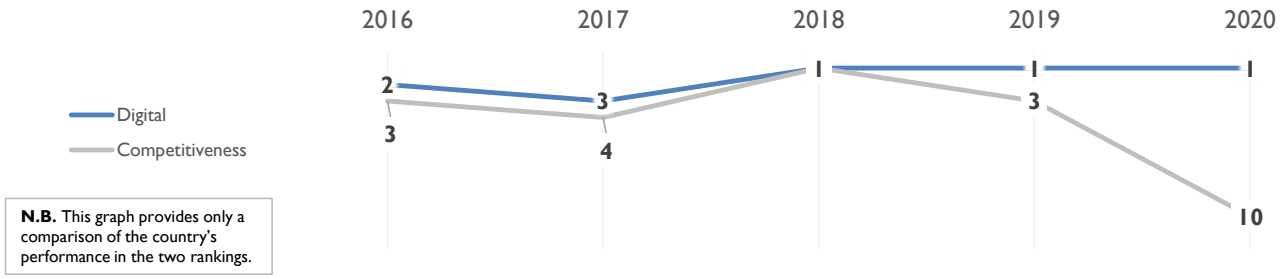
USA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	2	3	1	1	1
Knowledge	4	5	4	1	1
Technology	5	6	3	5	7
Future readiness	1	2	2	1	2

COMPETITIVENESS & DIGITAL RANKINGS



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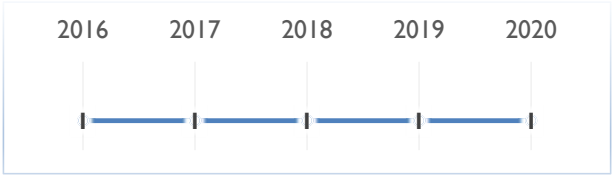
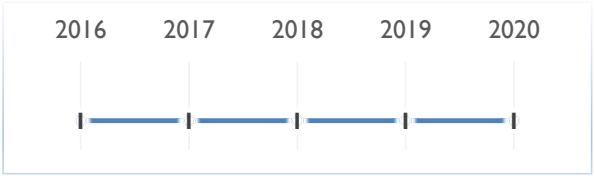
PEER GROUPS RANKINGS

THE AMERICAS (9 countries)



POPULATIONS > 20 MILLION (29 countries)



USA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	11	13	11	14	14
Training & education	30	33	21	25	24
Scientific concentration	1	1	1	1	1

Talent	Rank
Educational assessment PISA - Math	36
International experience	31
Foreign highly-skilled personnel	2
Management of cities	20
Digital/Technological skills	6
Net flow of international students	13

Training & education	Rank
▷ Employee training	40
Total public expenditure on education	10
Higher education achievement	17
Pupil-teacher ratio (tertiary education)	19
▷ Graduates in Sciences	54
Women with degrees	13

Scientific concentration	Rank
Total expenditure on R&D (%)	10
Total R&D personnel per capita	-
Female researchers	-
R&D productivity by publication	3
▶ Scientific and technical employment	1
High-tech patent grants	5
Robots in Education and R&D	3

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	12	17	16	19	22
Capital	1	2	1	1	1
Technological framework	12	12	9	11	7

Regulatory framework	Rank
Starting a business	30
Enforcing contracts	16
▷ Immigration laws	63
Development & application of tech.	5
Scientific research legislation	7
Intellectual property rights	14

Capital	Rank
IT & media stock market capitalization	6
Funding for technological development	2
Banking and financial services	2
Country credit rating	11
▶ Venture capital	1
Investment in Telecommunications	21

Technological framework	Rank
Communications technology	13
Mobile Broadband subscribers	23
Wireless broadband	6
Internet users	3
Internet bandwidth speed	12
High-tech exports (%)	21

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	1	2	1	2	3
Business agility	4	3	9	2	2
IT integration	4	12	8	5	10

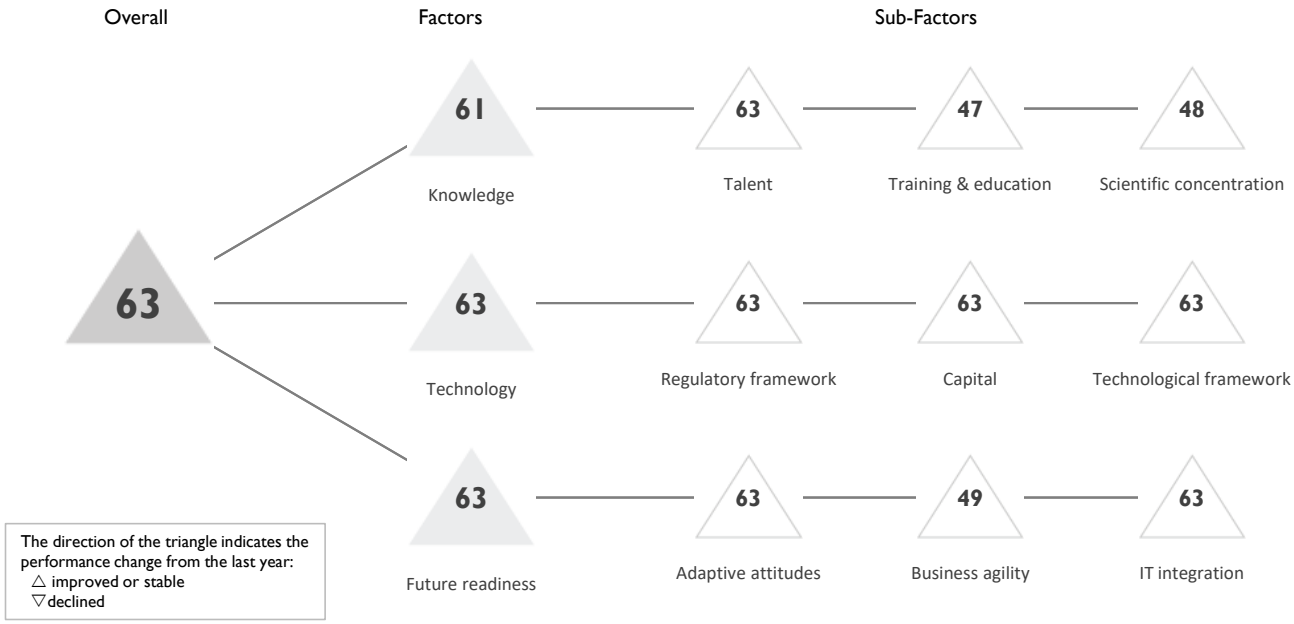
Adaptive attitudes	Rank
▶ E-Participation	1
Internet retailing	2
▶ Tablet possession	1
Smartphone possession	13
▷ Attitudes toward globalization	53

Business agility	Rank
Opportunities and threats	17
World robots distribution	4
Agility of companies	15
Use of big data and analytics	9
Knowledge transfer	9
Entrepreneurial fear of failure	17

IT integration	Rank
E-Government	9
Public-private partnerships	19
Cyber security	33
▶ Software piracy	1

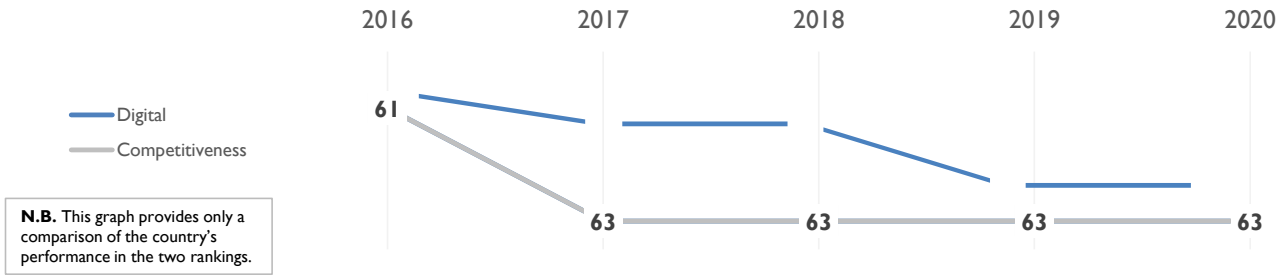
VENEZUELA

OVERALL PERFORMANCE (63 countries)



OVERALL & FACTORS - 5 years	2016	2017	2018	2019	2020
OVERALL	61	63	63	63	63
Knowledge	57	63	63	63	61
Technology	61	63	63	63	63
Future readiness	59	63	63	63	63

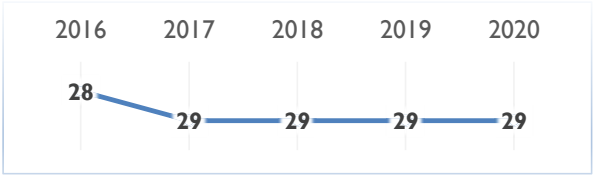
COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (29 countries)



VENEZUELA

▶ **Overall top strengths**

▷ **Overall top weaknesses**

KNOWLEDGE

Subfactors	2016	2017	2018	2019	2020
Talent	61	63	63	63	63
Training & education	39	62	60	56	47
Scientific concentration	47	50	22	51	48

Talent	Rank
Educational assessment PISA - Math	-
International experience	57
Foreign highly-skilled personnel	63
Management of cities	63
Digital/Technological skills	63
Net flow of international students	-

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

Scientific concentration	Rank
Total expenditure on R&D (%)	62
Total R&D personnel per capita	-
▶ Female researchers	1
R&D productivity by publication	36
Scientific and technical employment	-
High-tech patent grants	53
Robots in Education and R&D	54

TECHNOLOGY

Subfactors	2016	2017	2018	2019	2020
Regulatory framework	61	63	63	63	63
Capital	61	63	63	63	63
Technological framework	59	62	63	63	63

Regulatory framework	Rank
▷ Starting a business	63
Enforcing contracts	60
Immigration laws	42
Development & application of tech.	62
Scientific research legislation	63
Intellectual property rights	63

Capital	Rank
IT & media stock market capitalization	49
Funding for technological development	63
Banking and financial services	63
▷ Country credit rating	63
Venture capital	63
▷ Investment in Telecommunications	63

Technological framework	Rank
▷ Communications technology	63
Mobile Broadband subscribers	58
Wireless broadband	61
Internet users	48
▷ Internet bandwidth speed	63
High-tech exports (%)	-

FUTURE READINESS

Subfactors	2016	2017	2018	2019	2020
Adaptive attitudes	56	62	63	63	63
Business agility	52	49	51	49	49
IT integration	61	63	63	63	63

Adaptive attitudes	Rank
E-Participation	61
Internet retailing	54
Tablet possession	50
Smartphone possession	61
Attitudes toward globalization	43

Business agility	Rank
▶ Opportunities and threats	22
World robots distribution	56
Agility of companies	51
Use of big data and analytics	45
Knowledge transfer	61
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	61
Public-private partnerships	63
Cyber security	63
Software piracy	62

Appendices and Sources

The statistical tables are available for subscribers of the IMD World Competitiveness Online.
Visit our eShop

Background Statistics

0.0.1 [B]	Population - market size	Estimates in millions
0.0.2 [B]	GDP per capita	US$ per capita

Factor I: Knowledge

1.1 Talent

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

1.2 Training & education

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

1.3 Scientific concentration

1.3.1	Total expenditure on R&D (%)	Percentage of GDP
1.3.2	Total R&D personnel per capita	Full-time work equivalent (FTE) per 1000 people
1.3.3	Female researchers	% of total (headcount FT&PT)
1.3.4	R&D productivity by publication	No. of scientific articles over R&D expenditure (as % GDP)
1.3.5	Scientific and technical employment	% of total employment
1.3.6	High-tech patent grants	% of all patents granted by applicant's origin (average 2015-2017)
1.3.7	Robots in Education and R&D	number of robots

Factor II: Technology

2.1 Regulatory framework

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

2.2 Capital

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

2.3 Technological framework

2.3.1 [S]	Communications technology	Communications technology (voice and data) meets business requirements
2.3.2	Mobile Broadband subscribers	3G & 4G market, % of mobile market
2.3.3	Wireless broadband	Penetration rate (per 100 people)
2.3.4	Internet users	Number of internet users per 1000 people/ Source: Computer Industry Almanac
2.3.5	Internet bandwidth speed	Average speed
2.3.6	High-tech exports (%)	Percentage of manufactured exports

Factor III: Future Readiness

3.1 Adaptive attitudes

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

3.2 Business agility

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

3.3 IT integration

3.3.1	E-Government	Provision of online government services to promote access and inclusion of citizens
3.3.2 [S]	Public-private partnerships	Public and private sector ventures are supporting technological development
3.3.3 [S]	Cyber security	Cyber security is being adequately addressed by corporations
3.3.4	Sofware piracy	% of unlicensed software installation

Notes and Sources by Criteria

The source of the survey criteria is always :
IMD World Competitiveness Center's Executive Opinion Survey 2020.
Which was conducted from mid-February to early May 2020, with a total number of 5'866 respondents.

Standard notes used in the data tables

When statistical data is not available or is too out-dated to be relevant for a particular economy, the name appears at the bottom of the statistical table and a dash is shown. When the data is older than the reference year, the year of the data is shown next to the criterion value.

Exchange Rate	As most data are expressed in U.S. dollars, you will find the exchange rates used at the beginning of the Statistical Tables. The sources for the Exchange Rates are International Financial Statistics Online March 2020 (IMF) and national sources.
Per capita	For all information presented "per capita" the sources for the population are Passport GMID (Euromonitor) and national sources.
% of GDP	For all information presented as a "percentage of GDP" the sources for GDP are the OECD Main Economic Indicators April 2020 and national sources.

[B] GDP per capita (US$ per capita)
OECD (2020), Main Economic Indicators - complete database
National sources

Provisional data or estimates for most recent year. Malaysia: Data 2017 & 2018: Preliminary; Data 2019 is sum of 4 quarters.

[B] Population - market size (Estimates in millions)
UNDP Human Development Report 2019

Mid-year estimates. Croatia: new census in 2011 with a new methodology.India: break in series in 2011. Jordan: series have been revised according to the the new Population and Housing Census published in 2016: end of year population for 2019. Portugal: methodological change in 2011. Russia: including Crimea as of 2015. UAE: re-estimation of the national population was made by the National Bureau of Statistics in 2010 (consequent increase as of 2008). Lithuania: break in series 2011 - census revised population figure downwards by 10% (emigration to EU over past decade). Philippines: Latest available census data is for 2010. 2011-2015 figures are projections based on PSA's annual Philippines in Figures publication.

Factor 1: Knowledge

1.1 Talent

1.1.1 Educational assessment PISA - Math (PISA survey of 15-year olds)
PISA 2018 (OECD)
http://www.oecd.org/pisa/

The OECD's Programme for International Student Assessment (PISA) is a regular survey of 15-year olds which assesses aspects of their preparedness for adult life. PISA selects a sample of students that represents the full population of 15-year-old students in each participating country or education system, in both public and private schools. Mathematical literacy: an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen. Scientific literacy: an individual's scientific knowledge and use of that knowledge to identify questions, to acquire new knowledge, to explain scientific phenomena, and to draw evidence based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and enquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen. Hong Kong (China), Netherlands, Portugal and United States: Data did not meet the PISA technical standards but were accepted as largely comparable. China: limited regions (B-S-J-Z); the municipalities of Beijing and Shanghai and the provinces of Jiangsu and Zhejiang participated.

1.1.6 Net flow of international students (Tertiary-level international students inbound minus students outbound (per 1000 people))
UNESCO http://stats.uis.unesco.org

Net flow of internationally mobile students (inbound from abroad studying in a given country minus outbound from a given country), both sexes, in tertiary education. Data can refer to the school or financial year prior or after the reference year.

1.2 Training & education

1.2.2 Total public expenditure on education (Percentage of GDP)
UNESCO http://stats.uis.unesco.org
Eurostat April 2020
National sources

Total general (local, regional and central) government expenditure in educational institutions (current and capital). It excludes transfers to private entities such as subsidies to households and students, but includes expenditure funded by transfers from international sources to government. It includes pre-primary, primary, secondary all levels and tertiary public institutions. Chile and Jordan: Budgetary central government. Philippines: Includes expenditure for items other than basic and higher education such as vocational education, culture and sports.

1.2.3 Higher education achievement (Percentage of population that has attained at least tertiary education for persons 25-34)
OECD Education at a Glance 2019
National sources

Percentage of the population aged 25-34 that has attained tertiary-type B and tertiary-type A and advance research programs. Tertiary-type A education covers more theoretical programs that give access to advanced research programs and to professions with high general skills requirements. Tertiary-type B education covers more practical or occupationally specific programs that provide participants with a qualification of immediate relevance to the labor market. Hong Kong: Figures starting from 2012 exclude post-secondary diploma or certificate and exclude foreign domestic helpers. New-Zealand and Slovenia: break in series. Peru: Tertiary education type A refers to University tertiary level and terciary education type B refers to Non-university tertiary level; for 25 years and more. Singapore: proportion of resident non-students aged 25-34 years with polytechnic, professional qualification or other diploma, or university qualification. Japan: Data for tertiary education include upper secondary or post-secondary non-tertiary programmes (less than 5% of adults are in this group).

1.2.4 Pupil-teacher ratio (tertiary education) (Number of pupils per teacher)
UNESCO http://stats.uis.unesco.org
OECD Education at a Glance 2019
National sources

Average number of pupils per teacher at a given level of education, based on headcounts of both pupils and teachers. Tertiary education (ISCED levels 5 to 8). Tertiary education builds on secondary education, providing learning activities in specialised fields of education. It aims at learning at a high level of complexity and specialisation. Tertiary education includes what is commonly understood as academic education but also includes advanced vocational or professional education. Australia, Czech Republic, Estonia, Greece and Ireland: based on full-time equivalents. Philippines: Academic Year 2017-2018 data. Data includes students and faculty from both public and private tertiary educational institutions.

1.2.5 Graduates in Sciences (% of graduates in ICT, Engineering, Math & Natural Sciences)
OECD Education at a Glance 2019
UNESCO
National sources

Share of graduates in Natural Sciences; Mathematics and Statistics; Information and Communication technologies; Engineering, manufacturing and construction. In tertiary education (ISCED2011 levels 5 to 8), both sexes (%). Philippines: Academic Year 2017-2018 data..

1.2.6 Women with degrees (Share of women who have a degree in the population 25-65)
OECD Education at a Glance 2019

Educational attainment in tertiary education of 25-64 year-old females expressed as a percentage of the female population 25-64. In most countries data refer to ISCED 2011 (codes 5/6/7/8). Japan: includes data from another category. Kazakhstan: Proportion of women aged 24-44 who have received tertiary education.

Scientific concentration

1.3.1 Total expenditure on R&D (%) (Percentage of GDP)
OECD Main Science and Technology Indicators
UNESCO http://stats.uis.unesco.org
National sources

National estimates, projections or provisional data for the most recent year. Chile, Denmark, France, Japan, Korea, Netherlands, Portugal, Slovenia, Spain and Sweden: break in series. Hungary (up to 2003), Israel: defense excluded(all or mostly). Indonesia: Estimate based on target GERD by the Ministry of Science and Technology. Sweden: underestimated or based on underestimated data. USA: excludes most or all capital expenditure.

1.3.2 Total R&D personnel per capita (Full-time work equivalent (FTE) per 1000 people)
OECD Main Science and Technology Indicators
UNESCO http://stats.uis.unesco.org
National sources

National estimates, projections or provisional data for most recent year. Czech Republic, Colombia, Denmark, Finland, Korea, Mexico, Netherlands, Hungary, Japan, Portugal, Slovenia, Sweden and Taiwan: break in series. United Kingdom: underestimated or based on underestimated data. Jordan, Philippines: based on headcount, not FTE.

1.3.3 Female researchers (% of total (headcount FT&PT))
UNESCO

Female researchers (headcount) who are mainly or partially employed in R&D. This includes staff employed both full-time and part-time. Expressed as a percentage of the total workforce (male + female)

1.3.4 R&D productivity by publication (No. of scientific articles over R&D expenditure (as % GDP))
NSF Science & Engineering Indicators 2020
Courtesy: National Science Foundation
National sources

The indicator is calculated as a ratio between the number of scientific articles by author's origin and the total expenditure in R&D as % GDP, which clearly include the input costs to produce research (e.g. researchers' salaries, equipement etc.). The result gives therefore the number of scientific articles published every year for a one percent (of GDP) expenditure in R&D activities. This measure can be consider as a proxy to assess the efficiency (or productivity) in producing high-level scientific research at country level.

1.3.5 Scientific and technical employment (% of total employment)
Business Monitor International
Eurostat
OECD

Scientific and technical employment as a % of total employment. Defined as formal employment within the 'scientific and technical' sector. For more information, refer to NACE2 category M (or equivalent).

1.3.6 High-tech patent grants (% of all patents granted by applicant's origin (average 2014-2016))
WIPO Statistics Database
http://www.wipo.int/ipstats/en/statistics/patents/
TIPO for Taiwan

High-Tech patent grants as a percentage of total patent grants (Direct and PCT national phase entries) by applicant's origin. Three year average to reduce volatility. Counts are based on the grant date. Country of origin refers to the country of residency of the first-named applicant in the application. Taiwan: data compiled by TIPO using data supplied by international patent offices (USPTO, JPO, EPO, KIPO, SIPO).

1.3.7 Robots in Education and R&D (number of robots)
World Robotics 2019
International Federation of Robotics (IFR)

Industrial robot as defined by ISO 8373:2012: an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications.

The primary source is data on robot installations by country, industry and application that nearly all industrial robot suppliers worldwide report to the IFR Statistical Department directly. Several national robot associations collect data on their national robot markets and provide their results as secondary data to the IFR. This data is used to validate and complete the IFR primary data.

IFR Statistical Departments estimates the operational stock assuming an average service life of 12 years with an immediate withdrawal from service afterwards.

Factor 2: Technology

2.1 Regulatory framework

2.1.1 Starting a business (Distance to Frontier)
Doing Business 2020 - World Bank

The distance to frontier score aids in assessing the absolute level of regulatory performance and how it improves over time. This measure shows the distance of each economy to the "frontier," which represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005. This allows users both to see the gap between a particular economy's performance and the best performance at any point in time and to assess the absolute change in the economy's regulatory environment over time as measured by Doing Business. An economy's distance to frontier is reflected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. For example, a score of 75 in DB 2016 means an economy was 25 percentage points away from the frontier constructed from the best performances across all economies and across time. A score of 80 in DB 2017 would indicate the economy is improving. In this way the distance to frontier measure complements the annual ease of doing business ranking, which compares economies with one another at a point in time.

2.1.2 Enforcing contracts (Distance to Frontier)
Doing Business 2020 - World Bank

The distance to frontier score aids in assessing the absolute level of regulatory performance and how it improves over time. This measure shows the distance of each economy to the "frontier," which represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005. This allows users both to see the gap between a particular economy's performance and the best performance at any point in time and to assess the absolute change in the economy's regulatory environment over time as measured by Doing Business. An economy's distance to frontier is reflected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. For example, a score of 75 in DB 2016 means an economy was 25 percentage points away from the frontier constructed from the best performances across all economies and across time. A score of 80 in DB 2017 would indicate the economy is improving. In this way the distance to frontier measure complements the annual ease of doing business ranking, which compares economies with one another at a point in time.

2.2 Capital

2.2.1 IT & media stock market capitalization (% of total stock market capitalization)
Thomson One Banker
Thomson Data Stream

Datastream Telecom, Media and IT (TMT) Market Value in national currency. Calculated as a percentage of Datastream Total Market Value in national currency. Figures for close-of-business on the 29th March each year.

2.2.4 Country credit rating (Index (0-60) of three country credit ratings: Fitch, Moody's and S&P)
Fitch, Moody's and S&P

IMD WCC created index of the three country credit ratings Fitch, Moody's and S&P. Each rating, including the outlook, is converted to a numerical score from 20-0 and totalled for each country.

2.2.6 Investment in Telecommunications (Percentage of GDP)
Passport GMID
Source: © Euromonitor International 2020
National sources

Investment refers to as the annual capital expenditure; this is the gross annual investment in telecom (including fixed, mobile and other services) for acquiring property and network. The term investment means the expenditure associated with acquiring the ownership of property (including intellectual and non-tangible property such as computer software) and plant. This includes expenditure on initial installations and on additions to existing installations where the usage is expected to be over an extended period of time. Note that this applies to telecom services that are available to the public, and exclude investment in telecom software or equipment for private use.

2.3 Technological framework

2.3.2 Mobile Broadband subscribers (3G & 4G market, % of mobile market)
Business Monitor International

Total active mobile 3G and 4G subscriptions, excluding broadband connections on dedicated data SIM cards or USB dongles. Data given as a percentage of the total mobile market.

2.3.3 Wireless broadband (Penetration rate (per 100 people))
Passport GMID
Source: © Euromonitor International 2020

The penetration rates of wireless broadband is calculated by dividing the number of Wireless Broadband subscribers by the total population and multiplying by 100. Wireless-broadband subscriptions refer to the sum of satellite broadband, terrestrial fixed wireless broadband and active mobile-broadband subscriptions to the public Internet. The indicator refers to total active wireless-broadband Internet subscriptions using satellite, terrestrial fixed wireless or terrestrial mobile connections. Broadband subscriptions are those with an advertised download speed of at least 256 kbit/s. In the case of mobile-broadband, only active subscriptions are included (those with at least one access to the Internet in the last three months or with a dedicated data plan). The service can be standalone with a data card, or an add-on service to a voice plan. The indicator does not cover fixed (wired)-broadband or Wi-Fi subscriptions. Both residential and business subscriptions should be included.

2.3.4 Internet users (Number of internet users per 1000 people/ Source: Computer Industry Almanac)
Computer Industry Almanac Inc. April 2018
National sources

2.3.5 Internet bandwidth speed (Average speed)
M-Labs / cable.co.uk
Ookla
Akamai
OpenSignal

Average connection speed in Mbps: data transfer rates for Internet access by end-users.

Values presented are an average compiled from four different sources: M-Labs / cablie.co.uk; Ookla; Akamai; and OpenSignal.

2.3.6 High-tech exports (%) (Percentage of manufactured exports)
The World Bank (Development Data Group)
http://databank.worldbank.org
National sources

High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.

Factor 3: Future readiness

Adaptive attitudes

3.1.1 E-Participation (Use of online services that facilitate public's interaction with government)
UN E-Government Knowledge Database

The e-participation index (EPI) measures the use of online services to facilitate provision of information by governments to citizens ("e-information sharing"), interaction with stakeholders ("e-consultation"), and engagement in decision-making processes ("e-decision making").

3.1.2 Internet retailing (US$ Per '000 People)
Passport GMID
Source: © Euromonitor International 2020

Retail Value excluding sales tax

3.1.3 Tablet possession (% households)
Passport GMID
Source: © Euromonitor International 2020

Percentage of households having at least one item. Portable, usually battery-powered, and very thin personal computer contained with a touchscreen panel.

3.1.4 Smartphone possession (% households)
Passport GMID
Source: © Euromonitor International 2020

Percentage of households having at least one item. A smartphone is a cellular telephone with an integrated computer and other features not originally associated with telephones, such as an operating system, Web browsing, music and movie player, camera and camcorder, GPS navigation, voice dictation for messaging, the ability to run software applications, etc.

Business agility

3.2.2 World robots distribution (Percentage share of world robots)
World Robotics 2019
International Federation of Robotics (IFR)

Industrial robot as defined by ISO 8373:2012: an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications.

The primary source is data on robot installations by country, industry and application that nearly all industrial robot suppliers worldwide report to the IFR Statistical Department directly. Several national robot associations collect data on their national robot markets and provide their results as secondary data to the IFR. This data is used to validate and complete the IFR primary data.

IFR Statistical Departments estimates the operational stock assuming an average service life of 12 years with an immediate withdrawal from service afterwards.

3.2.6 Entrepreneurial fear of failure
Global Entrepreneurship Monitor https://www.gemconsortium.org/data

Percentage of 18-64 population perceiving good opportunities to start a business who indicate that fear of failure would prevent them from setting up a business.

IT integration

3.3.1 E-Government (Provision of online government services to promote access and inclusion of citizens)
UN E-Government Knowledge Database

The E-Government Development Index presents the state of E-Government Development of the United Nations Member States. Along with an assessment of the website development patterns in a country, the E-Government Development index incorporates the access characteristics, such as the infrastructure and educational levels, to reflect how a country is using information technologies to promote access and inclusion of its people. The EGDI is a composite measure of three important dimensions of e-government, namely: provision of online services, telecommunication connectivity and human capacity.

3.3.4 Sofware piracy (% of unlicensed software installation)
BSA Global Software Survey

The BSA Global Software Survey calculates unlicensed installations of software that runs on PCs — including desktops, laptops, and ultra-portables, such as netbooks. A key component of the BSA Global Software Survey is a global survey of more than 20,000 home and enterprise PC users, conducted by IDC. In addition, a parallel survey was carried out among 2,200 IT managers in 22 countries. Please consult the original report for a more detailed explanation of the methodology.

Index to Criteria

The first number indicates the Competitiveness Factor, the second number indicates the sub-factor and the third number indicates the criterion number.

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IMD is an independent academic institution with Swiss roots and global reach, founded almost 75 years ago by business leaders for business leaders. Since its creation, IMD has been a pioneering force in developing leaders who transform organizations and contribute to society.

Based in Lausanne (Switzerland) and Singapore, IMD has been ranked in the Top 3 of the FT's annual Executive Education Global Ranking for the last nine consecutive years and in the top five for 17 consecutive years. Our MBA and EMBA programs have repeatedly been singled out among the best in Europe and the world.

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