IMD World Digital Competitiveness

Ranking 2023

IMD / World Competitiveness Center

Preface

I am delighted to present the seventh edition of the IMD World Digital Competitiveness Ranking (WDCR).

Once again, we have analyzed the capacity of economies with differing levels of prosperity and resources – and of varying sizes and mentalities – to embrace new digital technologies and use them to transform government practices, business models, and society in general in a way that improves people's lives. The total number of economies assessed in the 2023 WDCR is 64, with Kuwait making its début.

Building "digital nations" – that is, creating systems that help companies and individuals to adopt digital tech seamlessly – should be a top priority for executives and anyone who has an influence on governmental activities in 2024.

This year has been peppered with colorful talks on Artificial Intelligence (AI) with equal doses of concern, excitement, and conjecture as to how it could shake up our lives, starting with our jobs. AI is set to generate enormous productivity gains by automating many tasks that previously required human intervention, but I do not think it is about to replace our jobs, despite the hype.

That said, tasks set to be replaced do include creative ones just as much as those that are routine. The increased efficiency that will ensue is going to reduce costs, but employment levels could also drop. AI will fill the gap though, as I see it, by providing personalized services, thereby boosting quality of life and satisfaction. This is, of course, in an ideal use case of the technology.

While we measure no specific AI indicators as such in the WDCR – that is, we are not yet measuring the uptake of chatbots, say – AI sits silently at the core of several of the subfactors into which we group our hard data and survey replies. These are, namely: talent, regulatory and technological frameworks, and adaptive attitudes and business agility. On a data level, the quality of digital regulation, the funding available for technology development, and the degree of company agility are all data points that are enmeshed with AI.

AI and cybercrime, too, exist in symbiosis. AI assists in password cracking via algorithms and in hacking via its automation abilities. As my colleagues address in their analytical report that follows my macro-outlook for digital competitiveness, a mere 5% of our 4,000 survey respondents (all global senior executives) said they hadn't implemented any new cybersecurity measures in the past year.

And yet, AI tools have also reduced the need for human involvement in aspects like malware development, scams, and extortion within cybercriminal organizations. This alone knocks the digital talent panorama off its shelf. Cyber security, then, becomes a clear example of the need to assess AI's trade-offs and to take a very deliberate approach towards using it optimally. Countries cannot do this in isolation but need to lean on regional, if not global, institutions to do so.

At the IMD World Competitiveness Center, we are, as ever, indebted to our partner institutes, the IMD alumni community, and our panel of experts for offering a combination of data and invaluable insights without which our rankings would be mere pipedreams and not the tools for positive action they have become. Thank you.

Professor Arturo Bris
Director
IMD World Competitiveness Center

IMD / World Competitiveness Center

Table of Contents

Competitiveness Country Profiles

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

The IMD World Competitiveness Center team:

At IMD:

Professor Arturo Bris	Director IMD World Competitiveness Center
Andrea Caballero	Data Coordinator
José Caballero	Senior Economist
Christos Cabolis	Chief Economist & Head of Operations
Odete Madureira	Center Coordinator
Marco Pistis	Research Associate
Chinar Sharma	Projects Analyst
Alice Tozer	Editor
Maryam Zargari	Research Associate

At KAESCO Consulting:

Jean-François Kaeser

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.

Contact

e-mail: wccinfo@imd.org
Internet: www.imd.org/wcc

Database: https://worldcompetitiveness.imd.org/

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:

Argentina
Shaw Institute for Business Research
Catholic University of Argentina, Buenos Aires
http://www.uca.edu.ar
—
Dr. Carlos Newland, Dean
Dr. Marcelo F. Resico, Senior Economist
Blas E. Menéndez, Research Assistant

Australia
CEDA – Committee for Economic
Development of Australia
www.ceda.com.au
—
Jarrod Ball, Chief Economist
Elizabeth Byrne, Associate Director Strategic
Communications & Advocacy

Austria
Federation of Austrian Industries, Vienna
Austrian Institute of
Economic Research, Vienna
http://www.iv-net.at
—
Univ.-Prof. Dr. Christian Helmenstein, Chief Economist
Michael Oliver, Economist

Bahrain
Ministry of Finance and National Economy
https://www.mofne.gov.bh/
—
Dr. Faisal Hammad, Assistant Undersecretary for
Competitiveness & Economic Indicators

Belgium
FEB - Federation of
Enterprises in Belgium, Brussels
www.feb.be
—
Dries Vantomme, Attaché Economie & Conjoncture

Botswana
Botswana National Productivity Centre (BNPC)
www.bnpc.bw
—
Letsogile Batsetswe,
Experienced Research Consultant
Jacob Mmola, Acting Executive Director

Brazil
Fundação Dom Cabral, Innovation
and Entrepreneurship Center
https://www.fdc.org.br/
—
Carlos Arruda, Professor
and Member of FDC Innovation
and Entrepreneurship Center
Hugo Tadeu, Professor and Director
of FDC Innovation
and Entrepreneurship Center
Miguel F. Costa, Researcher

Bulgaria
Center for the Study of Democracy, Sofia
www.csd.bg
—
Ruslan Stefanov, Program Director
and Chief Economist
Daniela Mineva, Senior Analyst, Economic Program
Petar Terziev, Analyst, Economic Program
Vanya Petrova, Senior Analyst, Economic Program

Bulgarian Chamber of
Commerce and Industry
https://www.bcci.bg
—
Lyubomir Levicharov, Chief Economic Analyst,
Economic Analysis and Policy Department
Blagovesta Dzhabirova, Economic Analyst, Economic
Analysis and Policy Department

Canada
Information and Communications Technology Council
(ICTC)
www.ictc-ctic.ca
—
Alexandra Cutean,
Chief Research Officer

Chile
Universidad de Chile
Facultad de Economía y Negocios (FEN)
www.fen.uchile.cl
—
Dr. Enrique Manzur, Vice Dean
Dr. Sergio Olavarrieta,
Ph.D Program Director
Dr. Pedro Hidalgo, Department Head

China
China Institute for Development Planning,
Tsinghua University
—
Prof. Yang Yongheng, Associate Director of China Institute for Development Planning, Tsinghua University
Prof. Wang Youqiang, Professor, China Institute for Development Planning, Tsinghua University
Dr. Gong Pu, Assistant Professor, China Institute for Development Planning, Tsinghua University
Ms. Huang Suyuan, Research Assistant, China Institute for Development Planning, Tsinghua University
Dr. Wang Hongshuai, Postdoctoral fellow, Tsinghua University
Ms. Zhang Ruijun, PhD Candidate, Tsinghua University
Mr. Wang Jiancheng, PhD Candidate, Tsinghua University
Ms. Sun Xiao, PhD Candidate, Tsinghua University
Ms. Zhu Siyao, Graduate Student, Tsinghua University
Mr. Li Xiaofan, Graduate Student, Tsinghua University
Mr. Zhang Zhe, Graduate Student, Tsinghua University

Colombia
National Planning Department
https://www.dnp.gov.co
—
Jorge Ivan Gonzalez, General Director, Department of National Planning (DNP)
Camilo Rivera Pérez, Technical Director, Innovation and Private Sector Development - DNP

Croatia
National Competitiveness Council
http://konkurentnost.hr/en/
—
Ivan Mišetić, acting President
Biserka Sladović, Advisor
Hrvoje Stojić, Chief Economist

Croatian Employers' Association
https://www.hup.hr/en/
—
Iva Tomic, PhD, Chief Economist

Cyprus
Economics Research Centre,
University of Cyprus
http://ucy.ac.cy/erc/en/
—
Sofronis Clerides,
Professor of Economics
Nicoletta Pashourtidou,
Assistant Director

Cyprus Employers and Industrialists Federation (OEB)
www.oeb.org.cy
—
Antonis Frangoudis

Czech Republic
Consumer Forum (Spotřebitelské fórum)
www.spotrebitelskeforum.cz
—
Dr. Kryštof Kruliš,
Chairman of the Board of Directors

Denmark
Confederation of Danish Industry
https://www.danskindustri.dk/english/
—
Allan Sørensen, Chief Economist

Estonia
Estonian Institute of Economic Research (EKI)
www.ki.ee
—
Bruno Pulver, Member of the Board

Enterprise Estonia (EAS)
—
Helery Tasane, Head of Strategy and Analysis

Partner Institutes

Finland
ETLA Economic Research
www.etla.fi
—
Ville Kaitila, Researcher
Päivi Puonti, Head of Forecasting
Aki Kangasharju, Managing Director

France
Business France, Paris
http://en.businessfrance.fr/en/home
—
Louise Cassagnes, Economist

Greece
Federation of Industries of Greece (SBE), Thessaloniki
—
Dr. Christos Georgiou, Director, Research and Documentation Department
Mr. Constantinos Styliaras, Economist, Research and Documentation Department

Foundation for Economic and Industrial Research (FEIR/IOBE), Athens
—
Aggelos Tsakanikas, Associate Professor
National Technical University of Athens - Head of Entrepreneurship Observatory
Sophia Stavraki, Research Associate

Hong Kong SAR
Hong Kong Trade Development Council
—
Ms. Alice Tsang, Principal Economist
Cherry Yeung, Senior Economist

Hungary
ICEG European Center, Budapest
http://icegec.org
—
Ms. Renata Anna Jaksa, Director
Dr. Oliver Kovacs,
Senior Research Fellow

University of Public Service
http://en.uni-nke.hu/
—
Dr. Magdolna Csath,
Research Professor in competitiveness

Iceland
Icelandic Chamber of Commerce, Reykjavik
www.chamber.is
—
Elisa Arna Hilmarsdottir, Economist
Gunnar Ulfarsson, Economist

India
National Productivity Council,
New Delhi
www.npcindia.gov.in
—
Dr. K.P. Sunny,
Director & Head (Finance)
Mr. Rajesh Sund,
Director and Head (Economic Services)

Indonesia
Lembaga Management,
Faculty of Economics and Business, Universitas Indonesia (LM FEB UI), Jakarta
https://www.lmfebui.com/
—
Dr. Willem A. Makaliwe, Managing Director
Mr. Bayuadi Wibowo, Group Head of Research & Consulting
Mr. Arza Faldy Prameswara,
Senior Researcher
Mr. Taufiq Nur, Senior Researcher
Ms. Shona Kamila Laily, Analyst
Mr. Yendra Emirsyah Kivatra – Analyst

NuPMK Consullting, Jakarta
http://nupmk.co.id
—
Ms. Tini Moeis, Managing Director
Devi RD Hamdani,
Senior Business Manager

Ireland
IDA Ireland
www.idaireland.com
—
Karen Law, Planning Executive

Israel
The Federation of Israeli Chambers of Commerce, Tel-Aviv
www.chamber.org.il
—
Israela Many – Deputy Managing Director of Economy and Tax
Liran Avitan, Economist

Japan
Mitsubishi Research Institute, Inc., Tokyo
Research Center
for Policy and Economy
www.mri.co.jp
—
Dr. Hirotsugu Sakai, Research Director

Jordan
Ministry of Planning
and International Cooperation
www.mop.gov.jo
—
Dr. Hadram Al-Fayes,
Policies and Studies Director
Mira Mango, Deputy Head of the Competitiveness
and Business Environment Division

Kazakhstan
Economic Research Institute, JSC of the Ministry of
National Economy of the Republic of Kazakhstan,
Nur-Sultan
https://economy.kz
—
Aidana Terlikbayeva, Senior Expert,
Center for Strategic Analysis
Aimira Sabugaliyeva, Senior Expert,
Center for Strategic Analysis

Korea Rep.
Korea Institute for International Economic Policy
—
Dr. Sang-Ha Yoon, Head, International
Macroeconomics Team
Ms. Jiyun Lee, Researcher, International
Macroeconomics Team

The Korea Chamber of Commerce
and Industry
http://english.korcham.net/
—
Ethan Cho, Deputy Director

Kuwait
Kuwait Anti-Corruption Authority (Nazaha)
https://www.nazaha.gov.kw
—
Dhari Buyabes, Head of International Organizations
and Conferences International Cooperation Dept.

Latvia
University of Latvia Centre for European and
Transition Studies, LU CETS
http://www.lu.lv/cets
—
Dr. Zane Zeibote, Director
Prof. Dr. Tatjana Muravska,
Chairperson of the Board

Lithuania
Innovation Agency Lithuania
https://innovationagency.lt
—
Jonė Kalendienė, Head Research
and Analysis division
Irena Karelina, Project Manager

Luxembourg
Luxembourg Chamber of Commerce
www.cc.lu
—
Ms. Christel Chatelain,
Director Economic Affairs
Mr. Jean-Baptiste Nivet,
Senior Economist
Ms. Sidonie Paris, Economist

Malaysia
Malaysia Productivity Corporation (MPC), Petaling
Jaya, Selangor
www.mpc.gov.my
—
Dato' Abdul Latif Hj. Abu Seman, Director General
MPC
En. Zahid Ismail, Deputy Director General MPC
Dr. Mazrina Mohamed Ibramsah, Deputy Director
General MPC
Ms. Wan Fazlin Nadia Wan Osman, Director MPC
En. Mohammed Alamin Rehan, Director MPC

Mexico
Center for Strategic Studies for Competitiveness
www.ceec.edu.mx
—
Carlos Maroto Espinosa,
General Manager

Partner Institutes

Mongolia
Economic Policy and Competitiveness Research Center
www.ecrc.mn
—
Mr. Tsagaan Puntsag, Founder and Chairman of Board
Ms. Lakshmi Boojoo, Director General
Ms. Odonchimeg Ikhbayar, Deputy Director, Head of Research
Mr. Ganbat Chuluun, Research Economist
Ms. Tungalag Erdenebat, Research Economist
Mr. Mungunjiguur Battsolmon, Research Economist

Netherlands
Confederation of Netherlands Industry and Employers (VNO-NCW), The Hague
www.vno-ncw.nl
—
Mr. Thomas Grosfeld
Mr. Tim Zandbergen

New Zealand
Kerridge & Partners, Auckland
https://kerridgepartners.com/
—
Mr Peter Kerridge, Partner

Peru
CENTRUM PUCP
https://centrum.pucp.edu.pe/
—
Mr. Percy Marquina, General Director
Mrs. Beatrice Avolio, Head of the Graduate Business Department
Mr. Luis Del Carpio, Director of CENTRUM Competitiveness Center
Mr. Victor Fajardo, Researcher of CENTRUM Competitiveness Center

Philippines
Asian Institute of Management Rizalino S. Navarro Policy Center for Competitiveness AIM RSN PCC
https://aim.edu/research-centers/rizalino-s-navarro-policy-center-competitiveness
—
Jamil Paolo Francisco, Ph.D. – Executive Director, AIM RSN PCC
Hauvre Somova – Economist, AIM RSN PCC
Regina Yvette Romero – Research Associate, AIM RSN PCC

Poland
SGH Warsaw School of Economics
World Economy Research Institute
Collegium of World Economy
https://www.sgh.waw.pl/en
—
Prof. Marzenna Weresa
Dr. Anna Dzienis

Portugal
Porto Business School, University of Porto, Porto
https://www.pbs.up.pt/
—
Prof. Álvaro Almeida
Prof. Daniel Bessa
Prof. Filipe Grilo
Prof. José Luís Alvim
Prof. João Loureiro
Prof. Ramon O'Callaghan
Prof. Patrícia Teixeira Lopes
Prof. José Esteves

Qatar
Department of Strategic Planning
Planning & Statistics Authority
www.psa.gov.qa
—
Hissa Alassiry, Project Manager
Dr. Hasan Mahmoud Omari, Economic Development Expert

Romania
CIT-IRECSON Center of Technological Information, Bucharest
www.cit-irecson.ro
—
Mr. Bogdan Ciocanel, PhD, Director
Mr. Dan Grigore, Economist

Saudi Arabia
NCC, National Competitiveness Center
https://www.ncc.gov.sa/en/
—
H.E. Dr. Eiman AlMutairi, CEO of National Competitiveness Center
Waleed AlRudaian, Vice President
Salman M. AlTukhaifi, General Manager of Analytics & Business Intelligence

Singapore
Singapore Business Federation
www.sbf.org.sg/
—
Solomon Alan Huang, Deputy Director,
Advocacy & Policy Division

Economics Division,
Ministry of Trade and Industry,
Singapore
https://www.mti.gov.sg/

Slovak Republic
F.A.Hayek foundation, Bratislava
http://www.hayek.sk/
—
Matúš Pošvanc

Slovenia
Institute for Economic Research, Ljubljana
http://www.ier.si/
—
Mr. Peter Stanovnik, PhD, Associate Professor
Ms. Sonja Ursic, M.A.

University of Ljubljana,
School of Economics and Business
http://www.ef.uni-lj.si/en
—
Ms. Mateja Drnovsek, PhD,
Full Professor
Mr. Ales Vahcic, PhD, Full Professor

South Africa
Productivity SA
https://productivitysa.co.za/
—
Mr Mothunye Mothiba, CEO
Dr Leroi Raputsoane, Chief Economist
Ms Juliet Sebolelo Mashabela, Economist

Spain
Spanish Confederation of Employers, Madrid
www.ceoe.es
—
Ms. Edita Pereira,
Head of Economic Research Unit
Ms. Paloma Blanco,
Economic Research Unit

Taiwan, China
National Development Council, Taipei
http://www.ndc.gov.tw
—
Ms. Kao, Shien-Quey, Deputy Minister
Ms. Wu, Ming Huei, Director of Economic
Development Department
Mr. Wang, Chen-Ya, Executive Officer

Thailand
Thailand Management Association (TMA), Bangkok
www.tma.or.th
—
Ms. Wanweera Rachdawong,
Chief Executive Officer, TMA
Ms. Pornkanok Wipusanawan, Director, TMA Center
for Competitiveness
Mr. Nussati Khaneekul,
Senior Manager,
TMA Center for Competitiveness

Turkey
TUSIAD, Turkish Industry
and Business Association
Economic Research Department
www.tusiad.org
—
Gizem Öztok Altınsaç, Chief Economist
İsmet Tosunoğlu, Economist
İrem Sipahi, Junior Expert
Ömer Erdoğan, Trainee

United Arab Emirates (UAE)
Federal Competitiveness and Statistics Centre (FCSC)
http://fcsc.gov.ae/

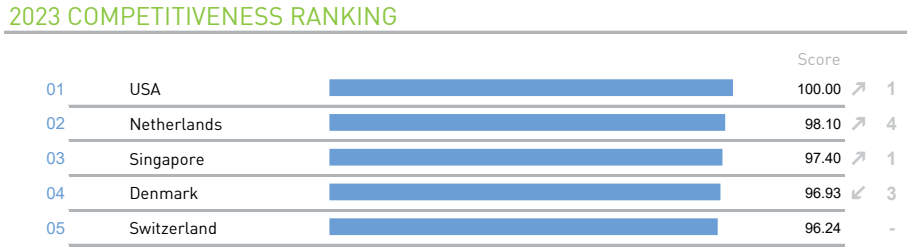
Venezuela
National Council to Investment Promotion (CONAPRI)
www.conapri.org
—
Mr. Juan Cabral, Executive Director
Ms. Jennyn Osorio,
Manager of Economic Affairs
Ms. Lilian Zambrano,
Manager of Legal Affairs

User Guide for the IMD World Digital Competitiveness Ranking

Overall and Breakdown: Digital Rankings

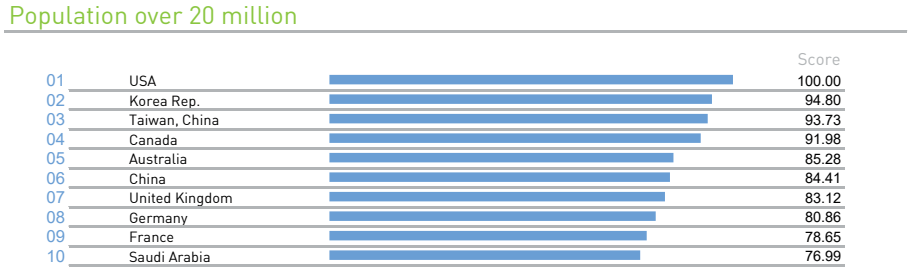
The IMD World Digital Competitiveness Ranking

The IMD World Digital Competitiveness Ranking presents the 2023 overall rankings for the 64 economies covered by the WCY. The rankings are calculated on the basis of the 54 ranked criteria: 34 hard and 20 survey data. The countries are ranked from the most to the least digital competitive. The final column shows the improvement or decline from the previous year. The index value or "score" is also indicated for each country.



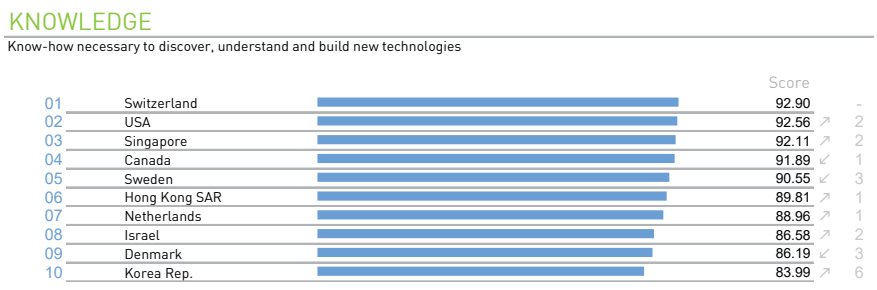
Selected breakdowns of the IMD World Digital Competitiveness Ranking

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 (2022) 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				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Argentina	59	59	61	59	61	58	50	55	58	62	56	62	62	62	63	56	47	52	46	49
Australia	14	15	20	14	16	15	17	19	14	15	14	14	18	15	18	14	17	22	17	20
Austria	20	17	16	18	22	10	11	10	13	16	32	28	32	36	35	23	16	16	13	19
Bahrain	-	-	-	32	38	-	-	-	34	36	-	-	-	23	30	-	-	-	36	46
Belgium	25	25	26	23	15	23	21	21	21	12	21	19	23	24	19	25	25	26	25	16
Botswana	-	-	63	61	60	-	-	64	55	52	-	-	63	59	52	-	-	63	61	63
Brazil	57	51	51	52	57	59	57	51	51	57	57	57	55	55	60	43	43	45	47	52
Bulgaria	45	45	52	48	55	46	47	53	48	53	42	45	51	51	56	48	44	55	50	58
Canada	11	12	13	10	11	05	05	07	03	04	13	13	15	14	13	18	15	15	11	11

Digital Sub-factor Rankings

A summary of the rankings for all nine sub-factors is presented for the 64 economies for 2023. 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	61	60	50	57	63	56	55	38	53	Argentina
Australia	08	28	16	15	16	31	04	42	23	Australia
Austria	20	11	17	34	34	38	24	22	13	Austria
Bahrain	15	55	34	29	47	14	49	32	50	Bahrain
Belgium	07	22	18	05	18	39	39	09	15	Belgium

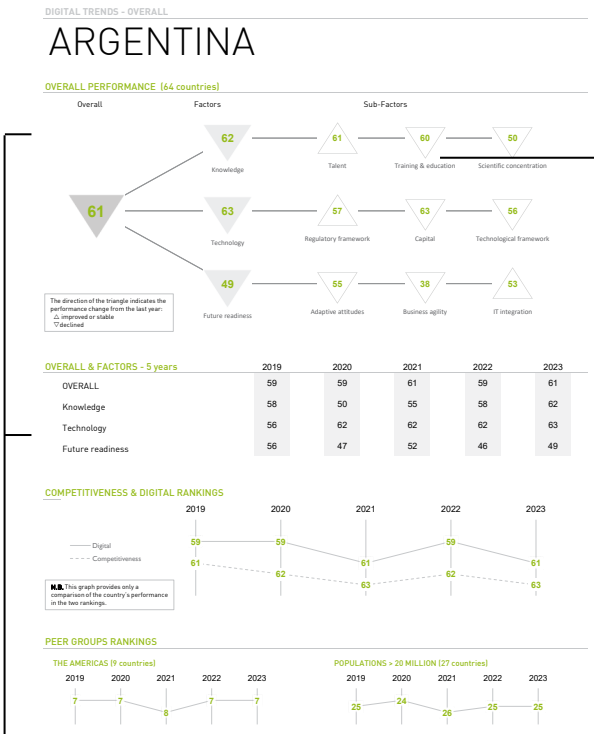
Digital Competitiveness Country Profiles

Each two page profile analyses the performance of one of the 64 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.

User Guide for the IMD World Digital Competitiveness Ranking

Page 1: Digital Competitiveness – Overall and factors trends

This page shows the overall, factors and sub-factors ranking performances of the country in 2023, their 5-years trends and a comparison of between competitiveness and digital competitiveness rankings. The following indicators are presented:



1. Overall Performance

Overall, factors and sub-factors digital ranking performances of the country in 2023. The direction of the triangles indicates whether there has been an improvement or a decline with respect to the previous year.

2. Overall & Factors – 5 years

The evolution of the overall and factors digital rankings in the past 5 years.

3. Competitiveness and Digital Rankings

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

4. Peer Group Rankings

Based on geographical region and population size.

	KNOWLEDGE			TECHNOLOGY			FUTURE READINESS			
	Talent	Training & education	Scientific concentration	Regulatory framework	Capital	Technological framework	Adaptive attitudes	Business agility	IT integration	
Argentina	61	60	50	57	63	56	55	38	53	Argentina
Australia	08	28	16	15	16	31	04	42	23	Australia
Austria	20	11	17	34	34	38	24	22	13	Austria
Bahrain	15	55	34	29	47	14	49	32	50	Bahrain
Belgium	07	22	18	05	18	39	39	09	15	Belgium

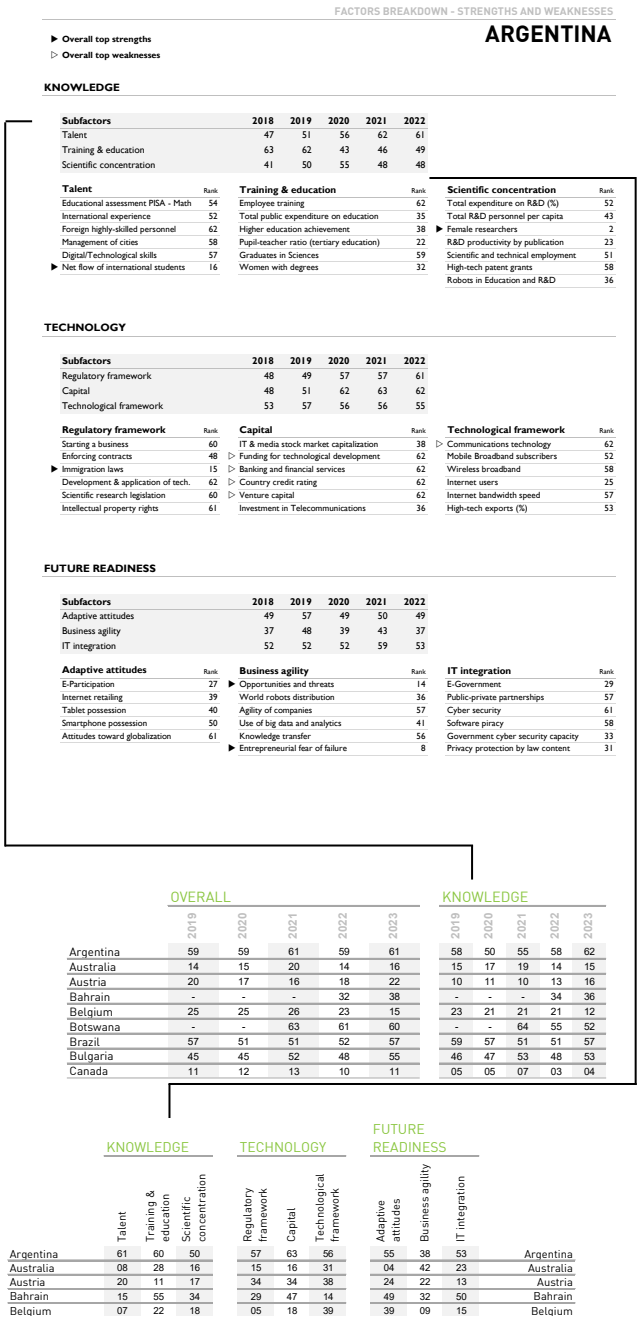
Population over 20 million

		Score
01	USA	100.00
02	Korea Rep.	94.80
03	Taiwan, China	93.73
04	Canada	91.98
05	Australia	85.28
06	China	84.41
07	United Kingdom	83.12
08	Germany	80.86
09	France	78.65
10	Saudi Arabia	76.99

	OVERALL					KNOWLEDGE					TECHNOLOGY					FUTURE READINESS				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Argentina	59	59	61	59	61	58	50	55	58	62	56	62	62	62	63	56	47	52	46	49
Australia	14	15	20	14	16	15	17	19	14	15	14	14	18	15	18	14	17	22	17	20
Austria	20	17	16	18	22	10	11	10	13	16	32	28	32	36	35	23	16	16	13	19
Bahrain	-	-	-	32	38	-	-	-	34	36	-	-	-	23	30	-	-	-	36	46
Belgium	25	25	26	23	15	23	21	21	21	12	21	19	23	24	19	25	25	26	25	16
Botswana	-	-	63	61	60	-	-	64	55	52	-	-	63	59	52	-	-	63	61	63
Brazil	57	51	51	52	57	59	57	51	51	57	57	57	55	55	60	43	43	45	47	52
Bulgaria	45	45	52	48	55	46	47	53	48	53	42	45	51	51	56	48	44	55	50	58
Canada	11	12	13	10	11	05	05	07	03	04	13	13	15	14	13	18	15	15	11	11

Page 2: Factors breakdown & Strengths and Weaknesses

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 54 criteria rankings for 2023.



FACTORS BREAKDOWN - STRENGTHS AND WEAKNESSES

ARGENTINA

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

KNOWLEDGE

Subfactors	2018	2019	2020	2021	2022
Talent	47	51	56	62	61
Training & education	63	62	43	46	49
Scientific concentration	41	50	55	48	48

Talent	Rank
Educational assessment PISA - Math	54
International experience	52
Foreign highly-skilled personnel	62
Management of cities	58
Digital/Technological skills	57
▶ Net flow of international students	16

Training & education	Rank
Employee training	62
Total public expenditure on education	35
Higher education achievement	38
Pupil-teacher ratio (tertiary education)	22
Graduates in Sciences	59
Women with degrees	32

Scientific concentration	Rank
Total expenditure on R&D (%)	52
Total R&D personnel per capita	43
▶ Female researchers	2
R&D productivity by publication	23
Scientific and technical employment	51
High-tech patent grants	58
Robots in Education and R&D	36

TECHNOLOGY

Subfactors	2018	2019	2020	2021	2022
Regulatory framework	48	49	57	57	61
Capital	48	51	62	63	62
Technological framework	53	57	56	56	55

Regulatory framework	Rank
Starting a business	60
Enforcing contracts	48
▶ Immigration laws	15
Development & application of tech.	62
Scientific research legislation	60
Intellectual property rights	61

Capital	Rank
IT & media stock market capitalization	38
▷ Funding for technological development	62
▷ Banking and financial services	62
▷ Country credit rating	62
▷ Venture capital	62
Investment in Telecommunications	36

Technological framework	Rank
▷ Communications technology	62
Mobile Broadband subscribers	52
Wireless broadband	58
Internet users	25
Internet bandwidth speed	57
High-tech exports (%)	53

FUTURE READINESS

Subfactors	2018	2019	2020	2021	2022
Adaptive attitudes	49	57	49	50	49
Business agility	37	48	39	43	37
IT integration	52	52	52	59	53

Adaptive attitudes	Rank
E-Participation	27
Internet retailing	39
Tablet possession	40
Smartphone possession	50
Attitudes toward globalization	61

Business agility	Rank
▶ Opportunities and threats	14
World robots distribution	36
Agility of companies	57
Use of big data and analytics	41
Knowledge transfer	56
▶ Entrepreneurial fear of failure	8

IT integration	Rank
E-Government	29
Public-private partnerships	57
Cyber security	61
Software piracy	58
Government cyber security capacity	33
Privacy protection by law content	31

	OVERALL					KNOWLEDGE				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Argentina	59	59	61	59	61	58	50	55	58	62
Australia	14	15	20	14	16	15	17	19	14	15
Austria	20	17	16	18	22	10	11	10	13	16
Bahrain	-	-	-	32	38	-	-	-	34	36
Belgium	25	25	26	23	15	23	21	21	21	12
Botswana	-	-	63	61	60	-	-	64	55	52
Brazil	57	51	51	52	57	59	57	51	51	57
Bulgaria	45	45	52	48	55	46	47	53	48	53
Canada	11	12	13	10	11	05	05	07	03	04

	KNOWLEDGE			TECHNOLOGY			FUTURE READINESS			
	Talent	Training & education	Scientific concentration	Regulatory framework	Capital	Technological framework	Adaptive attitudes	Business agility	IT integration	
Argentina	61	60	50	57	63	56	55	38	53	Argentina
Australia	08	28	16	15	16	31	04	42	23	Australia
Austria	20	11	17	34	34	38	24	22	13	Austria
Bahrain	15	55	34	29	47	14	49	32	50	Bahrain
Belgium	07	22	18	05	18	39	39	09	15	Belgium

1. Factors Breakdown

Shows the 5-years evolution of the sub-factors rankings composing the three factors of Knowledge, Technology and Future Readiness.

2. 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 54 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.

Striving towards being a digital nation in the era of artificial intelligence

Professor Arturo Bris
Director
IMD World Competitiveness Center

National strategies pay heed to the key role that technology is currently playing in accelerating economic growth and generating prosperity. Just look at the transformational impact of automation on industries such as automotive, logistics, and engineering, or the significant increase in service exports (mostly technology-related) in most developed countries. In many cases, we observe that technology has contributed to making countries more competitive.

And yet, in the western world, the revolution in robotics and automation for the last two decades – together with the incorporation of new technologies such as big data analytics, blockchain, and machine learning – has not been accompanied by significant improvements in productivity. Overall, between 2008 and 2004, this metric, measured as GDP per employee, has stayed flat.

Building "digital nations" – by which we mean countries that facilitate the full adoption of digital technologies by companies and individuals – should be a priority, and indeed the top countries in this year's IMD Digital Competitiveness Ranking are those that could be considered as such.

This year has been characterized by the emergence of Artificial Intelligence (AI) as a transformative technology for our societies. AI, first and foremost, is going to generate productivity gains by automating many tasks that previously required human intervention. This will create such a degree of efficiency that costs will be reduced, but this could have a negative effect on employment levels. By providing personalized services, however, AI will improve quality of life and satisfaction.

It is possible that AI could help us solve some of our most pressing environmental and social challenges through still unthinkable creative solutions. AI will transform our economies and help develop some sectors, though this could be at the expense of others.

Also, let us not forget that, by allowing the processing of data in a much faster and effective way, AI will speed up the digitalization of societies and therefore the growth of digital nations.

The potential of AI does not obscure the fact that to make algorithms work, access to large amounts of information is needed, posing a risk to privacy and raising ethical and regulatory concerns. This can be dealt with by a national and global response.

Given there is a certain consensus that AI will create new jobs, but also one saying it will destroy them, how it will ultimately fare in terms of social development is unclear. In this context, what is in store for those digital nations that are undergoing the AI revolution?

We hope this year's IMD World Digital Competitiveness Ranking helps shed light on the key factors that, at a national level, could really help countries to combine prosperity and economic development with digital transformation and the development of AI solutions.

What makes a nation truly digital?

Since the Center's first digital ranking in 2017, we have defended the view that granting individuals access to technology, and therefore enabling them to reap the rewards, is primarily the responsibility of governments. Only when the necessary digital infrastructure and regulations are in place can private-sector companies develop solutions that improve our quality of life. Lessons from consistently high performers in our ranking since its inception — the United States (first in 2023, Denmark (fourth in 2023), Singapore (third in 2023), and Estonia (18th in 2023) — are illustrative examples of the possible paths towards incorporating technology from the top down.

1. The first ingredient in the recipe for a successful digital nation is digital infrastructure. It will surprise many readers that, in our assessment of digital competitiveness, China is not in the top 10. One fundamental reason for this is that the quality of its digital infrastructure is not uniform across the country. On top of that, the country's internet bandwidth speed ranks just 18th out of 64 economies and the quality of its communications technology ranks 14th. The World Bank has identified five countries that account for 75% of the total investment in digital infrastructure in the world in 2023: China, Brazil, India, Indonesia, and Vietnam. These countries captured $68.3 billion in investments. [1]Seen in terms of per-capita contributions, the figures are modest for China though.

2. Infrastructure development requires both data governance and digital governance. Regulation is paramount for making sure that the benefits of technology are captured by society and not mis-used or indeed exploited by corporations. Ironically, the top country in this year's ranking — the United States — ranks just 37th in *Private Protection by Law Content*; an indicator measuring the extent to which private data is protected. By contrast, it should not be surprising that many European countries populate the list of the most digitally advanced nations (there are five in just the top 10) and that this is largely due to the fact that the EU Data Governance Act (DGA), enacted in 2022 and taking effect in September 2023, has established robust procedures to facilitate the safe utilization of certain protected public-sector data subject to the rights of individual citizens, such as trade secrets, personal data, and data protected by intellectual property.[2]

3. One salient distinctive factor among the most digital of nations is a good availability of digital identity programs. They take the form of technology-driven ID solutions, like in Denmark or Estonia, or personal IDs based on biometric individual characteristics such as Aadhaar in India. Digital identity is the main tool for making e-government solutions feasible, but also for integrating private-sector applications of technology into citizens' daily lives. National ID programs also differ in terms of how extended they are across the population and range from being mandatory (e.g., Estonia and Saudi Arabia) to voluntary (e.g., the EU), where take-up is subsequently lower.[3]

4. A combination of digital infrastructure and digital governance is needed to make technology available to citizens. Then, a final requirement for making a digital nation is the cultural acceptance of technology. Such acceptance can be endogenous to both infrastructure and regulation in the sense that people's trust in their national framework can be jeopardized by either weak data protection or unsafe digital infrastructure, or a combination of both. This results in different degrees of technology utilization across countries. For instance, Estonia ranks first in the 2023 World Digital Competitiveness Ranking in the E-Participation indicator, followed by South Korea, the United States, and Japan. Botswana, Jordan, and Venezuela come last, but Belgium (56th) and Qatar (57th) are also stragglers.

What are the social and economic benefits of national digital transformation? Estonia's digital signature has saved the country 2% of its GDP each year, according to data from the OECD. Additionally, its ICT sector contributes 7% to the country's output. Thus, digital nations are more efficient and cheaper to manage than their non-digital counterparts and allow the digital economy to develop faster and get bigger.[4]

Using data from the World Bank Development Indicators, **Figure 1** plots the relationship between internet usage and GDP per capita in developing economies. There is a strong correlation between the two (the R-Squared of the relationship is 70%), although it is not possible to conclude what the right causality is. Our rankings show the same relationship as this, as the correlation between the 2023 IMD World Competitiveness Ranking and the 2023 IMD World Digital Competitiveness Ranking is also very high.

---

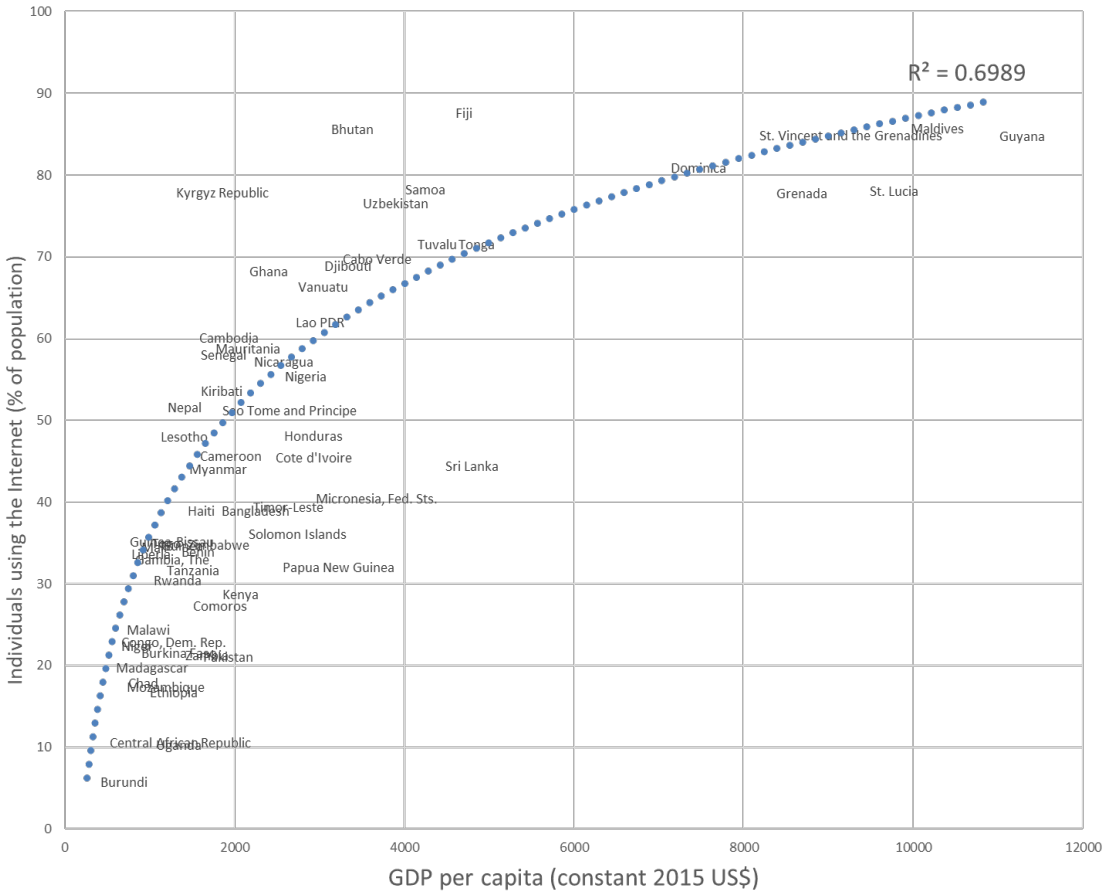
1 https://www.worldbank.org/en/news/press-release/2023/04/24/data-show-private-infrastructure-investment-continues-to-improve-following-pandemic-slump

2 See EU Data Governance Act 2022

3 The updated EU digital identity framework allows citizens to identify and authenticate themselves online without having to resort to commercial providers. However, it's not explicitly stated whether this is mandatory or voluntary.

4 OECD (2019), Digital Opportunities for Better Agricultural Policies, OECD Publishing, Paris, https://doi.org/10.1787/571a0812-en.

Figure 1: Internet usage and economic development
Source: World Bank Development Indicators. Data for 2022



The future of digital nations

In the coming years, countries pursuing the "digital imperative" (the need to incorporate technology into their economies) will be faced with headwinds, including the negative externalities of technology and the wealth and income inequalities that result from it. They will also have to grapple with the challenges inherent to achieving a national agenda that preserves both digital transformation and sustainability.

The Global Digital Compact proposed by the United Nations seems like a reasonable approach. It is an initiative proposed by Secretary-General António Guterres to ensure the responsible use of technologies, and it is to be agreed by September 2024. The Compact states the need to make digital agendas consistent with the UN Sustainable Development Goals.

There is abundant academic work showing the impact of digital technology on income inequality. Daud et al. (2020) investigated the relationship between financial development caused by technology and income inequality and concluded that, in the 54 countries analyzed between 2010 and 2015, the income inequality gap increased.[5] Interestingly, Nguyen (2022) was also able to demonstrate that digitalization narrows inequality in developed economies and widens it in developing economies. Therefore, the relationship between shaped[6]. It seems, then, that developing nations need to pay an initial inequality cost of digital transformation before it begins to see its social benefits emerge gradually.

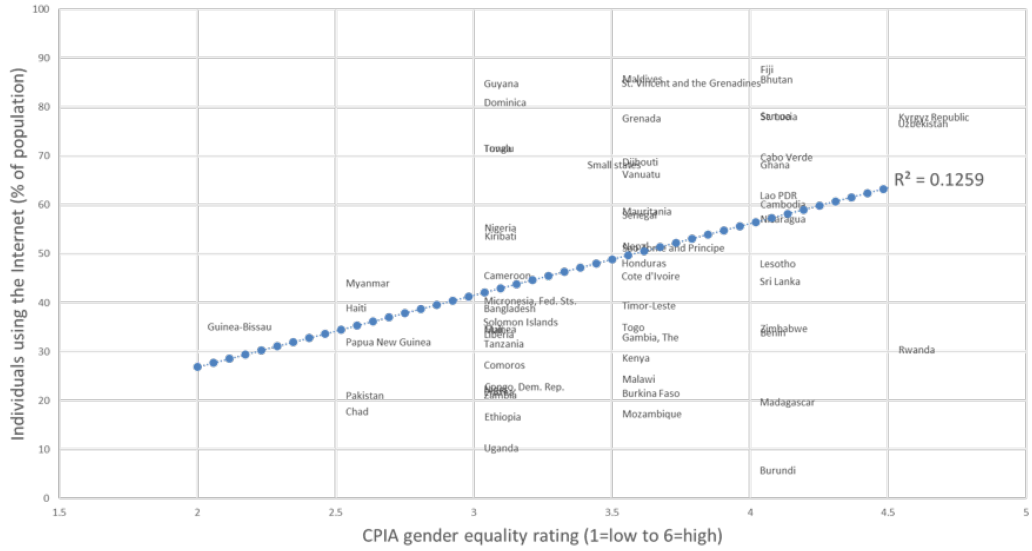
The relationship between digital transformation and ESG factors is also significant. The 2022 United Nations E-Government Survey[7] stressed the positive impact of

5 Mohd Daud, Siti Nurazira et al. "Financialization, digital technology and income inequality." Applied Economics Letters 28 (2020): 1339 - 1343.

6 Nguyen, Van. "Does Digitalization Widen Income Inequality? A Comparative Assessment for Advanced and Developing Economies." South East European Journal of Economics and Business 17 (2022): 154 -171.

7 UN E-Government Survey, available at https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2022

Figure 2: Technology and Gender Inequality
Source: World Bank Development Indicators. Data for 2022



digital technologies on closing the gender gap. Such a relationship is, however, difficult to isolate without considering the hidden factors behind the gender gap, such as economic development. **Figure 2** below shows, using two sets of World Bank data, that the relationship between access to the internet and gender inequality is weak, at least in developing economies.

On the other hand, it cannot be denied that digital transformation comes at the expense of natural resources and the environment. A recent paper[8] by Sharma (2022) finds that digital technologies account for 4% of greenhouse gases, and that their energy consumption increases by 9% per year. One challenge for the future is therefore how to continue the trend towards more technology while preserving social and environmental goals.

Digital nations and artificial intelligence: some guidance

It is not our intention to describe numerous applications of AI technology in this report. However, our analysis shows that countries that want to excel in the use of AI need to focus on the following five priorities:

1. Data access

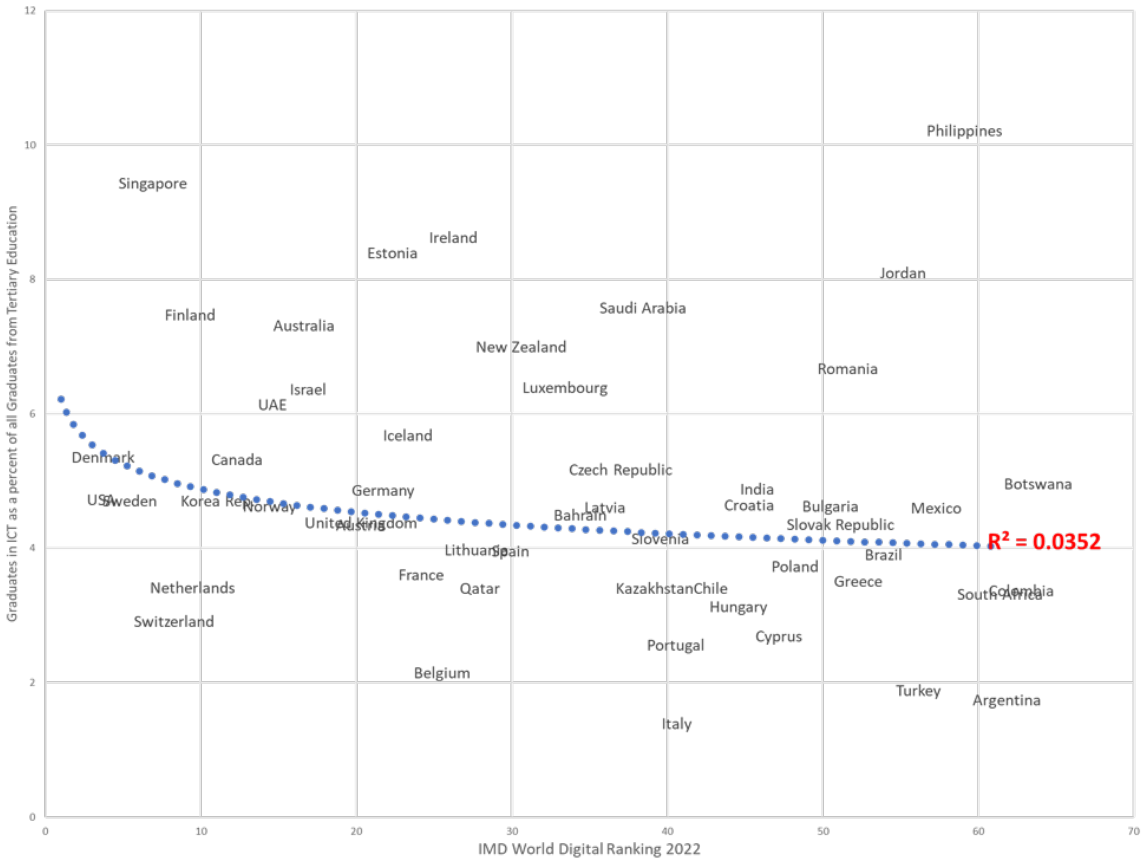
There is a dilemma of facilitating access to data on the one hand, and respecting privacy concerns on the other. Think, for example, of the banking industry, where the loan application process can be made not only faster, but also more fair and less prone to errors. In a seminal paper, Bartlett et al. (2022) showed[9] that fintech algorithms charge minority borrowers 40% less on average than face-to-face lenders, which points to lesser racial discrimination by AI. However, loan approval requires access to data that is not under the possession of banks (social network activity, location data, purchasing and credit-card history) and which therefore requires regulatory clearance and customer approval. How this data is accessed raises questions about how data can travel across borders and whether data-exporting countries can monetize it. The United Nations Conference on Trade and Development's (UNCTAD's) 2021 Digital Economy Report shows that 90% of the market capitalization of digital platforms is either the United States' or China's, [10] and calls for a more equitable system of data flows across countries.

8 Sharma, Pawankumar and Dash, Bibhu, The Digital Carbon Footprint: Threat to An Environmentally Sustainable Future (June 30, 2022). International Journal of Computer Science & Information Technology (IJCSIT) Vol 14, No 3, June 2022, Available at SSRN: https://ssrn.com/abstract=4335349

9 Robert Bartlett, Adair Morse, Richard Stanton, Nancy Wallace (2022), "Consumer-lending discrimination in the FinTech Era," Journal of Financial Economics, Volume 143, Issue 1, 30-56.

10 UNCTAD Digital Economy Report 2021, accessible at https://unctad.org/system/files/official-document/der2021_en.pdf

Figure 3: Digital Talent and Digital Competitiveness
Source of x axis: IMD World Competitiveness Center. The vertical axis plots the percentage of graduates from tertiary education graduating from Information and Communication Technologies programs, both sexes (%) in 2022. Source of y axis: OECD.



2. Digital talent

If AI is going to provide employment opportunities for citizens, nations need to provide the necessary digital skills. There is ample evidence across our rankings that national competitiveness results from investment in education and the provision of those skills required by the labor market. When it comes to technology and AI, the need is even greater.

However, in our analysis of the 2023 IMD World Talent Ranking, we emphasized how, in a world in which talent is global, the importance of national education systems is decreasing. This is so because, today, companies can hire talent anywhere. Besides, because of the opportunities provided by technology, employees can now work remotely – and, in the post-pandemic era, we have seen the emergence of digital nomads and international remote workers. So, for countries, it is important to develop AI skills so locals can innovate and come up with AI applications that make the economy more efficient and encourage the manufacturing of AI hardware (like sensors) at home. For other AI-related activities (like control and monitoring of systems, compliance-related tasks, and so on) the labor market will be global.

The evidence of this can be seen in **Figure 3**, where the relationship between graduates with ICT degrees in tertiary education and the overall digital competitiveness of a country is statistically insignificant (with an R-Squared of 3.5%).

Although it seems that most digitally competitive countries nurture high numbers of digital graduates, it is not a pre-requisite for digital competitiveness. Saudi Arabia has improved its digital skills thanks to the implementation of Vision 2030, yet it still requires opportunities for those graduates. At the same time, Switzerland and the Netherlands, say, do not specialize in digital education, and yet they are able to attract the talent they need, ending up on the top of the rankings.

3. AI regulation

Replacing humans with algorithms requires regulation. We need to control the extent to which private data is exploited, we need rules that solve new and important ethical dilemmas, and we need to protect a person's personal image, voice, and output so they are not misused by technology. Such regulation is starting to take shape at the national and regional level, and it looks set to continue in the coming years with a global standardization of practices and rules. Without global

coordination, there will be individual country incentives to protect one´s interest and benefit from other countries´ goodwill.

The European Union, in turn, has decided to regulate AI from the top down through the EU AI Act.[11] The European Commission's proposal for an AI framework, the first of its kind in the world, was published on 21 April 2021. GDPR (General Data Protection Regulation) was the seed that set the principles under which AI is regulated in Europe – namely, that data belongs not to the government or the private sector, but to individuals themselves. The EU distinguishes between "Limited-Risk" and "High-Risk" AI systems and foresees different degrees of transparency for each.

AI policies in the US are established in the Algorithmic Accountability Act of 2022, under which companies are required to assess the impact of their systems on privacy and transparency. But this regulation is, as of today, still not enacted.

Any global system to come should build on the fruitful and successful coordination of EU policies that helped make the EU AI Act a reality. It is, of course, difficult to foresee the interest of AI powers such as China and India to agree to regulations that curtail the power of the state in favor of individual rights and privacy.

4. AI infrastructure investment

Unlike their approach to general digital infrastructure, governments today rely on the private sector to generate AI projects and solutions. At the end of 2019, for instance, privately held AI companies in the US attracted nearly USD40bn across more than 3,100 transactions[12] (Arnold et al, 2020). In China it is the state who replaces private capital and with similar outcomes.

The role of the state is to provide adequate regulation and talent (see the previous section), but sometimes it takes the direct participation of AI companies. The German government, for instance, plans to invest one billion euros in AI during 2023.[13] Relative to China and the United States, figures in other countries are modest by comparison.

5. Job creation with or without AI

A recent study by McKinsey estimates[14] that in the coming years, and at least in the United States, more people will move toward high-wage jobs – and that fewer workers will be willing to take lower-wage service jobs. This means that routine, low-skilled, and low-paid jobs can easily be done by robots or AI applications. Generative AI in particular will take over 30% of the hours currently worked by humans, according to the study.

Two questions that the report does not answer is (1) whether our economies can generate enough high-wage jobs for those whose tasks are becoming automated, and (2) whether AI will cause a reduction in the salaries of those who will willingly work less once part of their tasks are taken over by machines.

These are particularly important questions for emerging markets. Additionally, we do not know how the introduction of AI applications to the performance of tasks currently outsourced to countries with cheaper labor will impact the latter countries. For instance, apparel manufactures like Inditex and H&M outsource manufacturing to lower-wage countries like Bangladesh and Turkey. In a new era of smart automation operating at near-zero marginal cost, the damage to employment in such developing economies can be severe.

We should also be concerned about how AI could impact the ability of developing economies to compete with "AI-advanced" economies once AI has reduced their cost advantage. There is a risk of the world becoming more fragmented in terms of trade in both goods and services. This will ultimately impact unemployment levels everywhere.

Data protection is also essential for developments in artificial intelligence, and our 2023 findings on this topic – via data we gather on cybersecurity – will be presented by my colleagues in the report that precedes this one.

---

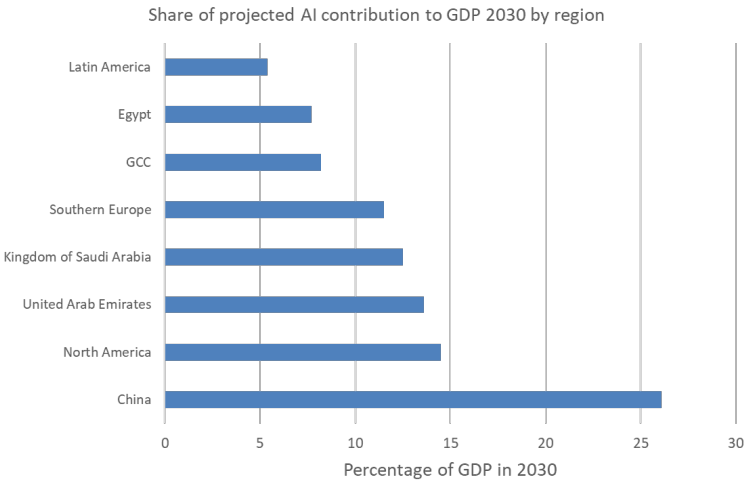
11 See https://www.weforum.org/agenda/2023/06/european-union-ai-act-explained/

12 Arnold Zachary, Ilya Rahkovsky, and Tina Huang (2020), "Tracking AI Investment: Initial Findings From the Private Markets," Center for Security and Emerging Technology.

13 https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC1834265&blobtype=pdf

14 McKinsey 2023, "Generative AI and the Future of Work in America," available at https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america

Figure 4: AI Contribution to GDP in 2024
Source: PWC



The role of artificial intelligence in national competitiveness

AI is going to create efficiency gains, new business opportunities, new jobs, and therefore prosperity and economic growth. Our analysis above describes the risks –social, regulatory, and environmental –brought about by AI. But it seems that, on balance, AI is going to be a driver of prosperity and economic growth. Estimates by PWC shown in **Figure 4** indicate that in countries like China, the AI-related economy could represent more than 25% of GDP in 2030.

Notwithstanding, our key message this year is AI is going to create winners and losers, given the fact that even if the net effect of technology is an increase in the number of jobs available, these will benefit those countries that are currently massively investing in AI, and this will be at the expense of "poorer-AI" countries.

A system of global governance could help alleviate such inequalities. And this is not unrealistic, but how could we really help make it happen? To conclude this report, let us propose some guidance for such a global governance system:

1. AI governance cannot leave any country behind and must include the needs for better technology and infrastructure in emerging markets. The objective of such a global system must be to increase global prosperity. This will require some countries to make some sacrifices, particularly the more AI-developed ones.

2. Regulators must balance corporate interests to reduce costs and increase efficiencies with the national interest of employment generation and prosperity. What is good at the micro level may not be optimal at the aggregate, national, and global level. Therefore, governments must impose some of the costs of AI development on companies, either through taxes or by creating ecosystems where companies share some of their gains with society.

3. Those nations that are reluctant to abide by global rules must realize that it is in their own interest to have a global system that provides guidance and transparency. Otherwise, in a world of winners and losers, the Luddites will triumph and there will be soon a technology backlash where society will demand a return to a more human, less technology-centered, economy.

4. The efforts to regulate AI at the global level cannot be led by the United Nations. The UN has proven to be an obsolete organization based on a political system that emerged at the end of the Second World War and that gives a dominant position to countries that have lost relevance in the global economy, such as France and the UK, against other countries whose economies are bound to dominate in trade and technology in the 21st century, such as India, Saudi Arabia, and Brazil.

5. The main objective of AI, as with any other technology, is to increase human prosperity: that is, quality of life, life expectancy, availability of jobs, decent salaries, possibilities for education and healthcare and available infrastructure in a green economy. It is not to increase stock prices and replace jobs. Ultimately, AI must be able to make countries more competitive –otherwise, it is simply not a desirable technology.

Appendix: Sub-regions composition

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 ▪ Latvia	▪ Lithuania ▪ Poland ▪ Romania ▪ Slovenia ▪ Slovak Republic	
Western Asia & Africa	▪ Bahrain ▪ Botswana ▪ Israel ▪ Jordan ▪ Kuwait	▪ Qatar ▪ Saudi Arabia ▪ South Africa ▪ Turkey ▪ UAE	
Ex-CIS & Central Asia	▪ Kazakhstan ▪ Mongolia		
Eastern Asia	▪ China ▪ Hong Kong SAR ▪ Japan	▪ Korea Rep. ▪ Taiwan, China	**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	

Analysis of results

Dr José Caballero
Senior Economist
IMD World Competitiveness Center

Dr Christos Cabolis
Chief Economist & Head of Operations
IMD World Competitiveness Center

Marco Pistis
Research Specialist
IMD World Competitiveness Center

1. Introduction

This year's results see the US reclaiming the top position in the ranking, a testament to its robust performance across all three factors measured: knowledge, technology, and future readiness. The Netherlands takes second position, advancing four places by bolstering its standing in the knowledge and future readiness factors. Singapore ascends one position to claim third place by improving in the knowledge factor. Denmark, however, drops to fourth place, mainly due to the decline in future readiness and technology factors. Switzerland maintains fifth position, improving both technology and future readiness factors. Unsurprisingly, the top economies are characterized by the pillars of digital nations: digital talent, digital culture, and digital infrastructure.

At the regional level, Eastern Asia continues to lead, with North America and Western Europe in pursuit. Eastern Asia outperforms in all digital factors, notably outshining North America and Western Europe in both technology and future readiness subfactors. While Western Europe and North America exhibit similar scores in these subfactors, regional disparities in the knowledge factor account for Eastern Asia and North America's consistency as core hubs for digital innovation since the inception of the IMD World Digital Competitiveness Ranking (WDCR) in 2017.

We are pleased to welcome Kuwait to the WDCR for the first time. As with last year's edition, the economies of Russia and Ukraine are omitted from the ranking due to limited reliability of the data that was able to be collected.

Our model of digital competitiveness considers that in order for digital nations to thrive, they must possess an effective digital infrastructure, digital skills and competences, together with a culture that embraces digital innovation. These elements are intimately related to the factors analyzed by the WDCR: the knowledge factor, quantifying the quality of human capital; the technology factor, capturing the excellence of technological infrastructure; and the future readiness factor, assessing the degree to which technology is adopted by governments, business, and society at large. They are all necessary for countries to excel in the adoption of technology – including artificial intelligence (AI) – and its various applications at the corporate and individual level.

In what follows, we delve into the trends for digital competitiveness at both the regional and economy level. Our exploration this year pays special attention to findings concerning the cybersecurity measures undertaken by companies in the countries we study.

2. Regional trends

Regional digital competitiveness levels are mostly stationary in 2023 with few exceptions. **Figure 1** presents the regional overall digital competitiveness ranking trend for the years 2019 to 2023. Over the past year, North America and Ex-CIS and Central Asia have slightly improved their levels of digitalization; Eastern Asia, Western Europe, and South America have, to varying extents, worsened their average digital rankings compared to 2022. Southern Asia & the Pacific, Eastern Europe, and Western Asia & Africa remain relatively stable in their overall average positions.

In North America, digital competitiveness levels rise from an average 23rd to 22nd place, with the US and Mexico's improvements compensating for Canada's one position decline. Similarly, Ex-CIS and Central Asia's average digital competitiveness position rises to 48th (up one point from 2022). Eastern Asia remains the most digitally competitive region of the world. However, the average digital competitiveness ranking of the economies in this area (China, Hong Kong SAR, Japan, South Korea, and Taiwan) has declined by one position from 14th to 15th over the past year, confirming a declining trend that began

Figure 1: Average ranking positions by region in overall digital competitiveness 2019-2023

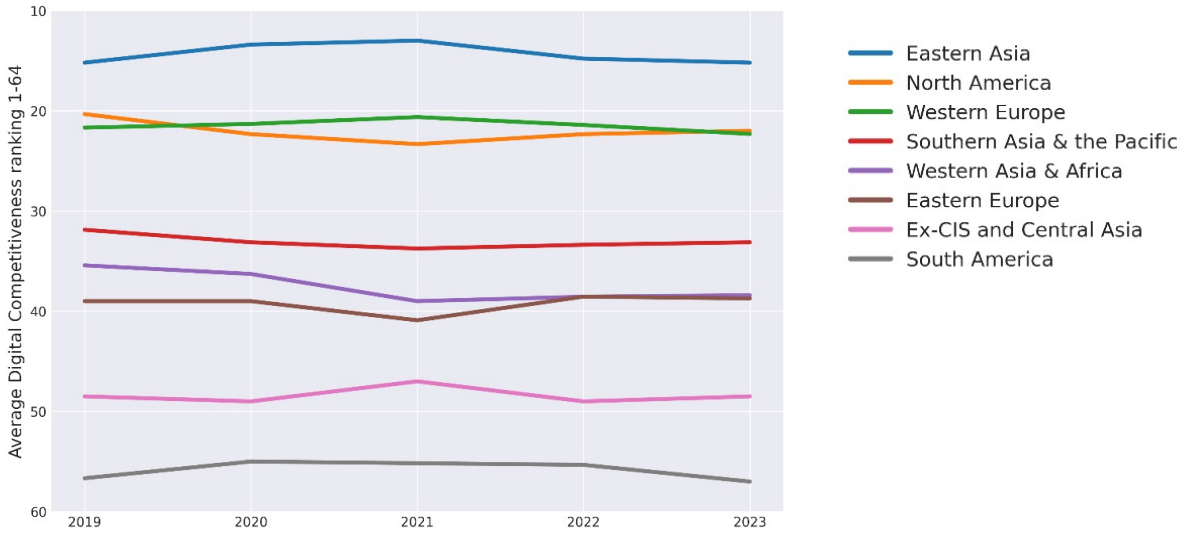
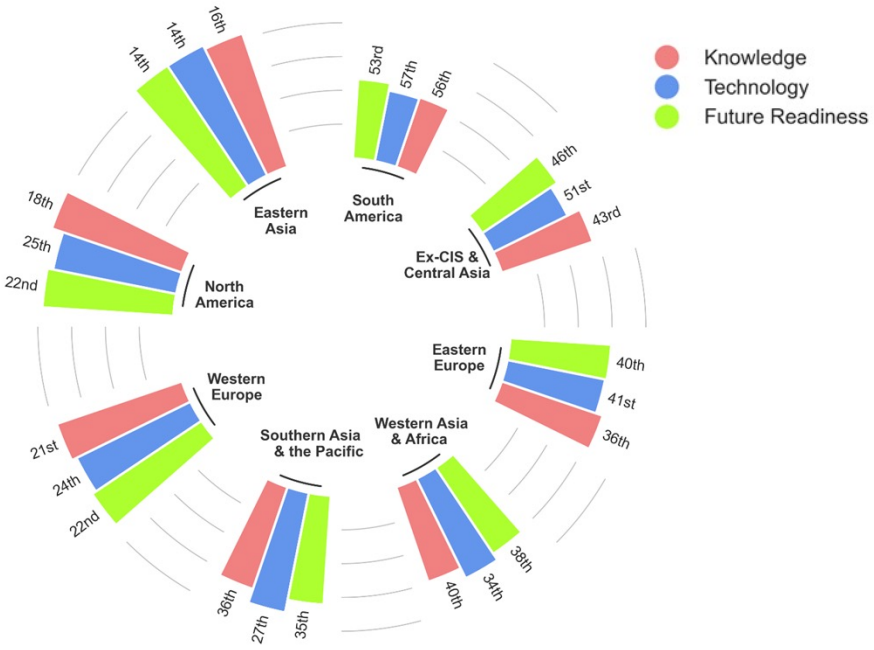


Figure 2: Average digital competitiveness factor ranking by region in 2023



in 2021. Western Europe follows a very similar path too, with an average digital competitiveness level in the region declining over the past two years to 22nd position. South American economies, on average, continue to lag behind in digitalization when compared to the rest of the world regions, further declining to 57th place in 2023. Finally, Eastern European, Southern Asia & the Pacific, Western Asian and African economies maintain a stable average digital competitiveness performance between 2022 and 2023.

Figure 2 presents the sub-regional average rankings in digital competitiveness at factor level. In 2023, Eastern Asia achieves top marks in all digital factors, significantly distancing North America and Western Europe in both technology and future readiness subfactors. While Western Europe and North America share similar scores in the latter subfactors, regional performances in the knowledge factor point to the fact that Eastern Asia and North America consistently remain the core hubs for digital innovation since the creation of the IMD World Digital Competitiveness Ranking in 2017. **Figure 2** also shows that Southern Asia and the Pacific, as well as Western Asia and Africa, are rapidly closing the gap with the most digitally competitive regions. The average rankings in the technology factor for these two regions highlight the fact that adoption and diffusion of digital technologies in these economies is advancing rapidly. This trend will likely facilitate the progression of these economies as the next innovation challengers to the Eastern Asian, North American, and Western European dominance.

3. Top 10 economies in digital competitiveness

The US returns to the top position in the overall ranking of the IMD World Digital Competitiveness Ranking 2023. The Netherlands moves up to second place (from sixth) and Singapore to third (from fourth). While Denmark declines to the fourth spot down from the top position, Switzerland remains in fifth place. The Republic of Korea rises to sixth place. Conversely, Sweden declines four positions to seventh and Finland one rank to eighth. Taiwan rises to the ninth position, returning to the top 10. Hong Kong SAR rounds up the top of the ranking, dropping one position. The US ranks first out of 64 economies we cover in the overall WDCR. At factor level, the US ranks second in future readiness, second in knowledge, and sixth in technology. Such a strong performance in the digital factors enables the country to recapture the top place in this edition of the ranking. At the subfactor level, the US ranks first in scientific concentration and capital, and second in adaptive attitudes and business agility. However, it's placed at 12th in the talent subfactor, reaching only the 20th position in the training and education subfactor.

The US' top position is underlined by its robust performance at the indicator level, such as in internet retailing and software piracy (first in both), as well as in the availability of venture capital (second), robots in education, and R&D and R&D productivity by publication (number of scientific articles over R&D expenditure as a percentage of GDP), ranking third in the latter two criteria. In addition, the country's performance is strongly improving in several indicators, including internet bandwidth speed (third), the effectiveness of public-private partnerships (ninth), and mobile broadband subscribers (11th). There are, however, some signs of concern for the sustainability of the country's digital competitiveness. For instance, it ranks 35th in PISA (math) educational assessment, 37th in the privacy protection by law content, 41st in the impact of immigration laws on competitiveness, 46th in graduates in sciences, and 50th in attitudes toward globalization. The US also drops positions in various indicators such as e-participation (10th), the efficiency of banking and financial services (18th), investment in telecommunications (as a percentage of GDP, 25th), and the effectiveness of communications technology (35th).

The Netherlands ranks second in the overall WDCR, which represents an improvement (from sixth). The latter largely originates in its advancement in two factors, future readiness and knowledge, in which the country ranks fourth and seventh respectively. It ranks fifth in the technology factor. Among the subfactors, the Netherlands reaches its best performance in regulatory framework and capital (second in both), talent (third), and adaptive attitudes (sixth). The country's performance in regulatory framework played an important role in its advancement in the overall ranking.

The crucial contributors to the Netherlands' rise in the ranking include its improvements in indicators such as the adequacy of the private sector's cybersecurity (12th), total public expenditure on education (22nd), and higher education achievement (percentage of population with at least tertiary education, 16th). Other contributors are the effectiveness of scientific research legislation (fourth), e-participation (fifth), agility of companies (10th), and the private sector's use of big data and analytics to support decision-making (13th). Among the strengths of the Netherlands at the indicator level are the country credit rating (first) and three indicators in which it ranks second: its attractiveness for foreign highly skilled personnel, IT and media stock market capitalization (percentage of total stock market capitalization), and the adequacy of the implementation of intellectual property rights. The country also performs robustly (third) in knowledge transfer, scientific and technical employment (percentage of total employment), and the availability of senior managers with significant international experience. The Netherlands' weaknesses include government cybersecurity capacity (41st), investment in telecommunications (45th), and contract enforcement (45th). Other indicators in which the Netherlands' performance is deficient include female researchers (percentage of total researchers, 47th) and graduates in sciences (51st). Also, the country declines in internet bandwidth speed (16th) and attitudes toward globalization (11th).

Singapore ranks third in the overall WDCR, progressing one position. It improves in the knowledge factor, reaching the third position. Singapore remains first in the technology factor and 10th in the future readiness factor. At the subfactor level, Singapore is first in the regulatory framework, second in the technological framework, fourth in talent, and ninth in training and education. Although it improves in the adaptive attitudes subfactor (13th), it declines in the business agility subfactor (14th). Singapore's improvement in the overall WDCR is largely due to its continued strong performance in talent, regulatory and technological frameworks, and its improvement in adaptive attitudes.

At the indicator level, progress in some criteria contributes to Singapore's advancement in the overall ranking. These indicators include wireless broadband (penetration rate per 100 people, sixth), tablet possession (percentage

of households, 15th), and scientific and technical employment (22nd). Singapore's strengths include high-tech patent grants (first), enforcing contracts (first), internet bandwidth speed (first), and country credit rating (first). It also performs strongly in higher education achievement and PISA (math) educational assessment (ranking second in both). There are some significant declines in Singapore's performance. It decreases in the effectiveness of public-private partnerships (eighth), the impact of immigration laws (49th), the availability of senior managers with significant international experience (11th), attitudes toward globalization (13th), and the agility of companies (24th). Among Singapore's weaknesses are R&D productivity by publication (42nd), female researchers (45th), privacy protection by law content (50th), and investment in telecommunications (58th).

Denmark loses the top position, dropping to the fourth spot in the overall ranking. The country drops in the future readiness factor (third from first) and to ninth in the knowledge factor (from sixth). It remains in seventh place in the technology factor. Denmark's decline is mainly due to its dwindling performance in the future readiness subfactors, dropping to eighth place in adaptive attitudes (from fifth), to sixth in business agility (from first), and to second in IT integration (from first). It also experiences declines in other subfactors including training and education (12th from seventh) and regulatory framework (10th from sixth). Denmark continues to perform strongly in the talent (fifth) and technological framework (sixth) subfactors.

Denmark experiences significant declines in several indicators, including opportunities and threats (whether companies respond efficiently to opportunities and threats, sixth), the impact of immigration laws (51st), and the quality of education as measured by the pupil-teacher ratio (tertiary education, 19th). Denmark also performs feebly in R&D productivity by publication (43rd) and in IT and media stock market capitalization (55th). It advances significantly, however, in investment in telecommunications (16th) and in graduates in sciences (33rd). The country also continues to perform strongly (first) in several indicators such as the efficiency of banking and financial services and of communications technology, country credit rating, and e-government. Other strengths (ranking second) are the effective management of cities, funding for technological development, and the prioritization of employee training by the private sector.

Switzerland remains in fifth position in the overall WDCR. It remains top in the knowledge factor and improves in the technology (10th) and future readiness factors (sixth). The country continues to perform robustly in the talent (second), training and education (seventh), regulatory framework (fourth), business agility (seventh), and IT integration (sixth) subfactors. There are some declines in the scientific concentration (10th) and adaptive attitudes (16th) subfactors.

Switzerland progresses significantly in mobile broadband subscribers (first), smartphone possession (20th), total public expenditure on education (14th), and the impact of immigration laws (16th). The country's strengths (ranking first) include the effectiveness of scientific research legislation, the effective enforcement of intellectual property rights, the availability of senior managers with significant international experience, the attractiveness of the country for foreign highly skilled personnel, mobile broadband subscribers, country credit rating, and knowledge transfer between the academic and private sectors. Among its strengths are also privacy protection by law content (third), the prioritization of employee training (fourth), and entrepreneurial fear of failure (fifth). Among Switzerland's largest declines are management of cities (10th), cybersecurity (20th), the use of big data and analytics (30th), e-government (22nd), availability of venture capital (18th), and e-participation (38th). Some of Switzerland's weaknesses are enforcing contracts (40th), wireless broadband (47th), and IT and media stock market capitalization (50th).

The Republic of Korea moves up to sixth position in the overall ranking. Such a rise is due to the country's strong performance in all digital competitiveness factors, improving in all of them. It ranks first in the future readiness factor, 10th in knowledge and 12th in technology. Korea's strongest performances at the subfactor level are in training and rducation (sixth), scientific concentration (second), technological framework (eighth), adaptive attitudes (first), and business agility (third). Its lowest ranking at this level is in the talent subfactor (31st), followed by the regulatory framework subfactor (26th).

At the indicator level, Korea advances in the quality of education as measured by the pupil-teacher ratio (tertiary education, 25th), total public expenditure on education (26th), prioritization of employee training (23rd), and enforcement of intellectual property rights (28th). Although it progresses in the availability of senior manager with international experience and the effectiveness of public-private partnerships, Korea's performance in this regard remains feeble (51st and 40th respectively). It also performs deficiently and drops positions in several indicators including the availability of funding for technological development (36th), the private sector's efficiency in dealing with opportunities

and threats (43rd), investment in telecommunications (23rd), agility of companies (28th), and impact of immigration laws (46th).

Korea performs strongly (second) in total expenditure on R&D (percentage of GDP), entrepreneurial fear of failure, enforcing contracts, and internet retailing. It also ranks third in world robot distribution, IT & media stock market capitalization, high-tech patent grants, and e-government. Conversely, Korea ranks 44th in the availability of venture capital, 47th in the country's attractiveness for foreign highly skilled personnel, 48th in availability of digital/technological skills, 50th in effectiveness of banking and financial services, 51st in availability of senior managers with international experience, 52nd in the support that the legal environment provides to the development and application of technology, and 55th in female researchers.

Sweden drops to seventh position (from third) in the overall ranking. Sweden declines in all factors, ranking fifth in knowledge (from second), eighth in future readiness (from fourth), and 11th in technology (from fifth). At the subfactor level, it declines in all except training and education, in which Sweden remains in fourth position. Among the more significant drops are in the talent (13th), technological framework (17th), and business agility (17th) subfactors. Sweden, however, remains in strong positions in the scientific concentration (fourth), regulatory framework (seventh), capital (eighth), and IT integration (eighth) subfactors.

Sweden's sluggish performance is largely due to significant declines in several indicators including total R&D personnel per capita (13th), knowledge transfer (ninth), the availability of digital/technological skills (10th), and internet bandwidth speed (20th). Other aspects of the country's deficient performance are in the attractiveness of the country for foreign highly skilled personnel (29th), immigration laws (34th), the effectiveness of public-private partnerships (33rd) and cybersecurity (26th), and the private sector's efficiency in responding to market opportunities and threats (32nd). Sweden's weaknesses include R&D productivity by publication (38th), female researchers (41st), smartphone possession (41st), and investment in telecommunications (49th). On the positive side of the country's performance, Sweden improves in several indicators including e-participation (29th) and the private sector's use of big data and analytics (ninth). In addition, the country remains in a leading position (first) in tablet possession, scientific and technical employment, and country credit rating. Other strengths include development and application of technology (fourth), total expenditure on R&D (fifth), total public expenditure on education (fifth), and attitudes toward globalization (fifth).

Finland drops to eighth place (from seventh) in the overall ranking. At factor level, it also declines to 11th in knowledge (from ninth) and to ninth in technology (from eighth) but improves in future readiness, moving up to fifth (from sixth). Finland drops in all the subfactors related to knowledge, ranking 11th in talent, 19th in training and education, and 13th in scientific concentration. It also drops to 21st position in business agility (from 16th). However, the countryremains in a robust position (third) in the adaptive attitudes and IT integration subfactors. In addition, it improves in the regulatory framework subfactor (from fifth to third) and technological framework (from 12th to 11th).

Finland's overall decline is driven by sluggish performance in several indicators, including women with degrees (the share of women who have a degree) in which it ranks 20th, opportunities and threats (27th), higher education achievement (40th), and agility of companies (23rd). Other substantial declines are in the availability of senior managers with significant international experience (22nd), immigration laws (37th), and the availability of venture capital (albeit it remains in a strong position, eighth). Conversely, this year, Finland's considerable improvements are in e-participation (sixth) and high-tech exports (percentage of manufactured exports, 38th). Among the country's weaknesses are higher education achievement and female researchers (ranking 40th in both), and pupil-teacher ratio (tertiary education, 44th), R&D productivity by publication (48th), and investment in telecommunications (56th). Its strengths include the development and application of technology (first), e-government (second), efficiency of banking and financial services (second), availability of digital/technological skills (second), scientific research legislation (third), the effectiveness of public-private partnerships (third), and cybersecurity (third).

Taiwan returns to the overall top 10 in ninth position. It improves in the technology (third) and future readiness (seventh) factors and remains in the 18th spot in knowledge. Taiwan reaches the top place in the business agility subfactor. It also performs in other subfactors such as capital and technological framework (fifth in both) and, to a lesser extent, in training and education (10th). Taiwan's lowest ranking positions at the subfactor level are in talent (22nd), scientific concentration (21st), and adaptive attitudes (17th).

At the indicator level, Taiwan's largest improvements are in investment in telecommunications (46th), women with degrees (eighth), internet bandwidth speed (13th), and tablet possession (percentage of households, 20th). Conversely, its largest declines are in the availability of senior managers with strong international experience (40th), cybersecurity (19th), development and application of technology (25th), scientific research legislation (16th), and the availability of venture capital (19th).

On the one hand, among Taiwan's strengths (first) are agility of companies, IT and media stock market capitalization, use of big data and analytics, mobile broadband subscribers, and total R&D personnel per capita. It performs robustly in higher education achievement (third), total expenditure on R&D (third), PISA (math) educational assessment (fourth), high-tech exports (fourth), and opportunities and threats (fifth). On the other hand, its weaknesses include privacy protection by law content (40th), availability of senior managers with significant international experience (40th), attractiveness of the economy to foreign highly skilled personnel (44th), and investment in telecommunications (46th). In addition, Taiwan performs poorly in scientific and technical employment (47th), pupil-teacher ratio (tertiary education, 50th), total public expenditure on education (52nd), and percentage of female researchers (54th).

Hong Kong SAR drops one position to 10th place in the overall WDCR. Hong Kong ranks sixth in knowledge and 17th in future readiness, which represents an improvement of one position in both factors. It remains in second place in the technology factor. Hong Kong performs strongly in all knowledge subfactors, ranking sixth in talent, fifth in training and education, and eighth in scientific concentration. It remains first in the technological framework subfactor, improving in regulatory framework (sixth) and adaptive attitudes (fifth). Its lowest ranking position at the subfactor level is IT integration (47th).

Hong Kong's slight decline in the overall digital ranking is largely due to significant drops in the efficiency of banking and financial services (13th), cybersecurity (14th), use of big data and analytics (23rd), availability of venture capital (21st), total public expenditure on education (50th), and investment in telecommunications (57th).

At the indicator level, however, Hong Kong substantially improves in the number of robots in education and R&D (34th), internet retailing (eighth), its attractiveness for foreign highly skilled personnel (23rd), and the effective management of cities (third). In addition, Hong Kong performs robustly in high-tech exports (first), graduates in sciences (first), high-tech patent grants (second), and smartphone possession (second). Other strengths include wireless broadband (penetration rate per 100 people) and PISA (math) educational assessment, ranking third in both criteria. Its lowest ranking positions at the indicator level are in privacy protection by law content (64th), investment in telecommunications (57th), and total public expenditure on education (50th). Other weaknesses are government cybersecurity capacity (49th) and total expenditure on R&D (41st).

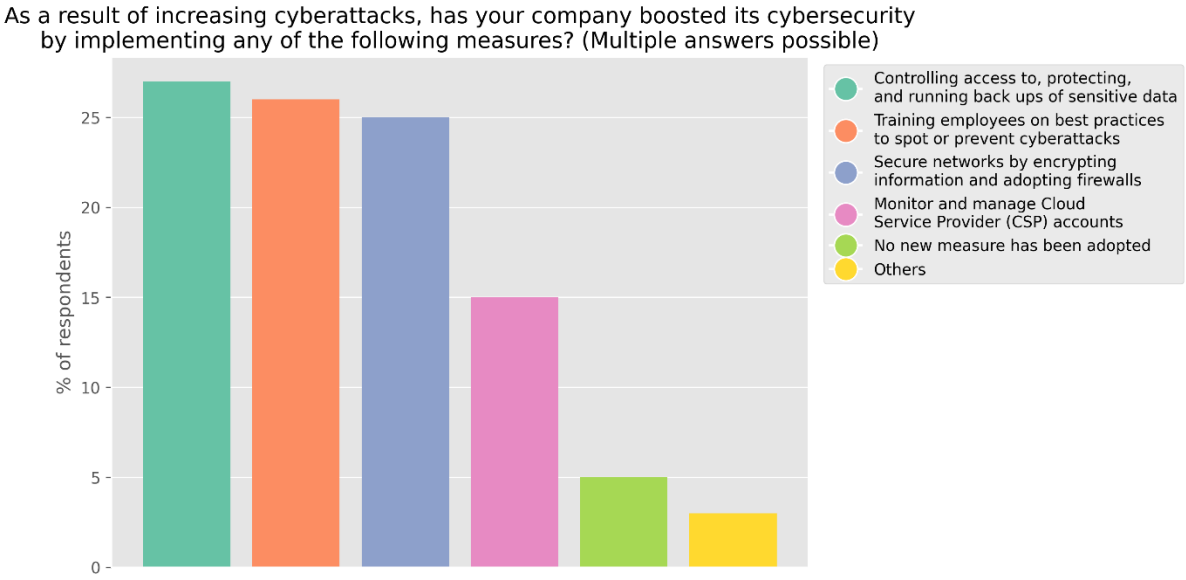
4. Cybersecurity challenges and digital competitiveness

The pandemic forced the proliferation of digital communication. In the professional domain, economies that exhibited the infrastructure that supported remote work embraced the hybrid employment models we currently observe worldwide. In the personal realm, the lockdown and plunge of traveling forced people to digitally connect with family and friends. The rapid technological innovations allowed for a profound change of the digital landscape. The increasing use of technological innovations and expansion of digital society, however, also increased the probability of potential compromises. In fact, the expansion of digital society has also contributed to a surge of cybercrime.

The numbers related to cybercrime are staggering. In 2019, before the start of the COVID-19 pandemic, Statista estimated the cost of cybercrime worldwide to be $1.16tn. By 2022, it reached the shocking amount of $7.08tn. As it was outlined above and in the preceding essay "Striving towards being a digital nation in the era of artificial intelligence", the digital infrastructure of an economy is of paramount importance because it provides the lower technological bound to secure the cyberworld of that economy.

However, the pressure to strengthen cybersecurity falls on companies as well. Proofpoint, Inc., for instance, estimates that among worldwide organizations, 85% experienced a bulk phishing attack while 76% had to deal with a situation involving ransomware. This strongly suggests that given the digital infrastructure of an economy, businesses must be proactive in finding ways to minimize the threat and instances of cyberattacks. Taking this into consideration, we asked the respon-

Figure 3



dents of our Executive Opinion Survey what steps their company has taken to address the increasing presence of cybercrime.

Figure 3 displays feedback from more than 4,000 executives across 64 economies. They overwhelmingly confirm the implementation of various measures. Predominantly, actions focus on the security of the infrastructure employed. Approximately 27% of the total responses indicated that they control access to, protect, and run backups of sensitive data, while 25% secure the integrity of their network by encrypting information and adopting firewalls. In addition, 26% of the respondents' companies enhance awareness by training their employees on best practices to identify or prevent cyberattacks, while 15% focus on monitoring and managing cloud service provider (CSP) accounts. This robust result emphasizes the widespread realization of the danger and the willingness to safeguard the digital presence of the companies. Notably, only 5% of the respondents declared no new measure was adopted in the past year.

The results remain consistent when we examine the size of the companies under consideration as well. **Figure 4** captures the responses from executives of large companies, that is, companies with more than 250 employees. In this category, the predominant new measures focus on increasing employee awareness. In contrast, for medium size companies with employees between 50 and 250 (**Figure 5**), and small companies with employees below 50 (**Figure 6**), employee training is the third most popular response. However, across all company sizes, the implementation of new measures stands out as the most frequent response.

The trend is similar when we break our sample between 'family' and 'non-family' businesses, although the detailed graphs are not provided here.

A notable difference emerges when we examine the share of executives who reported no additional measures taken. In large companies, only 1% of the respondents claim that no new measures were adopted, compared to 4% for medium-sized companies and to 11% for small companies. Similarly, there exists a much smaller difference between the 4% non-family businesses executives to the 6% of family businesses executives who did not implement any new measure since the year before.

Based on the available data, determining the reason for such an increase is challenging. The possible explanations include executives of small companies are being unaware of the magnitude of the thread, perceiving a low likelihood of exposure to cybercrime, or facing significant costs for implementing new measures. Alternatively, it may be that they were already actively engaged in a number of cybersecurity actions, rendering the need for new measures unnecessary in the previous year.

However, at the country level, results differ. **Figure 7** captures the relationship between the percentage of executives who responded that their companies did not adopt new cybersecurity measures in the preceding year (horizontal axis) and their responses to the survey question regarding the adequacy of cybersecurity addressed by corporations (vertical axis). This relationship is both intriguing and somewhat anticipated.

In economies where executives perceive an inadequate cybersecurity framework (Venezuela, for instance), they tend to implement additional measures within their companies, for instance, Venezuela. However,

Figure 4

As a result of increasing cyberattacks, has your company boosted its cybersecurity by implementing any of the following measures? (Multiple answers possible) - Large (more than 250 employees)

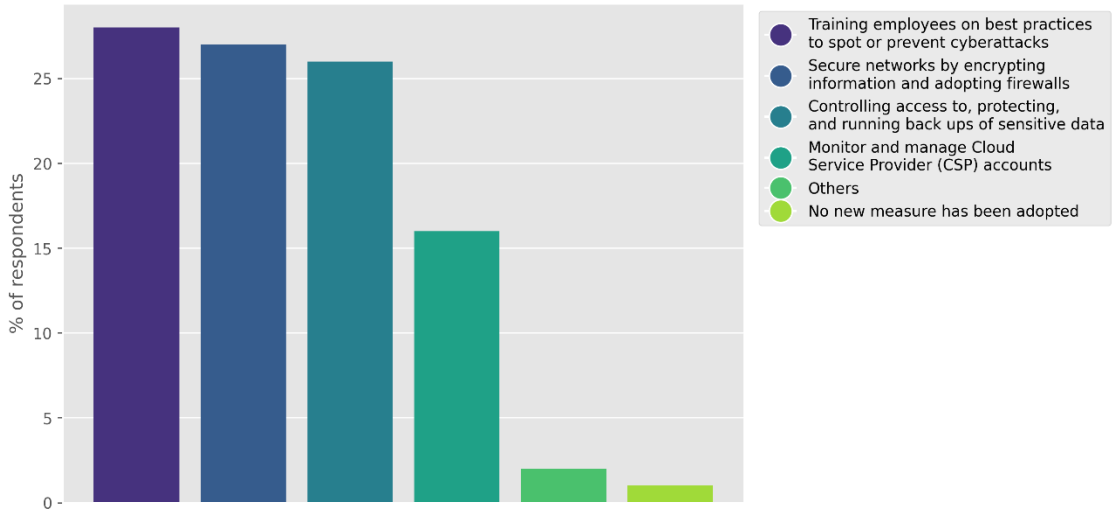


Figure 5

As a result of increasing cyberattacks, has your company boosted its cybersecurity by implementing any of the following measures? (Multiple answers possible) - Medium (from 50 to 250 employees)

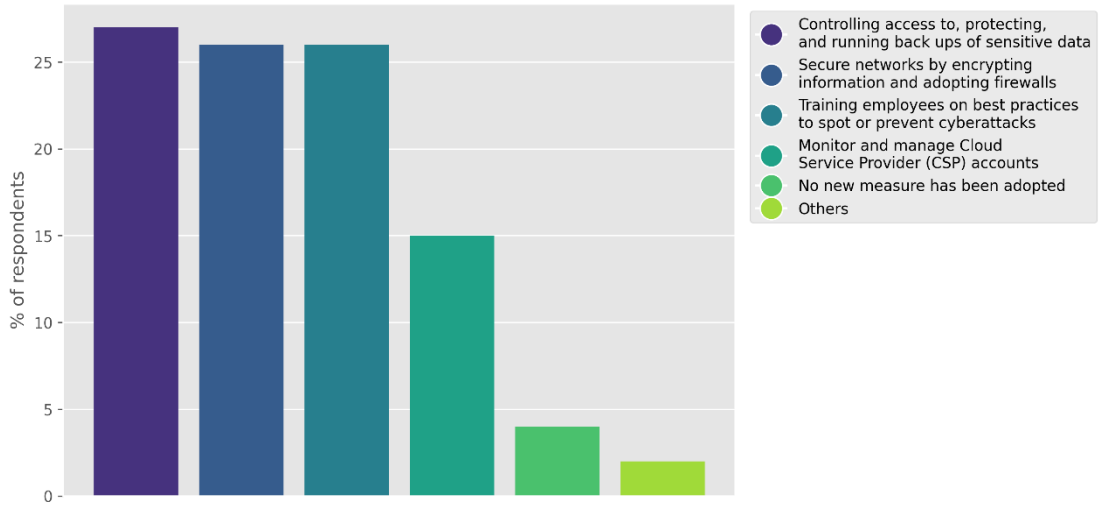


Figure 6

As a result of increasing cyberattacks, has your company boosted its cybersecurity by implementing any of the following measures? (Multiple answers possible) - Small (less than 50 employees)

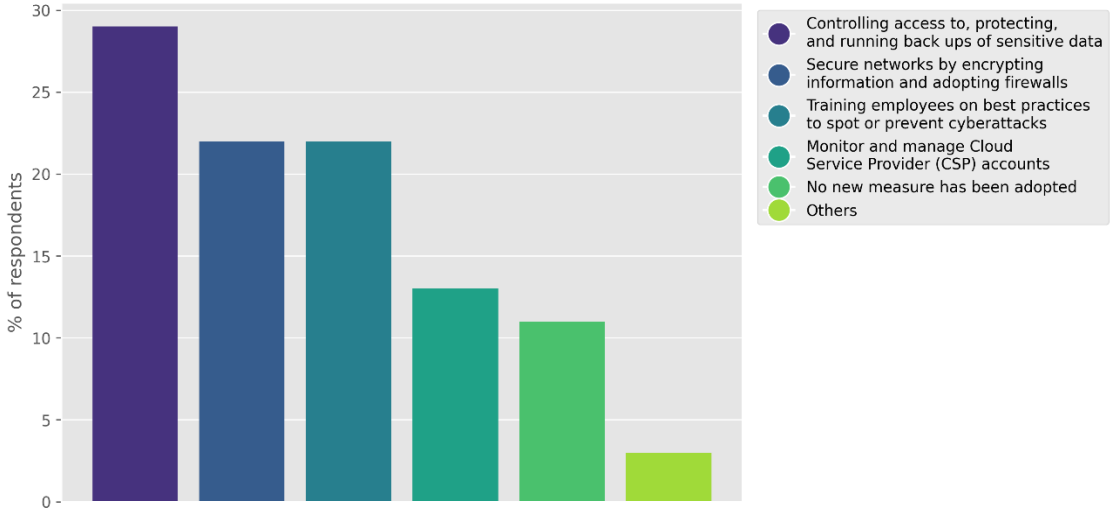
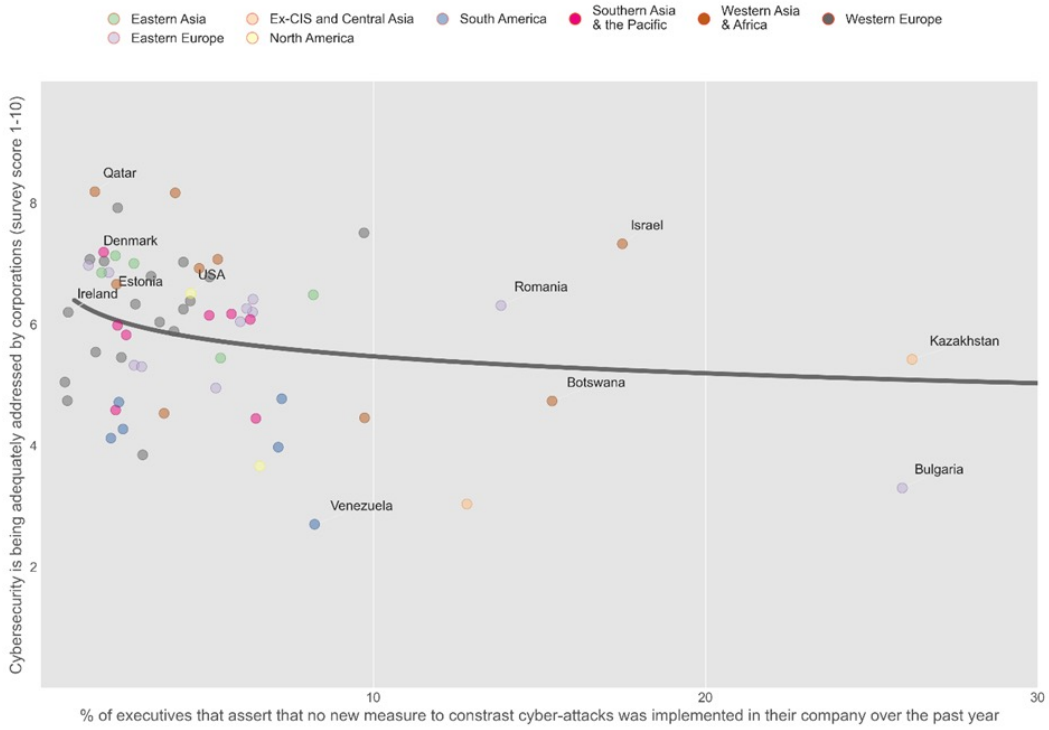


Figure 7



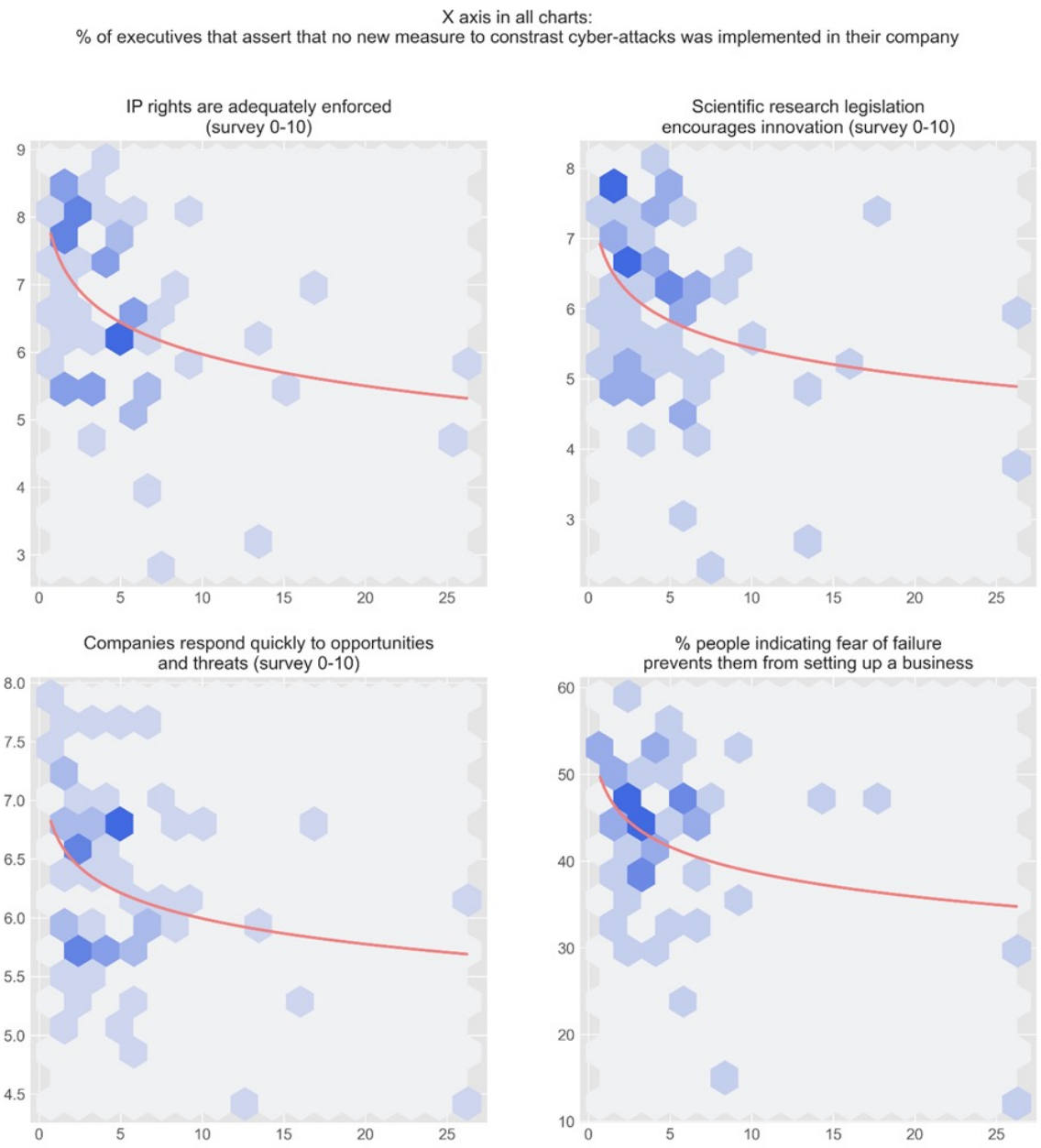
even in economies where cybercrime is adequately addressed, companies bolster their positions by undertaking additional measures. Examples include Qatar, Denmark, Estonia, and the US. Yet, outliers exist, such as Israel, where a strong perception of cybersecurity does not necessarily translate into proactive, company specific measures by companies. Bulgaria and similarly, Kazakhstan are also interesting cases that need further research. Despite executives who reside in these two economies believing that cybercrime can be addressed more effectively, they appear less proactive.

To contextualize these results, we delve deeper into the specific areas that executives find crucial when asserting the need for additional cybersecurity measures. **Figure 8** illustrates four areas exhibiting a robust negative relationship with the share of executives claiming that there have not been new cybersecurity measures, depicted in the horizontal axis. The four criteria measured on the vertical axes include the enforcement of intellectual property (IP) rights, the existence of a legislative framework promoting innovation research, the readiness of companies in dealing with opportunities and threats, and the existence of a prohibitively costly framework for failure, acting as a deterrent to business emergence.

The top graphs in **Figure 8** are related to the general economy. They suggest that in countries where business leaders perceive promotion of innovation (top right graph) and the enforcement of intellectual rights to innovations (top left graph), investing in additional measures to safeguard business digital integrity is considered a worthwhile venture. This outcome is heightened in countries where the private sector demonstrates resilience and agility by swiftly responding to emerging opportunities and threats (bottom left graph). Furthermore, in countries where the cost of failure is high, that is where fear of failure deters business activities, there is an increased likelihood of undertaking additional steps, including implementing new measures, to minimize the probability of a cyber compromise.

In conclusion, as economies grapple with the disruptive forces of the digital age, their capacity to generate value hinges on the resilience of their cybersecurity defenses. This can be realized by acknowledging the interconnected nature of robust cybersecurity measures at the company level and the existence of a protective and proactive regulatory framework at the economy level.

Figure 8


X axis in all charts:
% of executives that assert that no new measure to constrast cyber-attacks was implemented in their company
IP rights are adequately enforced (survey 0-10)
Scientific research legislation encourages innovation (survey 0-10)
Companies respond quickly to opportunities and threats (survey 0-10)
% people indicating fear of failure prevents them from setting up a business

5. Concluding remarks

The 2023 IMD World Digital Competitiveness Ranking portrays a dynamic landscape marked by shifts at the regional and economy levels of analysis. At the regional level, there is an increase in digital competitiveness for North America, which improves by one place to take 22nd position due to advances in the US and Mexico. Eastern Asia, though still holding its ground as the most digitally competitive region, witnesses a modest dip by one place to the 15th position, extending a trend started in 2021. This decline is mirrored in Western Europe, where the region's average digital competitiveness has declined over the past two years. Furthermore, South American economies continue to lag, securing 57th place in 2023.

The dominance of Eastern Asia across all digital factors stands out; notably, the region surpasses North America and Western Europe, particularly in the technology and future readiness factors. Lastly, Southern Asia & the Pacific, along with Western Asia & Africa, exhibit rapid strides in the technology factor, narrowing the divide with more digitally competitive regions and positioning themselves as potential contenders in innovation.

Examining the top-10 most advanced economies reveals a diverse range of strengths, such as scientific concentration and adaptive attitudes for the US, or dominance in technology and regulatory framework for Singapore. Top economies also exhibited weaknesses, such as adaptive attitudes in Denmark's case, and business agility where Finland is concerned. Such diversity underscores the complexity of the ranking, pointing out the lack of a single path for success in terms of competitiveness.

Adaptation shows itself to be important in this year's ranking. The return of the US to the top place, the re-entry of Taiwan into the top 10, and the significant rise of the Netherlands point to a need for continuous adaptation. That is to say, countries cannot be complacent from year to year as the digital panorama is a quickly changing one.

In particular, adaptation is needed to address an important threat of our time: cybercrime. Our survey of over 4,000 executives across 64 economies revealed a proactive stance among companies. Around 27% prioritize controlling access, protecting sensitive data, and running backups, while 25% focus on network integrity through encryption and firewalls. Moreover, 26% enhance awareness through employee training and 15% concentrate on monitoring and managing CSP accounts. Notably, a mere 5% reported no new cybersecurity measures in the past year, reflecting widespread recognition of imminent danger.

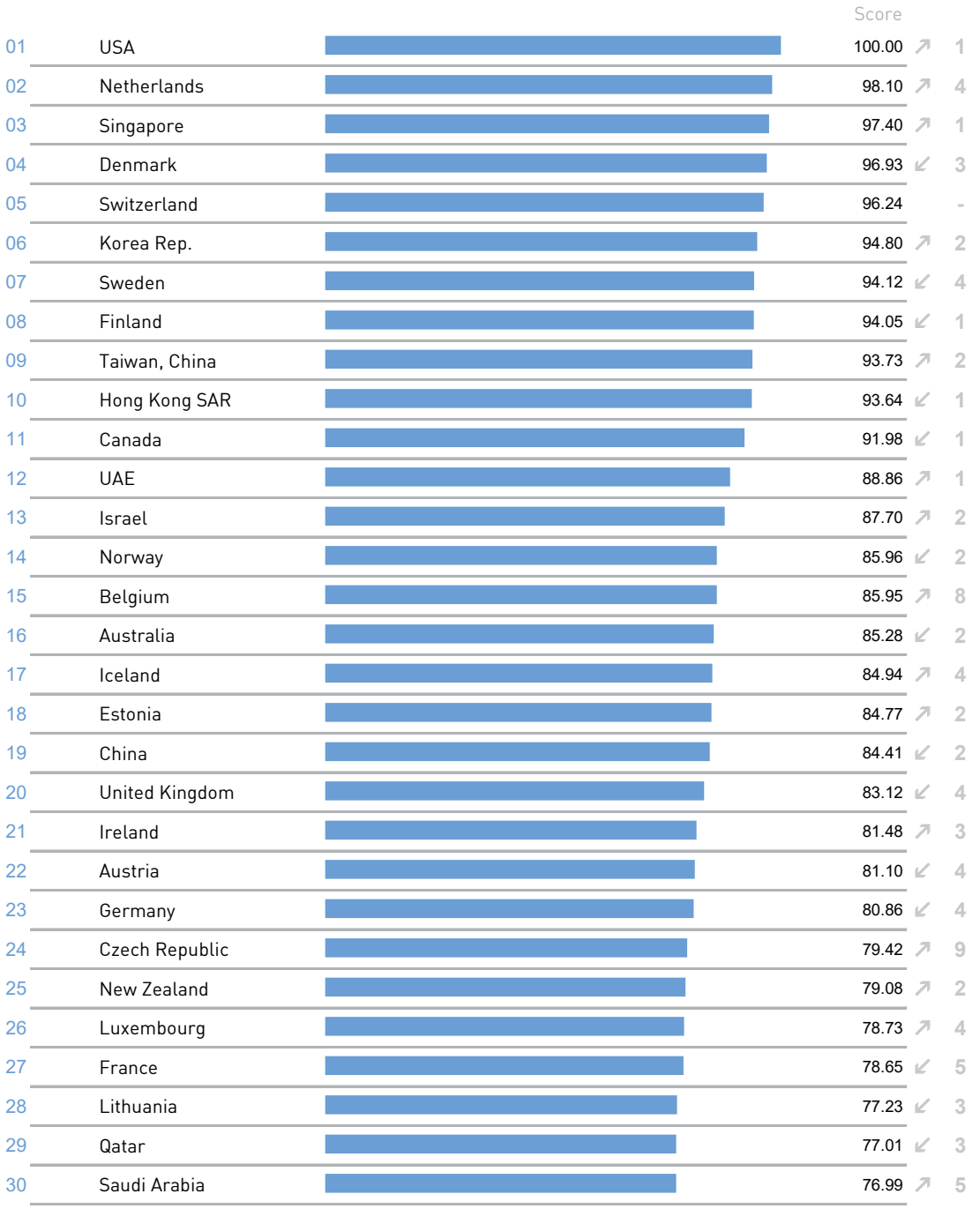
Dissecting responses based on company size reveals differences in cybersecurity strategies. Large companies predominantly emphasize increasing employee awareness, whereas medium and small companies prioritize employee training. Discrepancies also emerge at the national level, where economies with perceived inadequate cybersecurity frameworks witness a surge in additional cybersecurity measures. Overall, the ranking underscores the interconnectedness of robust cybersecurity practices at the company level with the same at the economy level, in order to achieve sustained value generation in the digital age.

In conclusion, successful digital nations – that is, economies that utilize digital talent, have a resilient and agile culture, and rely on effective digital infrastructure – align their skills and competences, their capacity, and their planned future investments in order to adopt and explore new digital technologies that can transform government practices, business models, and society at large.

IMD World Digital Competitiveness Ranking 2023

The 2023 IMD World Digital Competitiveness Ranking

2023 COMPETITIVENESS RANKING



The IMD World Digital Competitiveness Ranking presents the 2023 overall ranking for the 64 economies covered by the Center. The economies are ranked from the most to the least competitive. The Scores shown to the right are actually indices (0 to 100) generated for the unique purpose of constructing charts and graphics. The final column shows the improvement or decline from the previous year.

		Score		
31	Spain	76.62	↙	3
32	Japan	75.43	↙	3
33	Malaysia	75.31	↙	2
34	Kazakhstan	71.84	↗	2
35	Thailand	70.53	↗	5
36	Portugal	69.78	↗	2
37	Slovenia	69.14		-
38	Bahrain	69.06	↙	6
39	Poland	66.53	↗	7
40	Latvia	66.36	↙	6
41	Kuwait	65.14		-
42	Chile	64.84	↙	1
43	Italy	64.39	↙	4
44	Croatia	62.01	↙	1
45	Indonesia	60.36	↗	6
46	Slovak Republic	58.31	↗	1
47	Hungary	58.25	↙	5
48	Romania	58.25	↗	1
49	India	57.74	↙	5
50	Jordan	56.88	↗	3
51	Cyprus	54.77	↙	6
52	Greece	54.70	↙	2
53	Turkey	54.27	↗	1
54	Mexico	51.26	↗	1
55	Bulgaria	50.66	↙	7
56	Peru	50.17	↗	1
57	Brazil	49.70	↙	5
58	South Africa	48.61		-
59	Philippines	48.31	↙	3
60	Botswana	47.51	↗	1
61	Argentina	46.33	↙	2
62	Colombia	45.09	↙	2
63	Mongolia	43.03	↙	1
64	Venezuela	22.55	↙	1

Methodology in a nutshell

› 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.

› 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.

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

Knowledge

Technology

Future readiness

› 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.

› These 9 sub-factors comprise 54 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).

› 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).

› 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.

› The 54 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.

› 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).

› 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

Knowledge

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

- Talent
- Training and Education
- Scientific Concentration

Technology

Overall context that enables the development of digital technologies.

- Regulatory Framework
- Capital
- Technological Framework

Future Readiness

Level of country preparedness to exploit digital transformation.

- Adaptive Attitudes
- Business Agility
- IT Integration

Computing the Rankings

HARD DATA

Statistics from international, regional and national sources

34 Criteria

SURVEY

International Panel of Experts Executives Opinion Survey

20 Criteria

COMPUTE STD VALUES

Individually, for all criteria used in the ranking

54 Criteria

OVERALL RANKINGS

Aggregates the STD values for all the 54 ranked criteria

FACTORS RANKINGS

Knowledge, Technology, Future Readiness

CRITERIA RANKINGS

Each of the 54 criteria is individually rankd for the countries

The 2023 IMD World Digital Competitiveness Rankings

Population over 20 million

		Score
01	USA	100.00
02	Korea Rep.	94.80
03	Taiwan, China	93.73
04	Canada	91.98
05	Australia	85.28
06	China	84.41
07	United Kingdom	83.12
08	Germany	80.86
09	France	78.65
10	Saudi Arabia	76.99
11	Spain	76.62
12	Japan	75.43
13	Malaysia	75.31
14	Thailand	70.53
15	Poland	66.53
16	Italy	64.39
17	Indonesia	60.36
18	India	57.74
19	Turkey	54.27
20	Mexico	51.26
21	Peru	50.17
22	Brazil	49.70
23	South Africa	48.61
24	Philippines	48.31
25	Argentina	46.33
26	Colombia	45.09
27	Venezuela	22.55

Population under 20 million

		Score
01	Netherlands	98.10
02	Singapore	97.40
03	Denmark	96.93
04	Switzerland	96.24
05	Sweden	94.12
06	Finland	94.05
07	Hong Kong SAR	93.64
08	UAE	88.86
09	Israel	87.70
10	Norway	85.96
11	Belgium	85.95
12	Iceland	84.94
13	Estonia	84.77
14	Ireland	81.48
15	Austria	81.10
16	Czech Republic	79.42
17	New Zealand	79.08
18	Luxembourg	78.73
19	Lithuania	77.23
20	Qatar	77.01
21	Kazakhstan	71.84
22	Portugal	69.78
23	Slovenia	69.14
24	Bahrain	69.06
25	Latvia	66.36
26	Kuwait	65.14
27	Chile	64.84
28	Croatia	62.01
29	Slovak Republic	58.31
30	Hungary	58.25
31	Romania	58.25
32	Jordan	56.88
33	Cyprus	54.77
34	Greece	54.70
35	Bulgaria	50.66
36	Botswana	47.51
37	Mongolia	43.03

Selected Breakdowns

GDP per capita greater than $20,000

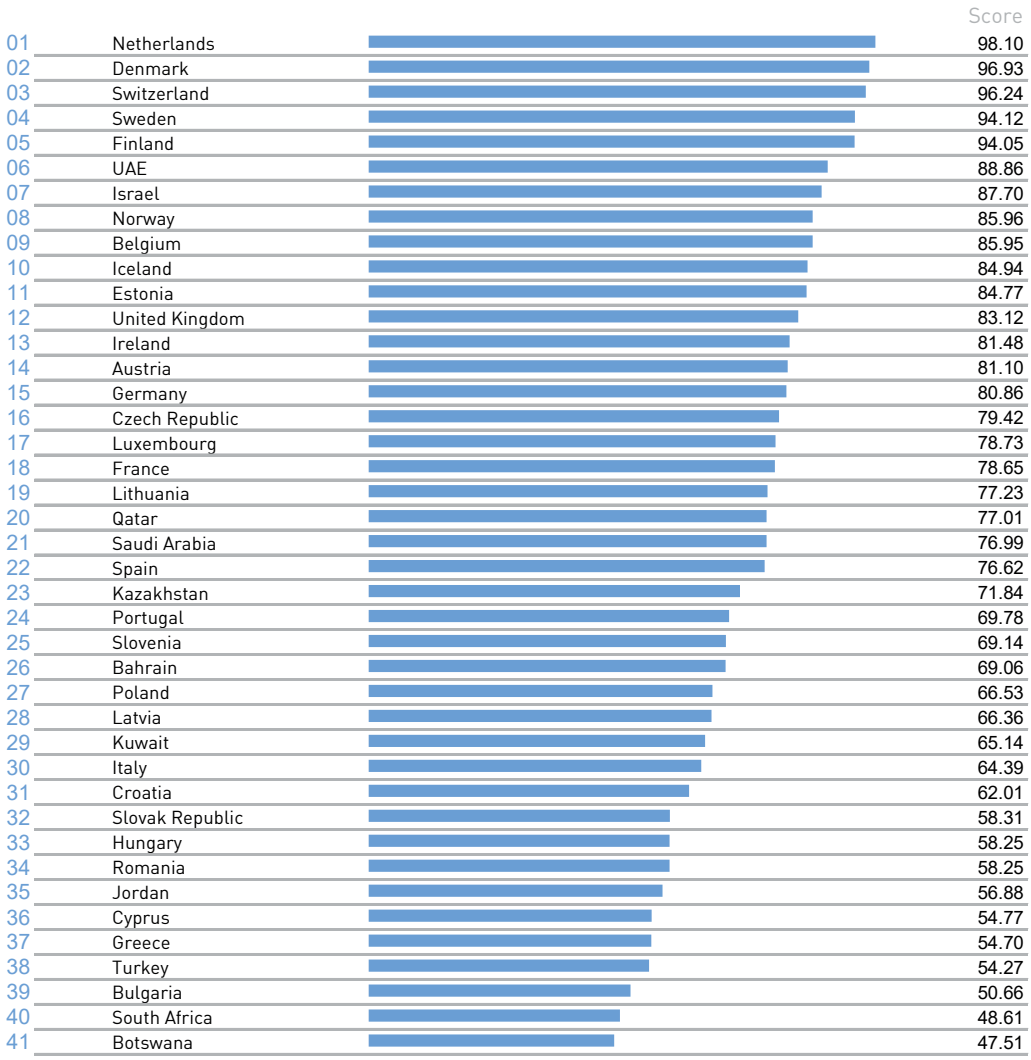
		Score
01	USA	100.00
02	Netherlands	98.10
03	Singapore	97.40
04	Denmark	96.93
05	Switzerland	96.24
06	Korea Rep.	94.80
07	Sweden	94.12
08	Finland	94.05
09	Taiwan, China	93.73
10	Hong Kong SAR	93.64
11	Canada	91.98
12	UAE	88.86
13	Israel	87.70
14	Norway	85.96
15	Belgium	85.95
16	Australia	85.28
17	Iceland	84.94
18	Estonia	84.77
19	United Kingdom	83.12
20	Ireland	81.48
21	Austria	81.10
22	Germany	80.86
23	Czech Republic	79.42
24	New Zealand	79.08
25	Luxembourg	78.73
26	France	78.65
27	Lithuania	77.23
28	Qatar	77.01
29	Saudi Arabia	76.99
30	Spain	76.62
31	Japan	75.43
32	Portugal	69.78
33	Slovenia	69.14
34	Bahrain	69.06
35	Latvia	66.36
36	Kuwait	65.14
37	Italy	64.39
38	Slovak Republic	58.31
39	Cyprus	54.77
40	Greece	54.70

GDP per capita less than $20,000

		Score
01	China	84.41
02	Malaysia	75.31
03	Kazakhstan	71.84
04	Thailand	70.53
05	Poland	66.53
06	Chile	64.84
07	Croatia	62.01
08	Indonesia	60.36
09	Hungary	58.25
10	Romania	58.25
11	India	57.74
12	Jordan	56.88
13	Turkey	54.27
14	Mexico	51.26
15	Bulgaria	50.66
16	Peru	50.17
17	Brazil	49.70
18	South Africa	48.61
19	Philippines	48.31
20	Botswana	47.51
21	Argentina	46.33
22	Colombia	45.09
23	Mongolia	43.03
24	Venezuela	22.55

The 2023 IMD World Digital Competitiveness Rankings

Europe - Middle East - Africa



		Score
01	Netherlands	98.10
02	Denmark	96.93
03	Switzerland	96.24
04	Sweden	94.12
05	Finland	94.05
06	UAE	88.86
07	Israel	87.70
08	Norway	85.96
09	Belgium	85.95
10	Iceland	84.94
11	Estonia	84.77
12	United Kingdom	83.12
13	Ireland	81.48
14	Austria	81.10
15	Germany	80.86
16	Czech Republic	79.42
17	Luxembourg	78.73
18	France	78.65
19	Lithuania	77.23
20	Qatar	77.01
21	Saudi Arabia	76.99
22	Spain	76.62
23	Kazakhstan	71.84
24	Portugal	69.78
25	Slovenia	69.14
26	Bahrain	69.06
27	Poland	66.53
28	Latvia	66.36
29	Kuwait	65.14
30	Italy	64.39
31	Croatia	62.01
32	Slovak Republic	58.31
33	Hungary	58.25
34	Romania	58.25
35	Jordan	56.88
36	Cyprus	54.77
37	Greece	54.70
38	Turkey	54.27
39	Bulgaria	50.66
40	South Africa	48.61
41	Botswana	47.51

Selected Breakdowns

Asia - Pacific

		Score
01	Singapore	97.40
02	Korea Rep.	94.80
03	Taiwan, China	93.73
04	Hong Kong SAR	93.64
05	Australia	85.28
06	China	84.41
07	New Zealand	79.08
08	Japan	75.43
09	Malaysia	75.31
10	Thailand	70.53
11	Indonesia	60.36
12	India	57.74
13	Philippines	48.31
14	Mongolia	43.03

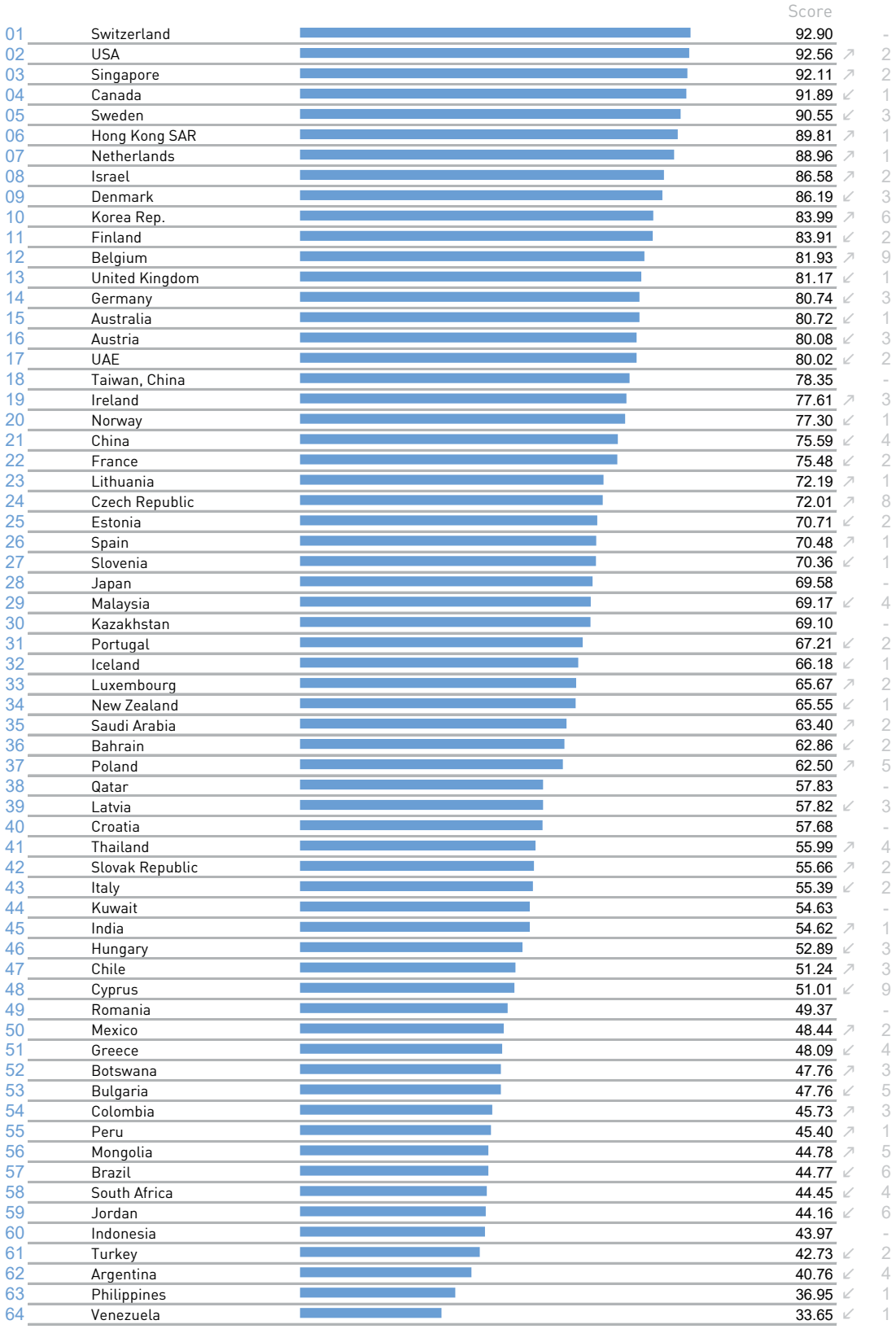
The Americas

		Score
01	USA	100.00
02	Canada	91.98
03	Chile	64.84
04	Mexico	51.26
05	Peru	50.17
06	Brazil	49.70
07	Argentina	46.33
08	Colombia	45.09
09	Venezuela	22.55

The 2023 IMD World Digital Competitiveness Rankings

KNOWLEDGE

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

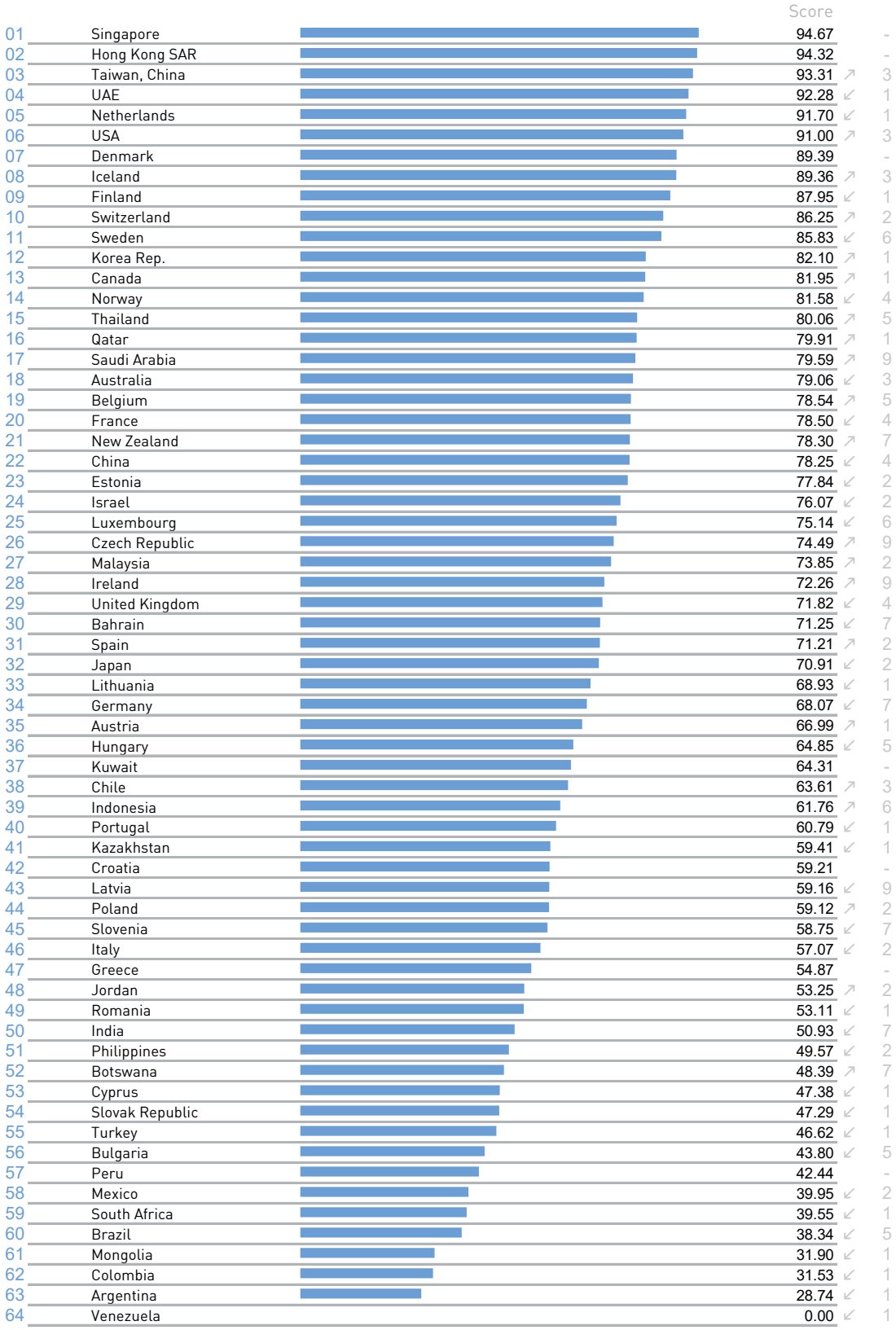


		Score		
01	Switzerland	92.90		-
02	USA	92.56	↗	2
03	Singapore	92.11	↗	2
04	Canada	91.89	↙	1
05	Sweden	90.55	↙	3
06	Hong Kong SAR	89.81	↗	1
07	Netherlands	88.96	↗	1
08	Israel	86.58	↗	2
09	Denmark	86.19	↙	3
10	Korea Rep.	83.99	↗	6
11	Finland	83.91	↙	2
12	Belgium	81.93	↗	9
13	United Kingdom	81.17	↙	1
14	Germany	80.74	↙	3
15	Australia	80.72	↙	1
16	Austria	80.08	↙	3
17	UAE	80.02	↙	2
18	Taiwan, China	78.35		-
19	Ireland	77.61	↗	3
20	Norway	77.30	↙	1
21	China	75.59	↙	4
22	France	75.48	↙	2
23	Lithuania	72.19	↗	1
24	Czech Republic	72.01	↗	8
25	Estonia	70.71	↙	2
26	Spain	70.48	↗	1
27	Slovenia	70.36	↙	1
28	Japan	69.58		-
29	Malaysia	69.17	↙	4
30	Kazakhstan	69.10		-
31	Portugal	67.21	↙	2
32	Iceland	66.18	↙	1
33	Luxembourg	65.67	↗	2
34	New Zealand	65.55	↙	1
35	Saudi Arabia	63.40	↗	2
36	Bahrain	62.86	↙	2
37	Poland	62.50	↗	5
38	Qatar	57.83		-
39	Latvia	57.82	↙	3
40	Croatia	57.68		-
41	Thailand	55.99	↗	4
42	Slovak Republic	55.66	↗	2
43	Italy	55.39	↙	2
44	Kuwait	54.63		-
45	India	54.62	↗	1
46	Hungary	52.89	↙	3
47	Chile	51.24	↗	3
48	Cyprus	51.01	↙	9
49	Romania	49.37		-
50	Mexico	48.44	↗	2
51	Greece	48.09	↙	4
52	Botswana	47.76	↗	3
53	Bulgaria	47.76	↙	5
54	Colombia	45.73	↗	3
55	Peru	45.40	↗	1
56	Mongolia	44.78	↗	5
57	Brazil	44.77	↙	6
58	South Africa	44.45	↙	4
59	Jordan	44.16	↙	6
60	Indonesia	43.97		-
61	Turkey	42.73	↙	2
62	Argentina	40.76	↙	4
63	Philippines	36.95	↙	1
64	Venezuela	33.65	↙	1

Selected Breakdowns

TECHNOLOGY

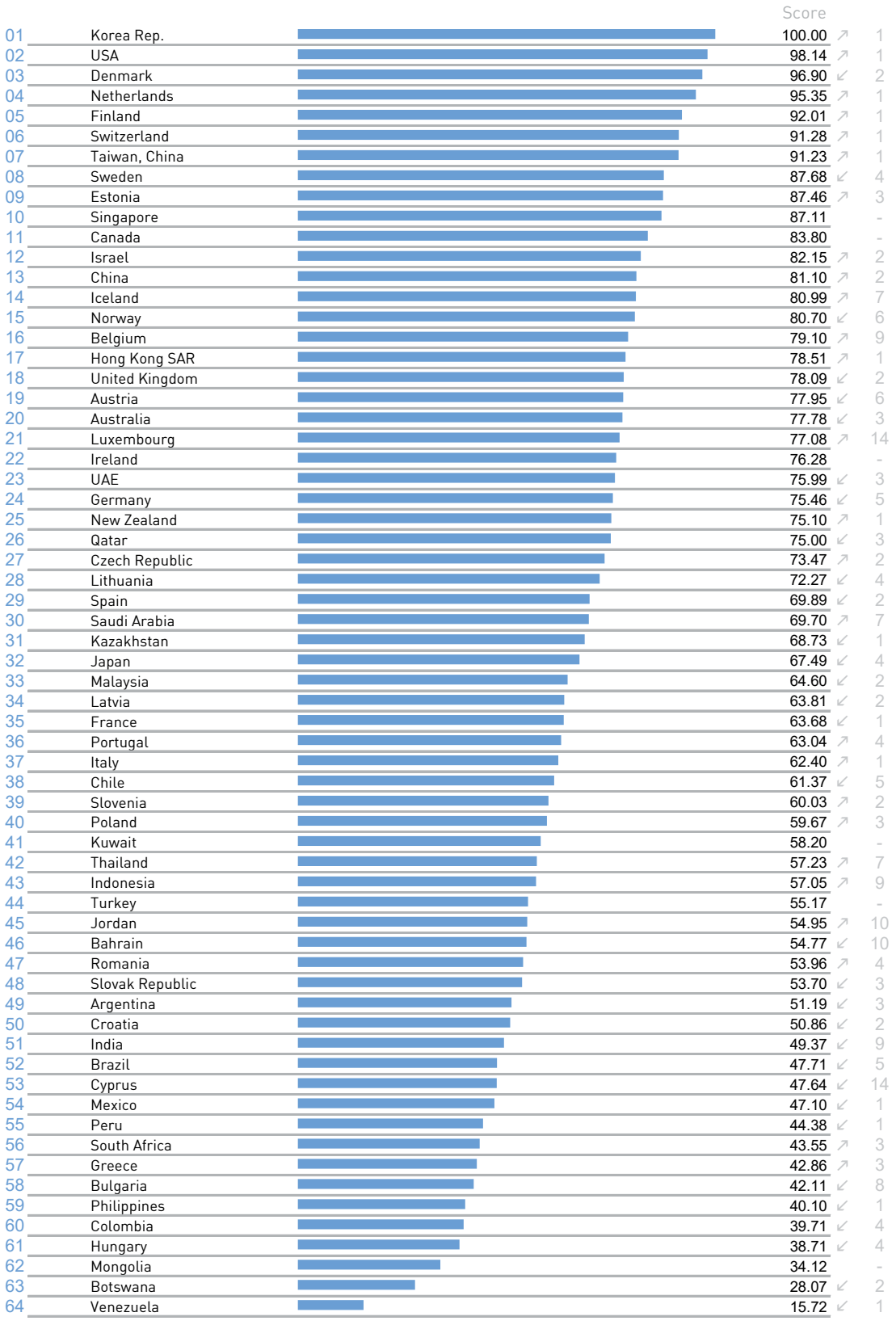
Overall context that enables the development of digital technologies



		Score		
01	Singapore	94.67		-
02	Hong Kong SAR	94.32		-
03	Taiwan, China	93.31	↗	3
04	UAE	92.28	↙	1
05	Netherlands	91.70	↙	1
06	USA	91.00	↗	3
07	Denmark	89.39		-
08	Iceland	89.36	↗	3
09	Finland	87.95	↙	1
10	Switzerland	86.25	↗	2
11	Sweden	85.83	↙	6
12	Korea Rep.	82.10	↗	1
13	Canada	81.95	↗	1
14	Norway	81.58	↙	4
15	Thailand	80.06	↗	5
16	Qatar	79.91	↗	1
17	Saudi Arabia	79.59	↗	9
18	Australia	79.06	↙	3
19	Belgium	78.54	↗	5
20	France	78.50	↙	4
21	New Zealand	78.30	↗	7
22	China	78.25	↙	4
23	Estonia	77.84	↙	2
24	Israel	76.07	↙	2
25	Luxembourg	75.14	↙	6
26	Czech Republic	74.49	↗	9
27	Malaysia	73.85	↗	2
28	Ireland	72.26	↗	9
29	United Kingdom	71.82	↙	4
30	Bahrain	71.25	↙	7
31	Spain	71.21	↗	2
32	Japan	70.91	↙	2
33	Lithuania	68.93	↙	1
34	Germany	68.07	↙	7
35	Austria	66.99	↗	1
36	Hungary	64.85	↙	5
37	Kuwait	64.31		-
38	Chile	63.61	↗	3
39	Indonesia	61.76	↗	6
40	Portugal	60.79	↙	1
41	Kazakhstan	59.41	↙	1
42	Croatia	59.21		-
43	Latvia	59.16	↙	9
44	Poland	59.12	↗	2
45	Slovenia	58.75	↙	7
46	Italy	57.07	↙	2
47	Greece	54.87		-
48	Jordan	53.25	↗	2
49	Romania	53.11	↙	1
50	India	50.93	↙	7
51	Philippines	49.57	↙	2
52	Botswana	48.39	↗	7
53	Cyprus	47.38	↙	1
54	Slovak Republic	47.29	↙	1
55	Turkey	46.62	↙	1
56	Bulgaria	43.80	↙	5
57	Peru	42.44		-
58	Mexico	39.95	↙	2
59	South Africa	39.55	↙	1
60	Brazil	38.34	↙	5
61	Mongolia	31.90	↙	1
62	Colombia	31.53	↙	1
63	Argentina	28.74	↙	1
64	Venezuela	0.00	↙	1

FUTURE READINESS

Level of country preparedness to exploit digital transformation



		Score		
01	Korea Rep.	100.00	↗	1
02	USA	98.14	↗	1
03	Denmark	96.90	↙	2
04	Netherlands	95.35	↗	1
05	Finland	92.01	↗	1
06	Switzerland	91.28	↗	1
07	Taiwan, China	91.23	↗	1
08	Sweden	87.68	↙	4
09	Estonia	87.46	↗	3
10	Singapore	87.11		-
11	Canada	83.80		-
12	Israel	82.15	↗	2
13	China	81.10	↗	2
14	Iceland	80.99	↗	7
15	Norway	80.70	↙	6
16	Belgium	79.10	↗	9
17	Hong Kong SAR	78.51	↗	1
18	United Kingdom	78.09	↙	2
19	Austria	77.95	↙	6
20	Australia	77.78	↙	3
21	Luxembourg	77.08	↗	14
22	Ireland	76.28		-
23	UAE	75.99	↙	3
24	Germany	75.46	↙	5
25	New Zealand	75.10	↗	1
26	Qatar	75.00	↙	3
27	Czech Republic	73.47	↗	2
28	Lithuania	72.27	↙	4
29	Spain	69.89	↙	2
30	Saudi Arabia	69.70	↗	7
31	Kazakhstan	68.73	↙	1
32	Japan	67.49	↙	4
33	Malaysia	64.60	↙	2
34	Latvia	63.81	↙	2
35	France	63.68	↙	1
36	Portugal	63.04	↗	4
37	Italy	62.40	↗	1
38	Chile	61.37	↙	5
39	Slovenia	60.03	↗	2
40	Poland	59.67	↗	3
41	Kuwait	58.20		-
42	Thailand	57.23	↗	7
43	Indonesia	57.05	↗	9
44	Turkey	55.17		-
45	Jordan	54.95	↗	10
46	Bahrain	54.77	↙	10
47	Romania	53.96	↗	4
48	Slovak Republic	53.70	↙	3
49	Argentina	51.19	↙	3
50	Croatia	50.86	↙	2
51	India	49.37	↙	9
52	Brazil	47.71	↙	5
53	Cyprus	47.64	↙	14
54	Mexico	47.10	↙	1
55	Peru	44.38	↙	1
56	South Africa	43.55	↗	3
57	Greece	42.86	↗	3
58	Bulgaria	42.11	↙	8
59	Philippines	40.10	↙	1
60	Colombia	39.71	↙	4
61	Hungary	38.71	↙	4
62	Mongolia	34.12		-
63	Botswana	28.07	↙	2
64	Venezuela	15.72	↙	1

	OVERALL					KNOWLEDGE				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Argentina	59	59	61	59	61	58	50	55	58	62
Australia	14	15	20	14	16	15	17	19	14	15
Austria	20	17	16	18	22	10	11	10	13	16
Bahrain	-	-	-	32	38	-	-	-	34	36
Belgium	25	25	26	23	15	23	21	21	21	12
Botswana	-	-	63	61	60	-	-	64	55	52
Brazil	57	51	51	52	57	59	57	51	51	57
Bulgaria	45	45	52	48	55	46	47	53	48	53
Canada	11	12	13	10	11	05	05	07	03	04
Chile	42	41	39	41	42	50	49	49	50	47
China	22	16	15	17	19	18	08	06	17	21
Colombia	58	61	59	60	62	57	59	56	57	54
Croatia	51	52	55	43	44	42	41	47	40	40
Cyprus	54	40	43	45	51	55	40	39	39	48
Czech Republic	37	35	33	33	24	37	37	35	32	24
Denmark	04	03	04	01	04	06	06	08	06	09
Estonia	29	21	25	20	18	30	23	27	23	25
Finland	07	10	11	07	08	09	15	09	09	11
France	24	24	24	22	27	20	20	20	20	22
Germany	17	18	18	19	23	12	12	14	11	14
Greece	53	46	44	50	52	53	48	45	47	51
Hong Kong SAR	08	05	02	09	10	07	07	05	07	06
Hungary	43	47	45	42	47	44	44	43	43	46
Iceland	27	23	21	21	17	29	27	33	31	32
India	44	48	46	44	49	38	39	41	46	45
Indonesia	56	56	53	51	45	56	63	60	60	60
Ireland	19	20	19	24	21	24	24	23	22	19
Israel	16	19	17	15	13	08	09	12	10	08
Italy	41	42	40	39	43	41	42	40	41	43
Japan	23	27	28	29	32	25	22	25	28	28
Jordan	50	53	49	53	50	49	54	48	53	59
Kazakhstan	35	36	32	36	34	32	34	36	30	30
Korea Rep.	10	08	12	08	06	11	10	15	16	10
Kuwait	-	-	-	-	41	-	-	-	-	44
Latvia	36	38	37	34	40	36	36	34	36	39
Lithuania	30	29	30	25	28	26	25	26	24	23
Luxembourg	21	28	22	30	26	34	35	29	35	33
Malaysia	26	26	27	31	33	19	19	22	25	29
Mexico	49	54	56	55	54	52	52	54	52	50
Mongolia	62	62	62	62	63	62	58	58	61	56
Netherlands	06	07	07	06	02	13	14	11	08	07
New Zealand	18	22	23	27	25	21	28	28	33	34
Norway	09	09	09	12	14	16	16	17	19	20
Peru	61	55	57	57	56	61	55	59	56	55
Philippines	55	57	58	56	59	51	62	63	62	63
Poland	33	32	41	46	39	33	30	38	42	37
Portugal	34	37	34	38	36	31	33	32	29	31
Qatar	31	30	29	26	29	45	45	44	38	38
Romania	46	49	50	49	48	47	53	52	49	49
Saudi Arabia	39	34	36	35	30	39	46	50	37	35
Singapore	02	02	05	04	03	03	02	04	05	03
Slovak Republic	47	50	47	47	46	48	51	46	44	42
Slovenia	32	31	35	37	37	27	29	30	26	27
South Africa	48	60	60	58	58	54	60	62	54	58
Spain	28	33	31	28	31	28	32	31	27	26
Sweden	03	04	03	03	07	04	04	02	02	05
Switzerland	05	06	06	05	05	02	03	01	01	01
Taiwan, China	13	11	08	11	09	17	18	16	18	18
Thailand	40	39	38	40	35	43	43	42	45	41
Turkey	52	44	48	54	53	60	56	57	59	61
UAE	12	14	10	13	12	35	31	18	15	17
United Kingdom	15	13	14	16	20	14	13	13	12	13
USA	01	01	01	02	01	01	01	03	04	02
Venezuela	63	63	64	63	64	63	61	61	63	64

TECHNOLOGY					FUTURE READINESS					
2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	
56	62	62	62	63	56	47	52	46	49	Argentina
14	14	18	15	18	14	17	22	17	20	Australia
32	28	32	36	35	23	16	16	13	19	Austria
-	-	-	23	30	-	-	-	36	46	Bahrain
21	19	23	24	19	25	25	26	25	16	Belgium
-	-	63	59	52	-	-	63	61	63	Botswana
57	57	55	55	60	43	43	45	47	52	Brazil
42	45	51	51	56	48	44	55	50	58	Bulgaria
13	13	15	14	13	18	15	15	11	11	Canada
41	40	35	41	38	37	39	36	33	38	Chile
26	27	20	18	22	21	18	17	15	13	China
60	61	60	61	62	55	50	53	56	60	Colombia
50	49	50	42	42	60	62	60	48	50	Croatia
59	52	53	52	53	40	29	34	39	53	Cyprus
34	36	37	35	26	39	36	37	29	27	Czech Republic
11	09	09	07	07	02	01	02	01	03	Denmark
22	23	25	21	23	30	20	20	12	09	Estonia
08	10	12	08	09	07	09	09	06	05	Finland
16	15	16	16	20	29	31	31	34	35	France
31	31	31	27	34	16	19	18	19	24	Germany
54	43	46	47	47	53	46	43	60	57	Greece
04	02	01	02	02	15	10	10	18	17	Hong Kong SAR
36	39	36	31	36	57	60	61	57	61	Hungary
20	21	10	11	08	26	22	25	21	14	Iceland
49	50	44	43	50	46	56	50	42	51	India
47	54	49	45	39	58	48	48	52	43	Indonesia
28	30	28	37	28	05	14	14	22	22	Ireland
30	32	27	22	24	19	23	21	14	12	Israel
46	46	42	44	46	31	38	30	38	37	Italy
24	26	30	30	32	24	26	27	28	32	Japan
53	44	43	50	48	52	58	56	55	45	Jordan
39	41	40	40	41	35	33	28	30	31	Kazakhstan
17	12	13	13	12	04	03	05	02	01	Korea Rep.
-	-	-	-	37	-	-	-	-	41	Kuwait
23	34	34	34	43	45	42	42	32	34	Latvia
25	29	29	32	33	32	30	33	24	28	Lithuania
12	17	14	19	25	17	27	24	35	21	Luxembourg
19	20	26	29	27	28	32	29	31	33	Malaysia
52	56	57	56	58	49	52	51	53	54	Mexico
62	60	61	60	61	61	59	62	62	62	Mongolia
06	08	07	04	05	03	04	04	05	04	Netherlands
15	18	21	28	21	20	21	19	26	25	New Zealand
03	03	06	10	14	08	06	08	09	15	Norway
58	58	56	57	57	59	55	54	54	55	Peru
55	53	54	49	51	54	54	57	58	59	Philippines
37	37	41	46	44	33	35	39	43	40	Poland
38	38	38	39	40	34	41	38	40	36	Portugal
33	25	19	17	16	22	24	23	23	26	Qatar
45	48	47	48	49	51	49	49	51	47	Romania
40	24	24	26	17	38	28	32	37	30	Saudi Arabia
01	01	03	01	01	11	12	11	10	10	Singapore
44	51	45	53	54	47	51	46	45	48	Slovak Republic
35	35	39	38	45	36	37	40	41	39	Slovenia
51	55	59	58	59	44	57	59	59	56	South Africa
29	33	33	33	31	27	40	35	27	29	Spain
07	06	08	05	11	06	07	06	04	08	Sweden
10	11	11	12	10	10	05	03	07	06	Switzerland
09	05	02	06	03	12	08	07	08	07	Taiwan, China
27	22	22	20	15	50	45	44	49	42	Thailand
48	42	52	54	55	41	34	41	44	44	Turkey
02	04	05	03	04	09	11	12	20	23	UAE
18	16	17	25	29	13	13	13	16	18	United Kingdom
05	07	04	09	06	01	02	01	03	02	USA
63	63	64	63	64	63	63	64	63	64	Venezuela

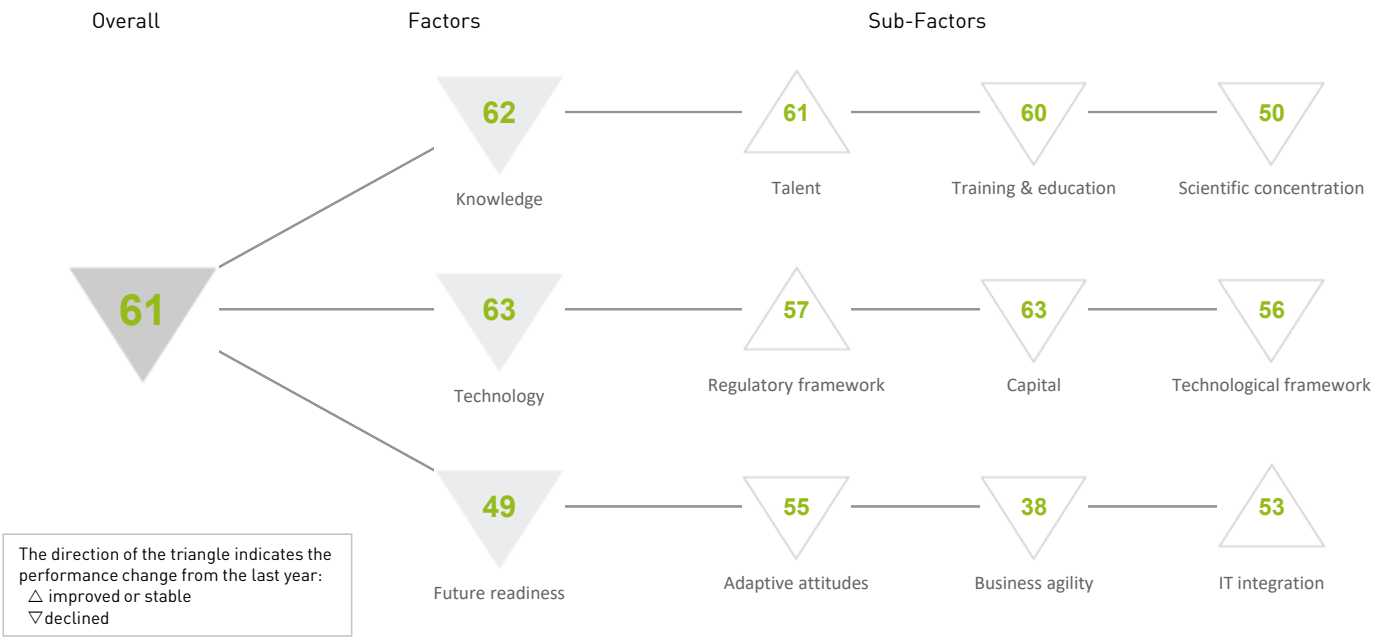
SUB-FACTOR RANKINGS

	KNOWLEDGE			TECHNOLOGY			FUTURE READINESS			
	Talent	Training & education	Scientific concentration	Regulatory framework	Capital	Technological framework	Adaptive attitudes	Business agility	IT integration	
Argentina	61	60	50	57	63	56	55	38	53	Argentina
Australia	08	28	16	15	16	31	04	42	23	Australia
Austria	20	11	17	34	34	38	24	22	13	Austria
Bahrain	15	55	34	29	47	14	49	32	50	Bahrain
Belgium	07	22	18	05	18	39	39	09	15	Belgium
Botswana	37	41	64	54	06	63	63	46	63	Botswana
Brazil	64	57	25	58	62	51	51	61	45	Brazil
Bulgaria	58	46	44	60	54	50	50	62	57	Bulgaria
Canada	09	02	05	19	04	26	18	24	04	Canada
Chile	41	45	56	37	50	30	25	52	34	Chile
China	14	43	09	20	26	20	20	04	32	China
Colombia	57	42	57	62	57	62	58	59	58	Colombia
Croatia	54	36	32	47	33	44	41	57	48	Croatia
Cyprus	55	44	40	53	56	49	46	63	39	Cyprus
Czech Republic	17	33	27	33	13	28	34	12	30	Czech Republic
Denmark	05	12	20	10	10	06	08	06	02	Denmark
Estonia	28	08	43	18	35	13	09	23	05	Estonia
Finland	11	19	13	03	07	11	03	21	03	Finland
France	24	29	14	21	28	19	43	41	24	France
Germany	26	14	07	32	21	47	28	20	18	Germany
Greece	53	59	31	46	37	52	61	60	43	Greece
Hong Kong SAR	06	05	08	06	14	01	05	16	47	Hong Kong SAR
Hungary	45	47	42	35	46	29	62	55	37	Hungary
Iceland	32	26	37	11	27	04	11	13	31	Iceland
India	34	48	52	52	23	60	60	30	52	India
Indonesia	42	61	59	45	03	57	54	10	59	Indonesia
Ireland	16	24	24	09	42	35	19	15	35	Ireland
Israel	23	03	03	25	25	23	30	19	01	Israel
Italy	46	58	23	41	48	45	31	33	41	Italy
Japan	49	21	15	50	36	07	22	56	16	Japan
Jordan	38	50	63	42	44	54	53	29	46	Jordan
Kazakhstan	47	01	49	22	53	48	29	05	54	Kazakhstan
Korea Rep.	31	06	02	26	24	08	01	03	12	Korea Rep.
Kuwait	43	53	35	44	40	25	36	47	40	Kuwait
Latvia	44	31	54	43	52	27	35	49	21	Latvia
Lithuania	25	15	33	28	39	33	37	18	28	Lithuania
Luxembourg	40	18	48	17	29	34	23	27	10	Luxembourg
Malaysia	30	17	36	36	32	16	27	37	33	Malaysia
Mexico	52	54	46	59	55	55	56	53	51	Mexico
Mongolia	63	37	61	61	61	58	44	64	62	Mongolia
Netherlands	03	23	12	02	02	10	06	08	07	Netherlands
New Zealand	33	32	30	24	19	24	12	40	22	New Zealand
Norway	21	16	22	13	20	21	15	26	17	Norway
Peru	59	38	62	51	51	59	47	48	61	Peru
Philippines	56	62	58	63	41	43	59	50	60	Philippines
Poland	36	39	28	49	43	37	45	28	44	Poland
Portugal	29	34	26	27	49	46	26	58	25	Portugal
Qatar	10	51	60	23	22	18	33	11	27	Qatar
Romania	50	56	47	39	59	40	48	45	42	Romania
Saudi Arabia	19	30	55	14	09	36	32	25	29	Saudi Arabia
Singapore	04	09	11	01	15	02	13	14	11	Singapore
Slovak Republic	48	40	39	55	58	42	52	51	36	Slovak Republic
Slovenia	39	13	29	48	38	41	38	39	38	Slovenia
South Africa	60	49	53	56	45	61	57	54	56	South Africa
Spain	27	35	19	38	30	22	21	43	19	Spain
Sweden	13	04	04	07	08	17	10	17	08	Sweden
Switzerland	02	07	10	04	11	12	16	07	06	Switzerland
Taiwan, China	22	10	21	16	05	05	17	01	14	Taiwan, China
Thailand	35	52	38	31	12	15	42	34	49	Thailand
Turkey	51	63	41	40	60	53	40	35	55	Turkey
UAE	01	25	51	08	17	03	14	31	26	UAE
United Kingdom	18	27	06	30	31	32	07	36	20	United Kingdom
USA	12	20	01	12	01	09	02	02	09	USA
Venezuela	62	64	45	64	64	64	64	44	64	Venezuela

IMD World Digital Competitiveness Country Profiles

ARGENTINA

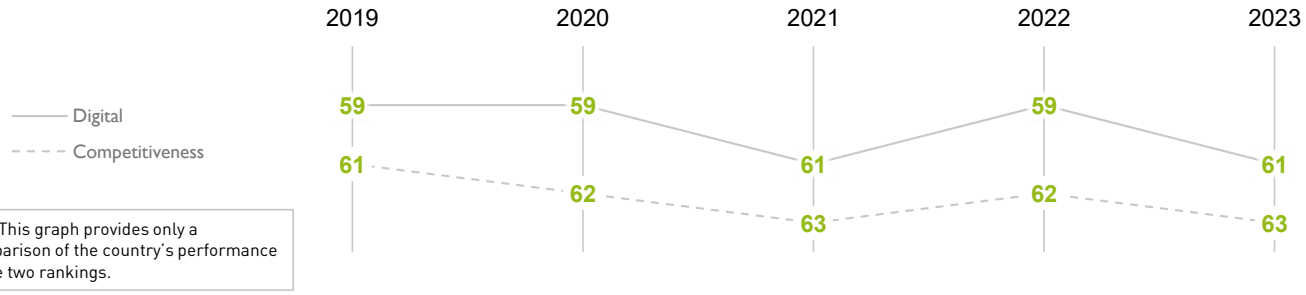
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	59	59	61	59	61
Knowledge	58	50	55	58	62
Technology	56	62	62	62	63
Future readiness	56	47	52	46	49

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

ARGENTINA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	51	56	62	61	61
Training & education	62	43	46	49	60
Scientific concentration	50	55	48	48	50

Talent	Rank
Educational assessment PISA - Math	54
International experience	50
Foreign highly skilled personnel	62
Management of cities	59
Digital/Technological skills	56
▶ Net flow of international students	18

Training & education	Rank
▷ Employee training	64
Total public expenditure on education	29
Higher education achievement	58
Pupil-teacher ratio (tertiary education)	22
Graduates in Sciences	60
Women with degrees	44

Scientific concentration	Rank
Total expenditure on R&D (%)	49
Total R&D personnel per capita	46
▶ Female researchers	04
R&D productivity by publication	24
Scientific and technical employment	50
High-tech patent grants	57
Robots in Education and R&D	38

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	49	57	57	61	57
Capital	51	62	63	62	63
Technological framework	57	56	56	55	56

Regulatory framework	Rank
Starting a business	61
Enforcing contracts	49
▶ Immigration laws	02
Development & application of tech.	62
Scientific research legislation	60
Intellectual property rights	62

Capital	Rank
IT & media stock market capitalization	41
▷ Funding for technological development	63
▷ Banking and financial services	63
▷ Country credit rating	63
▷ Venture capital	63
Investment in Telecommunications	37

Technological framework	Rank
Communications technology	62
Mobile broadband subscribers	51
Wireless broadband	58
Internet users	26
Internet bandwidth speed	54
High-tech exports (%)	57

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	57	49	50	49	55
Business agility	48	39	43	37	38
IT integration	52	52	59	53	53

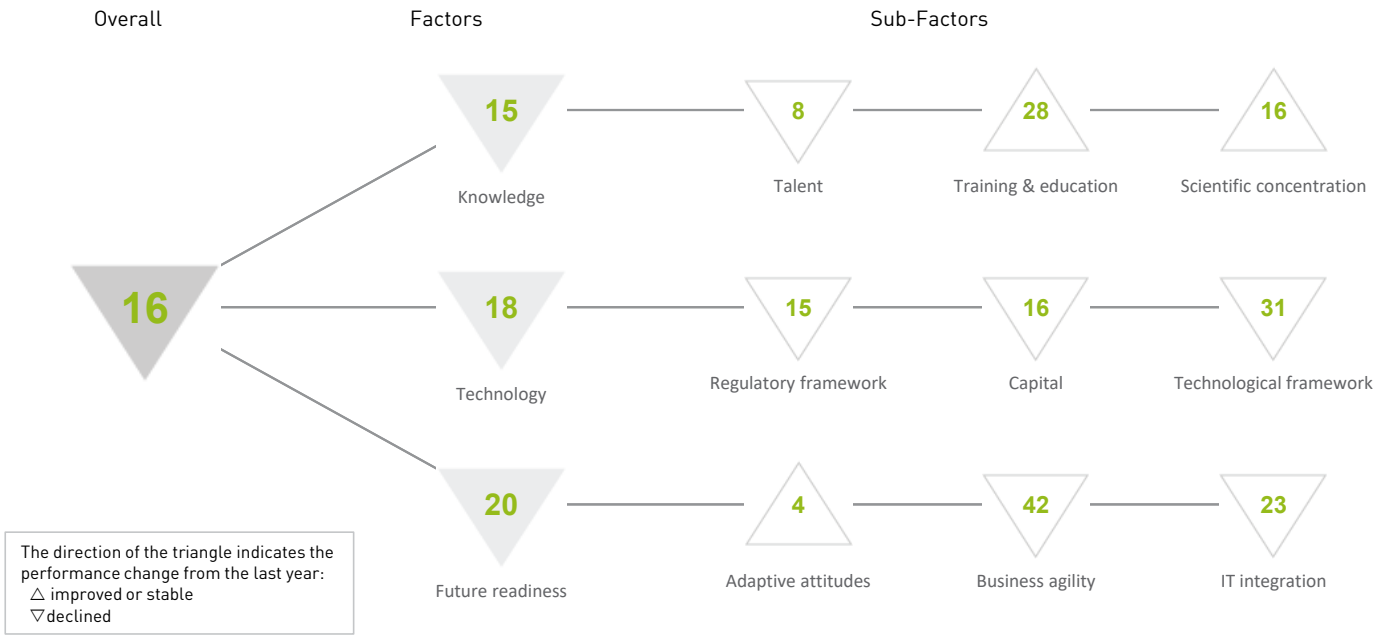
Adaptive attitudes	Rank
E-Participation	44
Internet retailing	38
Tablet possession	39
Smartphone possession	50
Attitudes toward globalization	61

Business agility	Rank
▶ Opportunities and threats	12
World robots distribution	36
Agility of companies	53
Use of big data and analytics	50
Knowledge transfer	55
▶ Entrepreneurial fear of failure	08

IT integration	Rank
E-Government	37
Public-private partnerships	54
Cyber security	59
Software piracy	58
Government cyber security capacity	34
Privacy protection by law content	31

AUSTRALIA

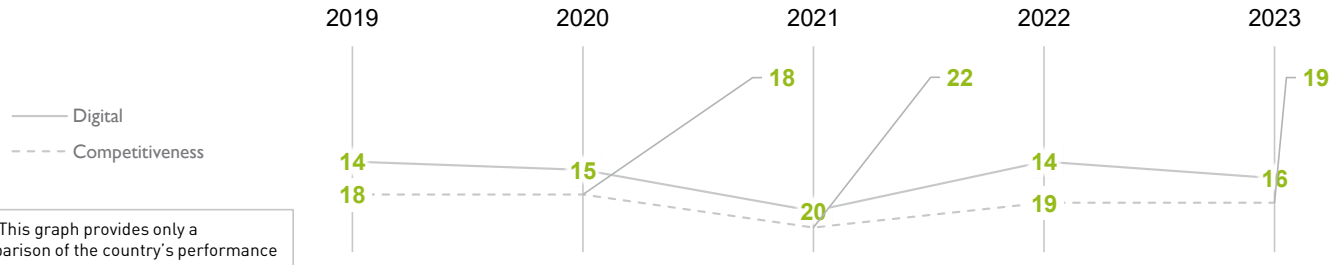
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	14	15	20	14	16
Knowledge	15	17	19	14	15
Technology	14	14	18	15	18
Future readiness	14	17	22	17	20

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 (27 countries)

AUSTRALIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	07	06	08	07	08
Training & education	29	28	37	29	28
Scientific concentration	13	19	18	16	16

Talent	Rank
Educational assessment PISA - Math	28
International experience	46
Foreign highly skilled personnel	12
Management of cities	22
Digital/Technological skills	39
▶ Net flow of international students	02

Training & education	Rank
▷ Employee training	47
Total public expenditure on education	18
Higher education achievement	18
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	44
Women with degrees	07

Scientific concentration	Rank
Total expenditure on R&D (%)	22
Total R&D personnel per capita	-
Female researchers	-
R&D productivity by publication	15
Scientific and technical employment	13
High-tech patent grants	33
Robots in Education and R&D	20

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	07	06	17	10	15
Capital	19	13	17	13	16
Technological framework	17	20	27	26	31

Regulatory framework	Rank
Starting a business	05
Enforcing contracts	06
Immigration laws	42
Development & application of tech.	26
Scientific research legislation	24
Intellectual property rights	16

Capital	Rank
IT & media stock market capitalization	38
Funding for technological development	35
Banking and financial services	29
▶ Country credit rating	01
Venture capital	34
Investment in Telecommunications	07

Technological framework	Rank
▷ Communications technology	49
Mobile broadband subscribers	09
Wireless broadband	14
Internet users	34
▷ Internet bandwidth speed	49
High-tech exports (%)	14

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	07	05	14	08	04
Business agility	35	43	55	40	42
IT integration	11	12	21	15	23

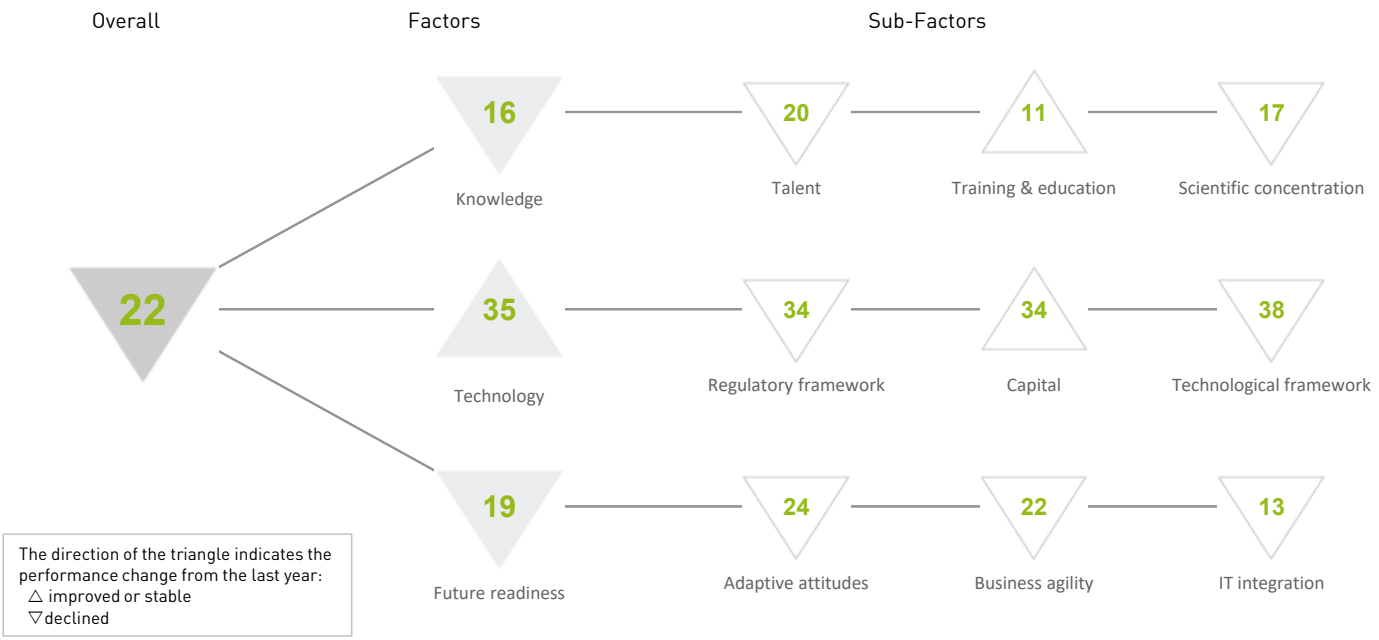
Adaptive attitudes	Rank
▶ E-Participation	02
▶ Internet retailing	04
▶ Tablet possession	03
Smartphone possession	15
Attitudes toward globalization	28

Business agility	Rank
▷ Opportunities and threats	50
World robots distribution	30
Agility of companies	45
Use of big data and analytics	35
Knowledge transfer	27
Entrepreneurial fear of failure	33

IT integration	Rank
E-Government	07
Public-private partnerships	30
▷ Cyber security	53
Software piracy	05
Government cyber security capacity	39
Privacy protection by law content	23

AUSTRIA

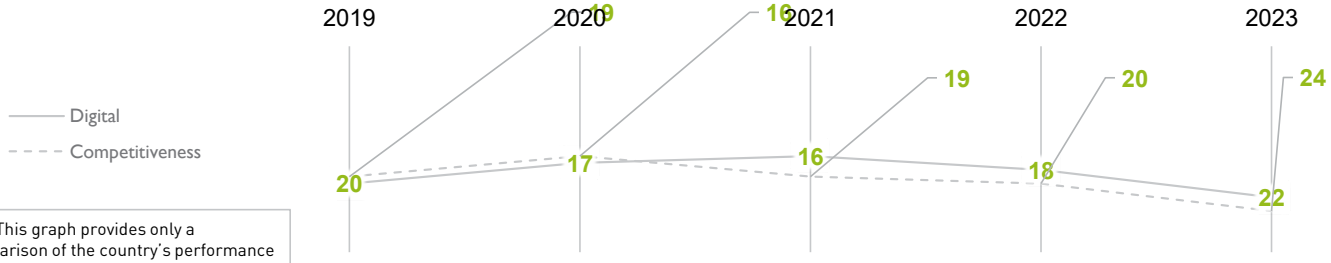
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	20	17	16	18	22
Knowledge	10	11	10	13	16
Technology	32	28	32	36	35
Future readiness	23	16	16	13	19

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

AUSTRIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	12	12	15	16	20
Training & education	08	12	05	12	11
Scientific concentration	14	14	15	15	17

Talent	Rank
Educational assessment PISA - Math	22
International experience	20
Foreign highly skilled personnel	34
Management of cities	15
▷ Digital/Technological skills	50
Net flow of international students	08

Training & education	Rank
▶ Employee training	01
Total public expenditure on education	32
Higher education achievement	35
▶ Pupil-teacher ratio (tertiary education)	02
▶ Graduates in Sciences	08
Women with degrees	37

Scientific concentration	Rank
Total expenditure on R&D (%)	09
Total R&D personnel per capita	10
Female researchers	46
▷ R&D productivity by publication	47
Scientific and technical employment	19
High-tech patent grants	22
Robots in Education and R&D	11

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	25	24	26	29	34
Capital	34	30	32	36	34
Technological framework	31	33	38	37	38

Regulatory framework	Rank
▷ Starting a business	53
Enforcing contracts	10
▷ Immigration laws	57
Development & application of tech.	37
Scientific research legislation	22
Intellectual property rights	11

Capital	Rank
IT & media stock market capitalization	47
Funding for technological development	20
Banking and financial services	24
Country credit rating	14
Venture capital	41
Investment in Telecommunications	47

Technological framework	Rank
Communications technology	28
Mobile broadband subscribers	34
Wireless broadband	32
Internet users	31
Internet bandwidth speed	41
High-tech exports (%)	33

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	29	21	21	19	24
Business agility	25	21	18	21	22
IT integration	15	09	11	11	13

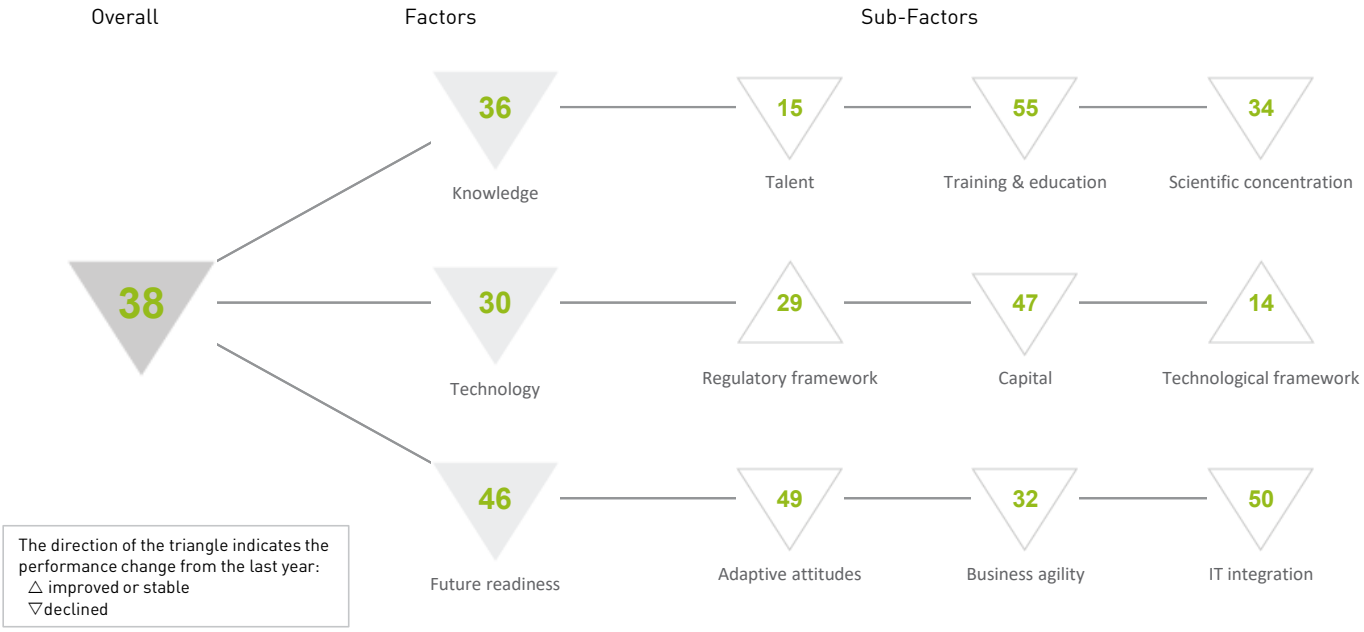
Adaptive attitudes	Rank
E-Participation	20
Internet retailing	16
Tablet possession	27
Smartphone possession	17
▷ Attitudes toward globalization	54

Business agility	Rank
Opportunities and threats	18
World robots distribution	23
Agility of companies	12
Use of big data and analytics	43
Knowledge transfer	20
Entrepreneurial fear of failure	10

IT integration	Rank
E-Government	19
Public-private partnerships	45
▶ Cyber security	04
▶ Software piracy	06
Government cyber security capacity	27
Privacy protection by law content	16

BAHRAIN

OVERALL PERFORMANCE (64 countries)

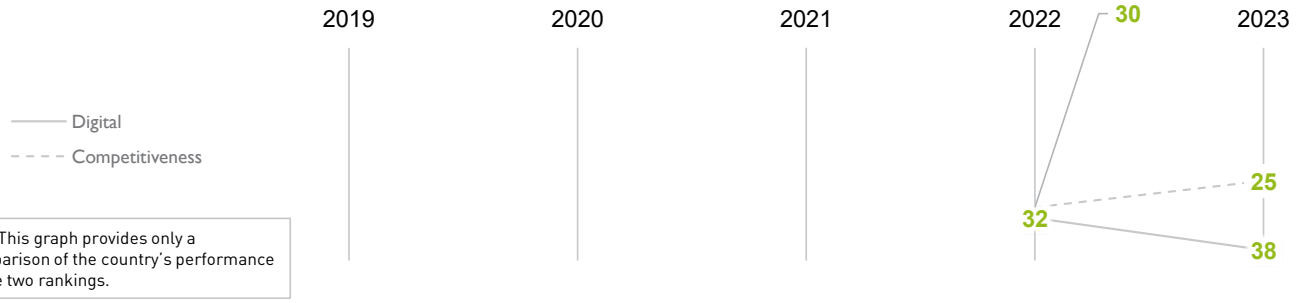


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	-	-	-	32	38
Knowledge	-	-	-	34	36
Technology	-	-	-	23	30
Future readiness	-	-	-	36	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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

BAHRAIN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	-	-	-	13	15
Training & education	-	-	-	48	55
Scientific concentration	-	-	-	31	34

Talent	Rank
Educational assessment PISA - Math	-
International experience	13
Foreign highly skilled personnel	07
Management of cities	13
▶ Digital/Technological skills	03
Net flow of international students	34

Training & education	Rank
Employee training	19
▷ Total public expenditure on education	63
Higher education achievement	53
Pupil-teacher ratio (tertiary education)	55
▷ Graduates in Sciences	58
▶ Women with degrees	03

Scientific concentration	Rank
Total expenditure on R&D (%)	-
Total R&D personnel per capita	-
Female researchers	21
R&D productivity by publication	-
Scientific and technical employment	-
High-tech patent grants	45
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	-	-	-	32	29
Capital	-	-	-	34	47
Technological framework	-	-	-	17	14

Regulatory framework	Rank
Starting a business	33
Enforcing contracts	42
▶ Immigration laws	01
Development & application of tech.	12
Scientific research legislation	37
Intellectual property rights	46

Capital	Rank
IT & media stock market capitalization	30
Funding for technological development	27
Banking and financial services	22
▷ Country credit rating	60
Venture capital	30
Investment in Telecommunications	51

Technological framework	Rank
Communications technology	06
▶ Mobile broadband subscribers	05
Wireless broadband	12
▶ Internet users	05
Internet bandwidth speed	27
High-tech exports (%)	56

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	-	-	-	23	49
Business agility	-	-	-	29	32
IT integration	-	-	-	46	50

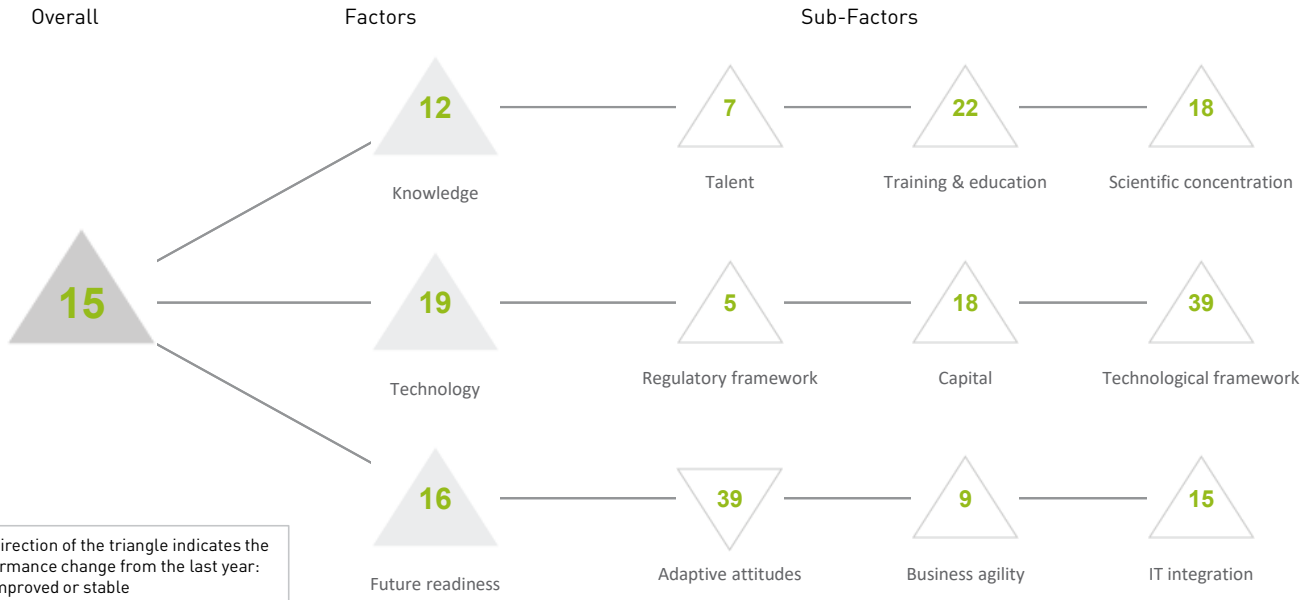
Adaptive attitudes	Rank
▷ E-Participation	59
Internet retailing	49
Tablet possession	44
Smartphone possession	28
Attitudes toward globalization	16

Business agility	Rank
Opportunities and threats	37
World robots distribution	-
Agility of companies	31
Use of big data and analytics	36
Knowledge transfer	30
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	47
Public-private partnerships	10
Cyber security	05
Software piracy	46
Government cyber security capacity	52
▷ Privacy protection by law content	61

BELGIUM

OVERALL PERFORMANCE (64 countries)

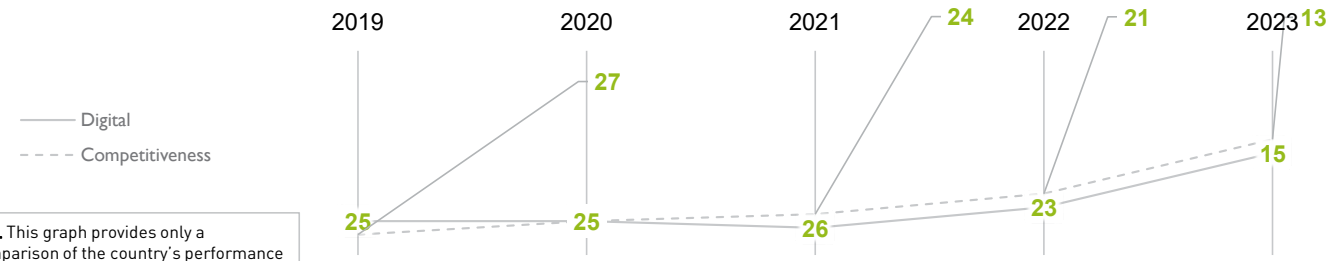


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	25	25	26	23	15
Knowledge	23	21	21	21	12
Technology	21	19	23	24	19
Future readiness	25	25	26	25	16

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

BELGIUM

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	18	20	20	17	07
Training & education	26	31	31	30	22
Scientific concentration	24	21	20	19	18

Talent	Rank
Educational assessment PISA - Math	14
▶ International experience	02
Foreign highly skilled personnel	15
Management of cities	23
Digital/Technological skills	17
Net flow of international students	12

Training & education	Rank
Employee training	10
Total public expenditure on education	07
Higher education achievement	22
Pupil-teacher ratio (tertiary education)	31
▷ Graduates in Sciences	54
Women with degrees	23

Scientific concentration	Rank
Total expenditure on R&D (%)	07
Total R&D personnel per capita	06
Female researchers	42
R&D productivity by publication	44
Scientific and technical employment	15
High-tech patent grants	32
Robots in Education and R&D	18

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	22	19	18	17	05
Capital	25	21	20	23	18
Technological framework	26	29	37	39	39

Regulatory framework	Rank
Starting a business	27
Enforcing contracts	39
Immigration laws	05
Development & application of tech.	06
▶ Scientific research legislation	02
Intellectual property rights	18

Capital	Rank
IT & media stock market capitalization	44
Funding for technological development	07
Banking and financial services	04
Country credit rating	20
▶ Venture capital	01
Investment in Telecommunications	38

Technological framework	Rank
Communications technology	27
Mobile broadband subscribers	41
▷ Wireless broadband	59
Internet users	19
Internet bandwidth speed	29
High-tech exports (%)	23

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	23	24	22	28	39
Business agility	33	35	38	27	09
IT integration	23	26	26	22	15

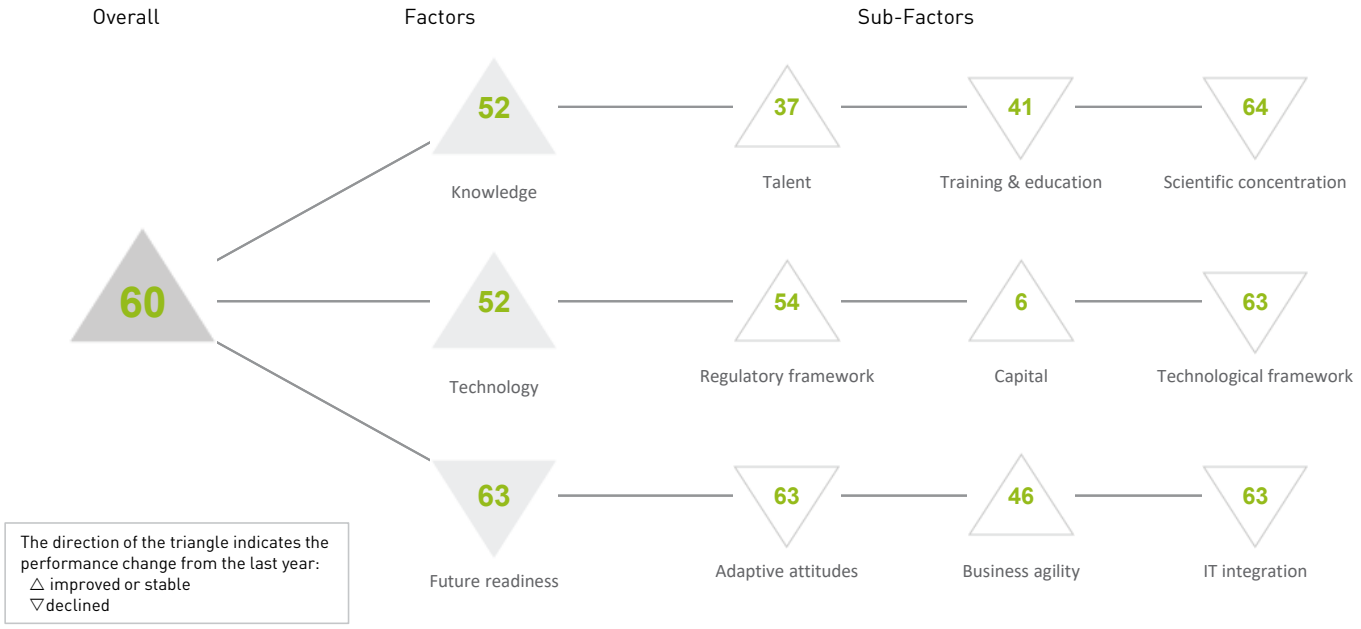
Adaptive attitudes	Rank
▷ E-Participation	58
Internet retailing	12
Tablet possession	41
▷ Smartphone possession	45
Attitudes toward globalization	35

Business agility	Rank
Opportunities and threats	07
World robots distribution	26
Agility of companies	17
▶ Use of big data and analytics	02
▶ Knowledge transfer	02
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	36
Public-private partnerships	06
Cyber security	07
Software piracy	13
▷ Government cyber security capacity	44
Privacy protection by law content	10

BOTSWANA

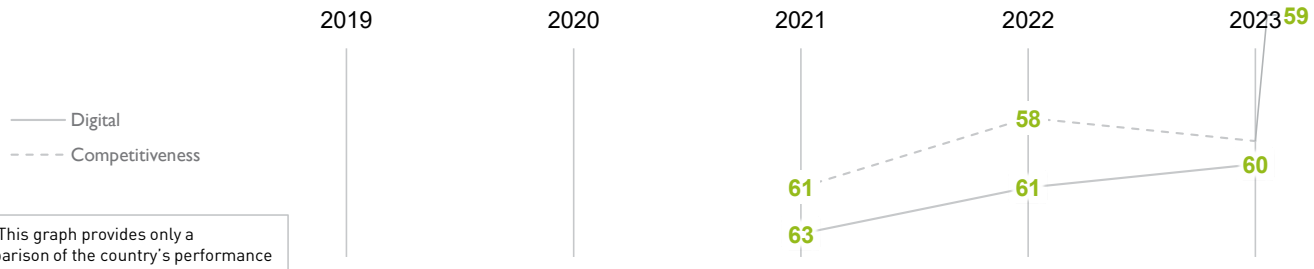
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	-	-	63	61	60
Knowledge	-	-	64	55	52
Technology	-	-	63	59	52
Future readiness	-	-	63	61	63

COMPETITIVENESS & DIGITAL RANKINGS

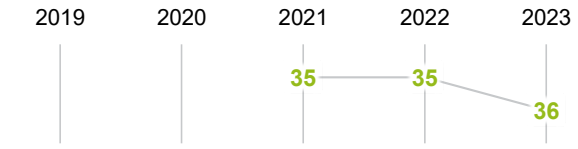


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)



BOTSWANA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	-	-	53	42	37
Training & education	-	-	48	39	41
Scientific concentration	-	-	63	63	64

Talent	Rank
Educational assessment PISA - Math	-
▶ International experience	19
▶ Foreign highly skilled personnel	17
Management of cities	42
Digital/Technological skills	54
Net flow of international students	47

Training & education	Rank
Employee training	55
▶ Total public expenditure on education	01
▷ Higher education achievement	62
Pupil-teacher ratio (tertiary education)	36
Graduates in Sciences	52
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	-
Total R&D personnel per capita	-
Female researchers	-
R&D productivity by publication	-
Scientific and technical employment	54
High-tech patent grants	61
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	-	-	63	54	54
Capital	-	-	56	47	06
Technological framework	-	-	64	62	63

Regulatory framework	Rank
Starting a business	62
Enforcing contracts	57
▶ Immigration laws	24
Development & application of tech.	36
Scientific research legislation	45
Intellectual property rights	49

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	50
Banking and financial services	38
Country credit rating	40
Venture capital	36
▶ Investment in Telecommunications	01

Technological framework	Rank
Communications technology	58
▷ Mobile broadband subscribers	64
Wireless broadband	55
▷ Internet users	63
▷ Internet bandwidth speed	64
▷ High-tech exports (%)	63

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	-	-	63	59	63
Business agility	-	-	46	51	46
IT integration	-	-	63	61	63

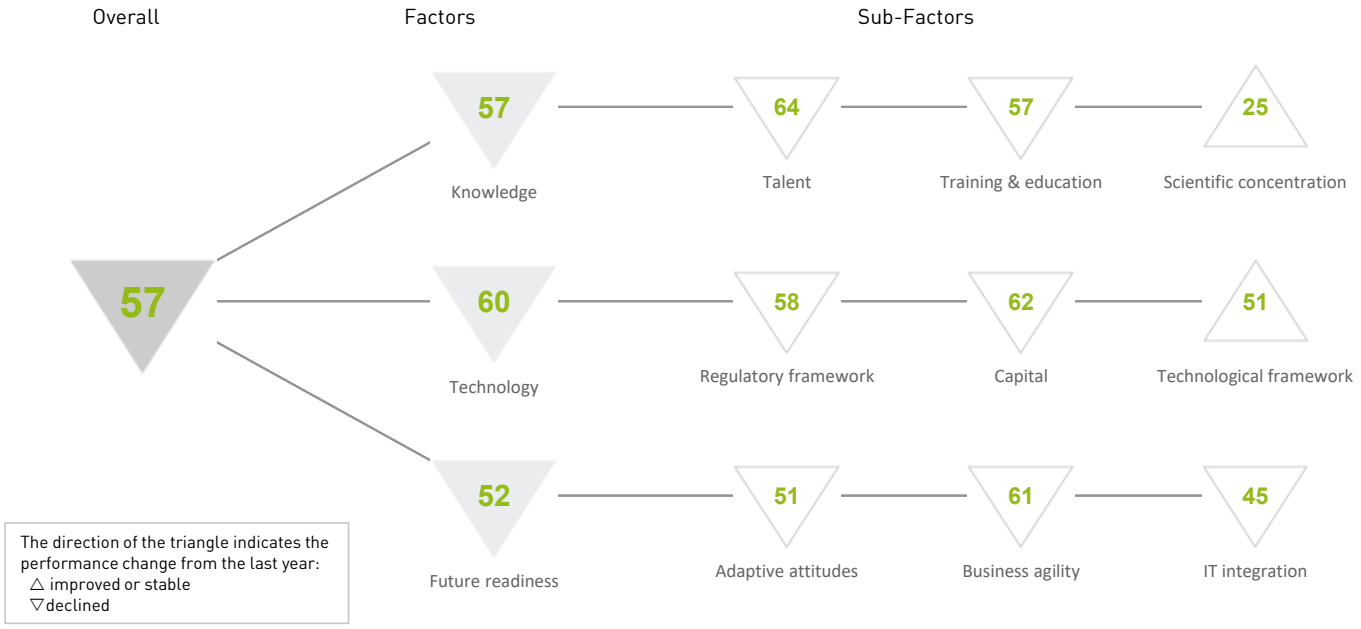
Adaptive attitudes	Rank
E-Participation	61
Internet retailing	-
Tablet possession	-
Smartphone possession	-
Attitudes toward globalization	53

Business agility	Rank
Opportunities and threats	58
World robots distribution	-
Agility of companies	59
Use of big data and analytics	41
Knowledge transfer	45
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	61
Public-private partnerships	31
Cyber security	51
Software piracy	60
Government cyber security capacity	62
Privacy protection by law content	27

BRAZIL

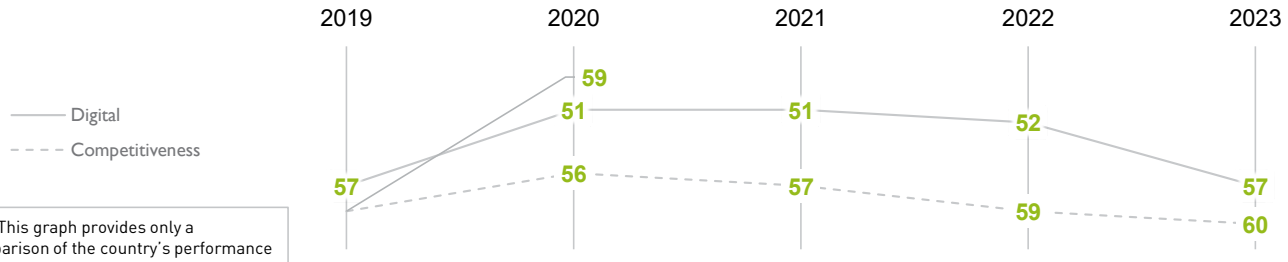
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	57	51	51	52	57
Knowledge	59	57	51	51	57
Technology	57	57	55	55	60
Future readiness	43	43	45	47	52

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

BRAZIL

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	61	62	63	62	64
Training & education	59	61	58	51	57
Scientific concentration	44	27	21	25	25

Talent	Rank
Educational assessment PISA - Math	53
▷ International experience	63
▷ Foreign highly skilled personnel	61
▷ Management of cities	61
▷ Digital/Technological skills	62
Net flow of international students	44

Training & education	Rank
Employee training	56
▶ Total public expenditure on education	12
Higher education achievement	54
Pupil-teacher ratio (tertiary education)	47
Graduates in Sciences	55
Women with degrees	50

Scientific concentration	Rank
Total expenditure on R&D (%)	35
Total R&D personnel per capita	19
▶ Female researchers	17
▶ R&D productivity by publication	07
Scientific and technical employment	37
High-tech patent grants	44
▶ Robots in Education and R&D	17

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	57	52	51	55	58
Capital	61	58	59	57	62
Technological framework	47	50	51	51	51

Regulatory framework	Rank
Starting a business	58
Enforcing contracts	41
Immigration laws	28
Development & application of tech.	59
Scientific research legislation	59
Intellectual property rights	60

Capital	Rank
IT & media stock market capitalization	48
Funding for technological development	60
Banking and financial services	60
Country credit rating	57
Venture capital	60
Investment in Telecommunications	36

Technological framework	Rank
Communications technology	55
Mobile broadband subscribers	37
Wireless broadband	51
Internet users	50
Internet bandwidth speed	37
High-tech exports (%)	45

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	33	39	40	43	51
Business agility	58	41	42	52	61
IT integration	49	48	49	43	45

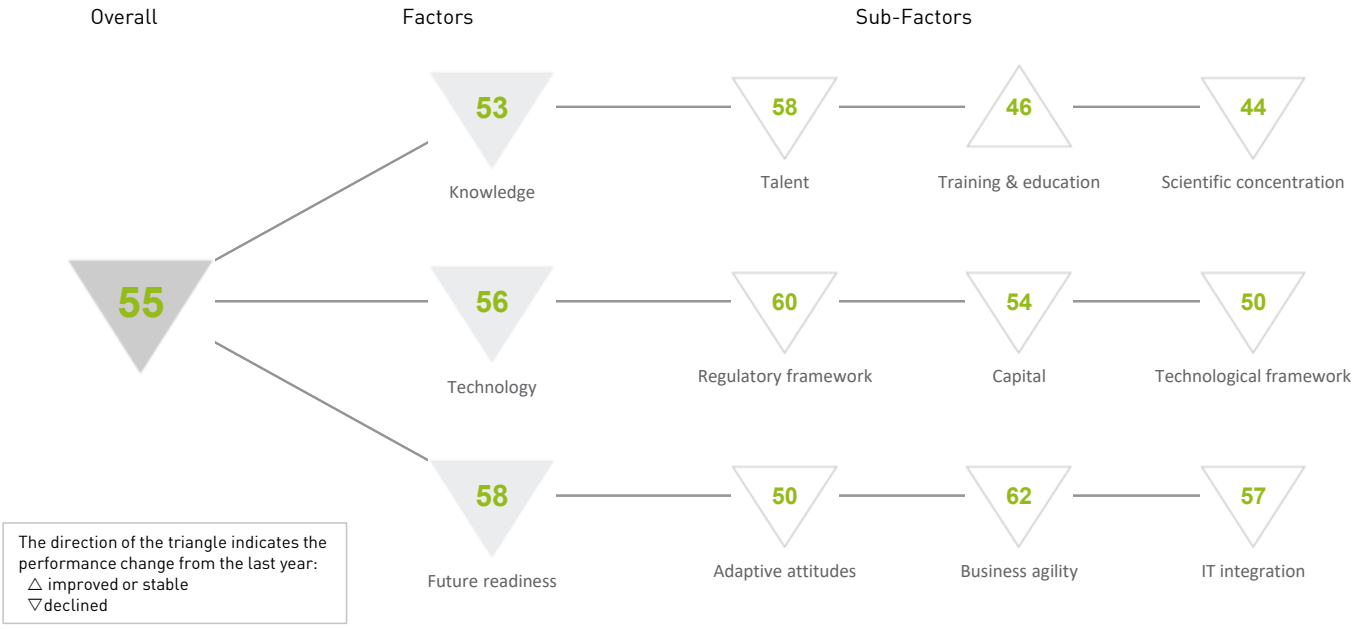
Adaptive attitudes	Rank
▶ E-Participation	11
Internet retailing	44
Tablet possession	56
Smartphone possession	38
Attitudes toward globalization	52

Business agility	Rank
Opportunities and threats	52
World robots distribution	19
Agility of companies	54
▷ Use of big data and analytics	61
Knowledge transfer	61
Entrepreneurial fear of failure	27

IT integration	Rank
E-Government	43
Public-private partnerships	60
Cyber security	57
Software piracy	36
Government cyber security capacity	26
Privacy protection by law content	29

BULGARIA

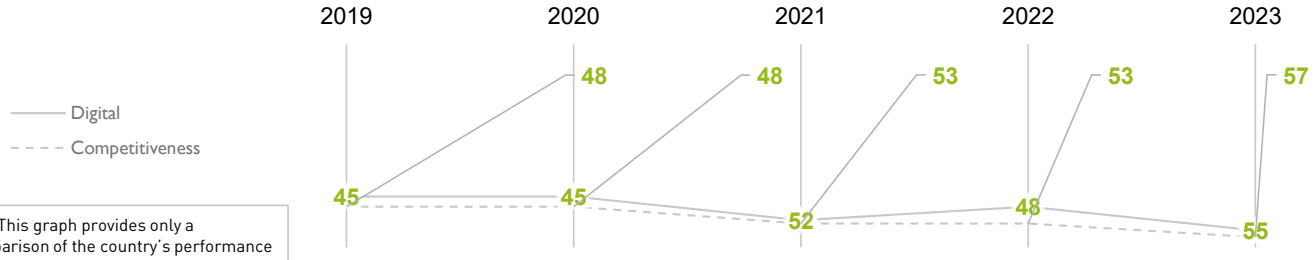
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

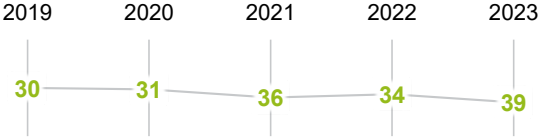
	2019	2020	2021	2022	2023
OVERALL	45	45	52	48	55
Knowledge	46	47	53	48	53
Technology	42	45	51	51	56
Future readiness	48	44	55	50	58

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS < 20 MILLION (37 countries)

BULGARIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	50	48	54	56	58
Training & education	46	50	53	52	46
Scientific concentration	37	42	46	40	44

Talent	Rank
Educational assessment PISA - Math	42
International experience	61
▷ Foreign highly skilled personnel	63
Management of cities	48
Digital/Technological skills	43
Net flow of international students	52

Training & education	Rank
Employee training	61
Total public expenditure on education	41
Higher education achievement	47
▶ Pupil-teacher ratio (tertiary education)	14
Graduates in Sciences	47
Women with degrees	36

Scientific concentration	Rank
Total expenditure on R&D (%)	44
Total R&D personnel per capita	39
▶ Female researchers	12
R&D productivity by publication	45
Scientific and technical employment	41
▶ High-tech patent grants	14
Robots in Education and R&D	48

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	46	55	55	52	60
Capital	42	48	53	52	54
Technological framework	44	39	42	46	50

Regulatory framework	Rank
Starting a business	47
Enforcing contracts	31
▷ Immigration laws	63
Development & application of tech.	57
Scientific research legislation	61
Intellectual property rights	61

Capital	Rank
IT & media stock market capitalization	43
Funding for technological development	54
Banking and financial services	54
Country credit rating	44
Venture capital	46
Investment in Telecommunications	39

Technological framework	Rank
Communications technology	48
Mobile broadband subscribers	39
Wireless broadband	22
Internet users	56
Internet bandwidth speed	48
High-tech exports (%)	37

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	43	41	45	39	50
Business agility	56	40	61	56	62
IT integration	47	47	53	49	57

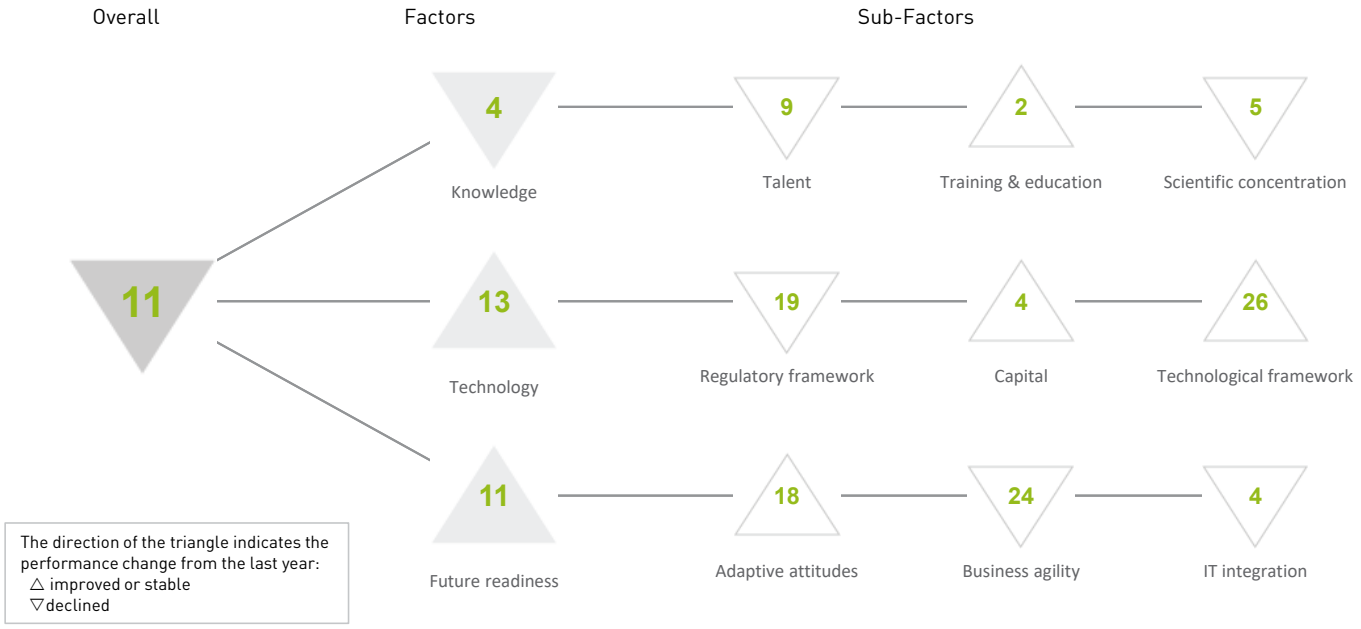
Adaptive attitudes	Rank
E-Participation	26
Internet retailing	50
Tablet possession	42
Smartphone possession	30
▷ Attitudes toward globalization	62

Business agility	Rank
▷ Opportunities and threats	63
World robots distribution	43
Agility of companies	62
Use of big data and analytics	55
Knowledge transfer	60
▶ Entrepreneurial fear of failure	06

IT integration	Rank
E-Government	45
Public-private partnerships	56
▷ Cyber security	62
Software piracy	51
Government cyber security capacity	60
▶ Privacy protection by law content	20

CANADA

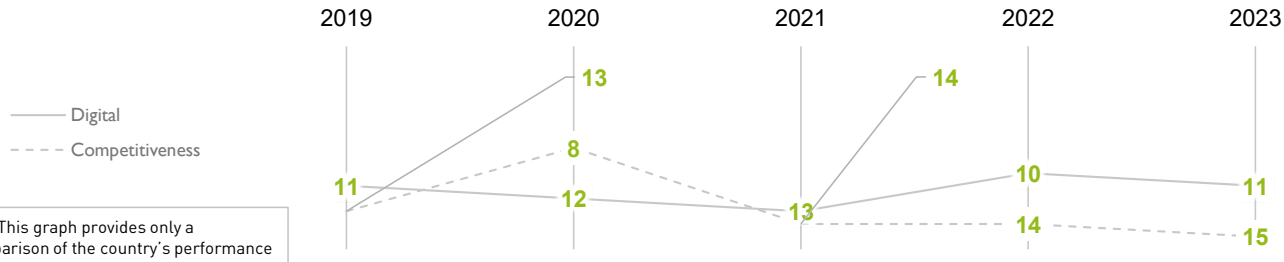
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	11	12	13	10	11
Knowledge	05	05	07	03	04
Technology	13	13	15	14	13
Future readiness	18	15	15	11	11

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

CANADA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	13	08	09	08	09
Training & education	07	06	10	03	02
Scientific concentration	02	07	05	04	05

Talent	Rank
Educational assessment PISA - Math	11
International experience	28
Foreign highly skilled personnel	10
Management of cities	18
Digital/Technological skills	18
Net flow of international students	05

Training & education	Rank
Employee training	15
▷ Total public expenditure on education	42
▶ Higher education achievement	05
Pupil-teacher ratio (tertiary education)	09
Graduates in Sciences	26
▶ Women with degrees	02

Scientific concentration	Rank
Total expenditure on R&D (%)	26
Total R&D personnel per capita	24
Female researchers	21
R&D productivity by publication	10
▶ Scientific and technical employment	02
High-tech patent grants	13
Robots in Education and R&D	09

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	17	12	13	13	19
Capital	10	03	09	06	04
Technological framework	27	26	29	31	26

Regulatory framework	Rank
▶ Starting a business	02
▷ Enforcing contracts	50
Immigration laws	11
Development & application of tech.	21
Scientific research legislation	14
Intellectual property rights	26

Capital	Rank
IT & media stock market capitalization	23
Funding for technological development	16
Banking and financial services	17
Country credit rating	10
Venture capital	12
Investment in Telecommunications	14

Technological framework	Rank
Communications technology	30
Mobile broadband subscribers	33
▷ Wireless broadband	53
Internet users	15
Internet bandwidth speed	12
High-tech exports (%)	29

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	17	16	17	18	18
Business agility	16	16	20	19	24
IT integration	13	13	14	02	04

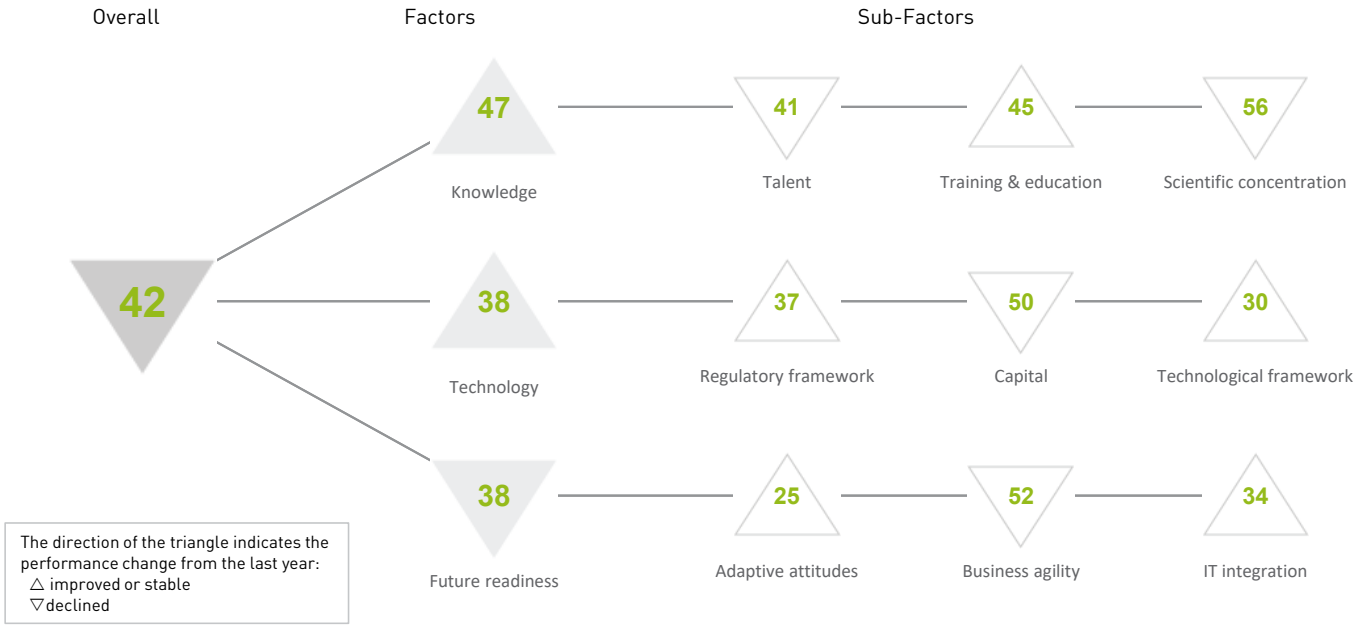
Adaptive attitudes	Rank
E-Participation	14
Internet retailing	10
Tablet possession	17
▷ Smartphone possession	53
Attitudes toward globalization	20

Business agility	Rank
Opportunities and threats	30
World robots distribution	13
Agility of companies	21
Use of big data and analytics	17
Knowledge transfer	10
▷ Entrepreneurial fear of failure	48

IT integration	Rank
E-Government	30
Public-private partnerships	14
Cyber security	17
Software piracy	13
▶ Government cyber security capacity	04
Privacy protection by law content	15

CHILE

OVERALL PERFORMANCE (64 countries)

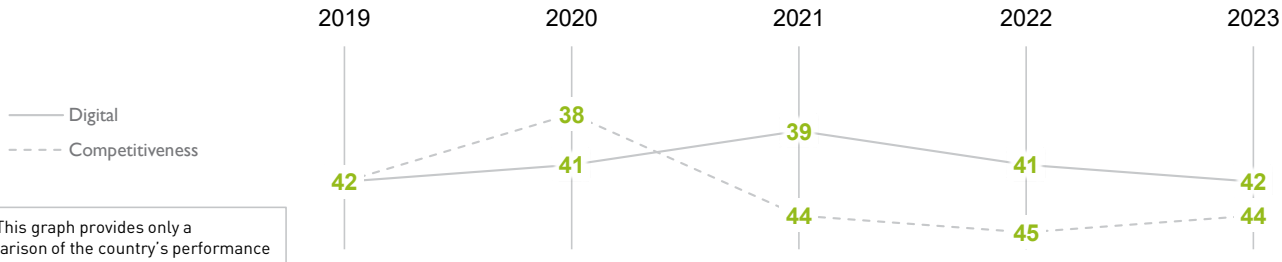


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	42	41	39	41	42
Knowledge	50	49	49	50	47
Technology	41	40	35	41	38
Future readiness	37	39	36	33	38

COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS < 20 MILLION (37 countries)

CHILE

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	36	37	36	39	41
Training & education	55	49	51	54	45
Scientific concentration	57	58	57	55	56

Talent	Rank
Educational assessment PISA - Math	47
International experience	26
▶ Foreign highly skilled personnel	13
▷ Management of cities	55
Digital/Technological skills	28
Net flow of international students	43

Training & education	Rank
▷ Employee training	63
▶ Total public expenditure on education	17
Higher education achievement	39
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	40
Women with degrees	41

Scientific concentration	Rank
Total expenditure on R&D (%)	52
Total R&D personnel per capita	52
Female researchers	35
R&D productivity by publication	18
Scientific and technical employment	38
▷ High-tech patent grants	58
Robots in Education and R&D	42

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	36	33	33	41	37
Capital	44	40	38	43	50
Technological framework	42	44	36	36	30

Regulatory framework	Rank
Starting a business	30
Enforcing contracts	37
Immigration laws	19
Development & application of tech.	39
Scientific research legislation	49
Intellectual property rights	31

Capital	Rank
▷ IT & media stock market capitalization	54
Funding for technological development	51
Banking and financial services	36
Country credit rating	35
▷ Venture capital	55
▶ Investment in Telecommunications	17

Technological framework	Rank
Communications technology	21
Mobile broadband subscribers	35
Wireless broadband	43
Internet users	42
▶ Internet bandwidth speed	08
High-tech exports (%)	34

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	27	22	24	26	25
Business agility	50	54	54	43	52
IT integration	39	40	39	34	34

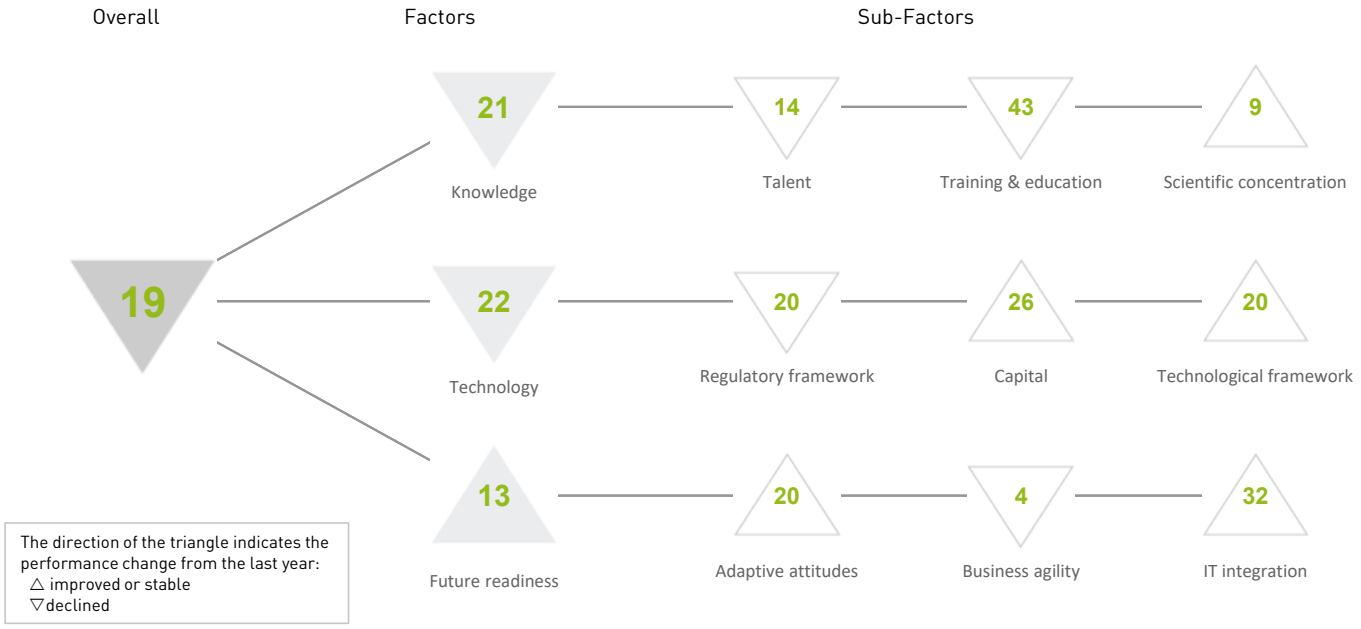
Adaptive attitudes	Rank
E-Participation	39
Internet retailing	32
Tablet possession	28
▶ Smartphone possession	11
Attitudes toward globalization	25

Business agility	Rank
Opportunities and threats	38
World robots distribution	47
Agility of companies	44
Use of big data and analytics	46
Knowledge transfer	49
Entrepreneurial fear of failure	32

IT integration	Rank
E-Government	33
Public-private partnerships	21
Cyber security	49
Software piracy	47
Government cyber security capacity	19
Privacy protection by law content	36

CHINA

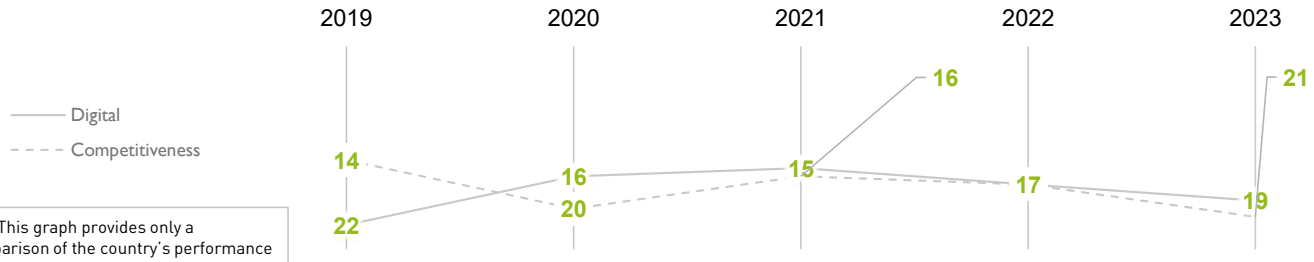
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	22	16	15	17	19
Knowledge	18	08	06	17	21
Technology	26	27	20	18	22
Future readiness	21	18	17	15	13

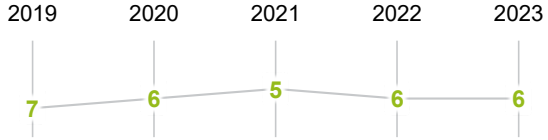
COMPETITIVENESS & DIGITAL RANKINGS



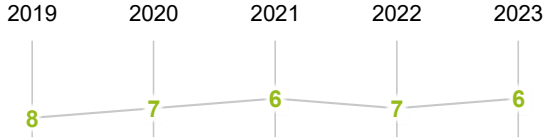
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)



POPULATIONS > 20 MILLION (27 countries)



CHINA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	19	13	12	12	14
Training & education	37	40	35	33	43
Scientific concentration	09	02	01	09	09

Talent	Rank
▶ Educational assessment PISA - Math	01
International experience	39
Foreign highly skilled personnel	39
Management of cities	07
Digital/Technological skills	13
Net flow of international students	50

Training & education	Rank
Employee training	18
▷ Total public expenditure on education	54
Higher education achievement	12
Pupil-teacher ratio (tertiary education)	45
Graduates in Sciences	-
▷ Women with degrees	54

Scientific concentration	Rank
Total expenditure on R&D (%)	15
Total R&D personnel per capita	40
Female researchers	53
▶ R&D productivity by publication	01
Scientific and technical employment	52
High-tech patent grants	05
▶ Robots in Education and R&D	01

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	20	18	15	16	20
Capital	32	31	27	27	26
Technological framework	32	32	28	24	20

Regulatory framework	Rank
Starting a business	16
Enforcing contracts	05
Immigration laws	40
Development & application of tech.	24
Scientific research legislation	20
Intellectual property rights	36

Capital	Rank
IT & media stock market capitalization	22
Funding for technological development	17
Banking and financial services	37
Country credit rating	29
Venture capital	29
Investment in Telecommunications	29

Technological framework	Rank
Communications technology	14
Mobile broadband subscribers	08
Wireless broadband	18
▷ Internet users	54
Internet bandwidth speed	18
High-tech exports (%)	09

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	24	17	19	22	20
Business agility	01	04	03	03	04
IT integration	41	35	32	32	32

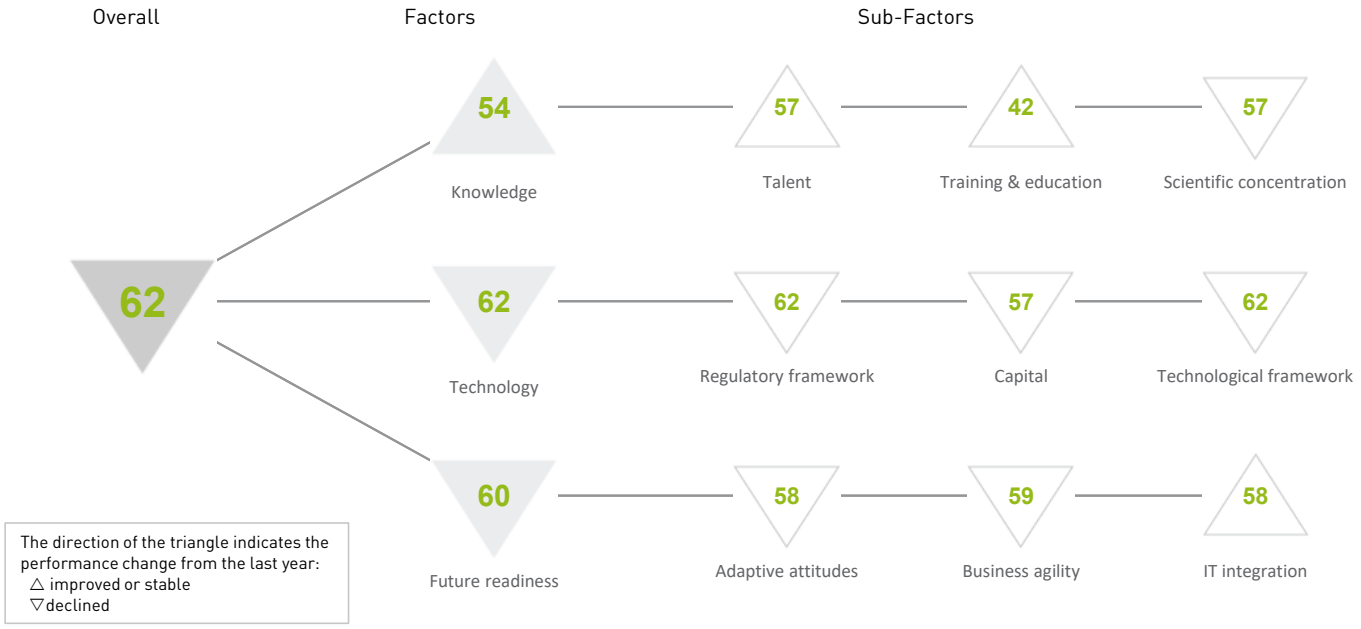
Adaptive attitudes	Rank
E-Participation	13
Internet retailing	22
Tablet possession	38
Smartphone possession	46
Attitudes toward globalization	08

Business agility	Rank
Opportunities and threats	25
▶ World robots distribution	01
Agility of companies	29
Use of big data and analytics	16
Knowledge transfer	28
Entrepreneurial fear of failure	25

IT integration	Rank
E-Government	38
Public-private partnerships	12
Cyber security	09
▷ Software piracy	56
▶ Government cyber security capacity	03
▷ Privacy protection by law content	60

COLOMBIA

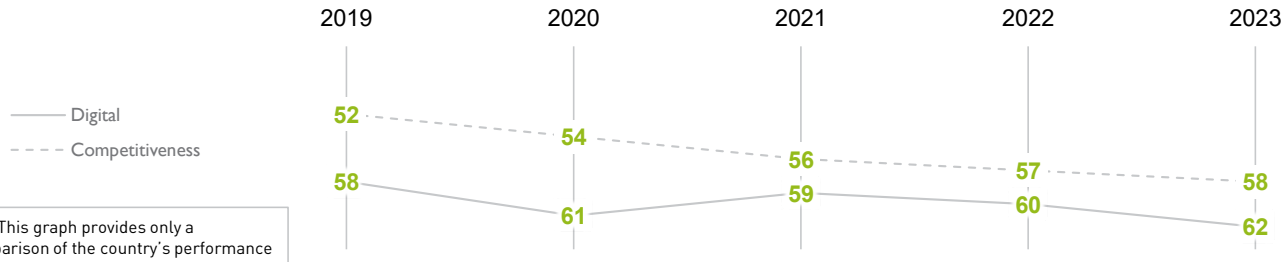
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	58	61	59	60	62
Knowledge	57	59	56	57	54
Technology	60	61	60	61	62
Future readiness	55	50	53	56	60

COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

COLOMBIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	56	54	57	58	57
Training & education	49	48	50	46	42
Scientific concentration	58	57	58	56	57

Talent	Rank
Educational assessment PISA - Math	52
International experience	42
Foreign highly skilled personnel	45
Management of cities	57
Digital/Technological skills	55
Net flow of international students	51

Training & education	Rank
Employee training	38
▶ Total public expenditure on education	23
Higher education achievement	49
▶ Pupil-teacher ratio (tertiary education)	32
Graduates in Sciences	30
Women with degrees	47

Scientific concentration	Rank
Total expenditure on R&D (%)	55
Total R&D personnel per capita	49
Female researchers	28
▶ R&D productivity by publication	14
Scientific and technical employment	45
High-tech patent grants	60
Robots in Education and R&D	48

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	61	60	61	59	62
Capital	55	56	49	56	57
Technological framework	52	61	59	61	62

Regulatory framework	Rank
Starting a business	40
▷ Enforcing contracts	64
Immigration laws	54
Development & application of tech.	54
Scientific research legislation	50
Intellectual property rights	50

Capital	Rank
IT & media stock market capitalization	58
Funding for technological development	53
Banking and financial services	59
Country credit rating	55
Venture capital	47
▶ Investment in Telecommunications	04

Technological framework	Rank
▷ Communications technology	61
▷ Mobile broadband subscribers	61
▷ Wireless broadband	63
Internet users	57
Internet bandwidth speed	46
High-tech exports (%)	47

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	56	60	58	48	58
Business agility	55	38	47	54	59
IT integration	45	49	46	58	58

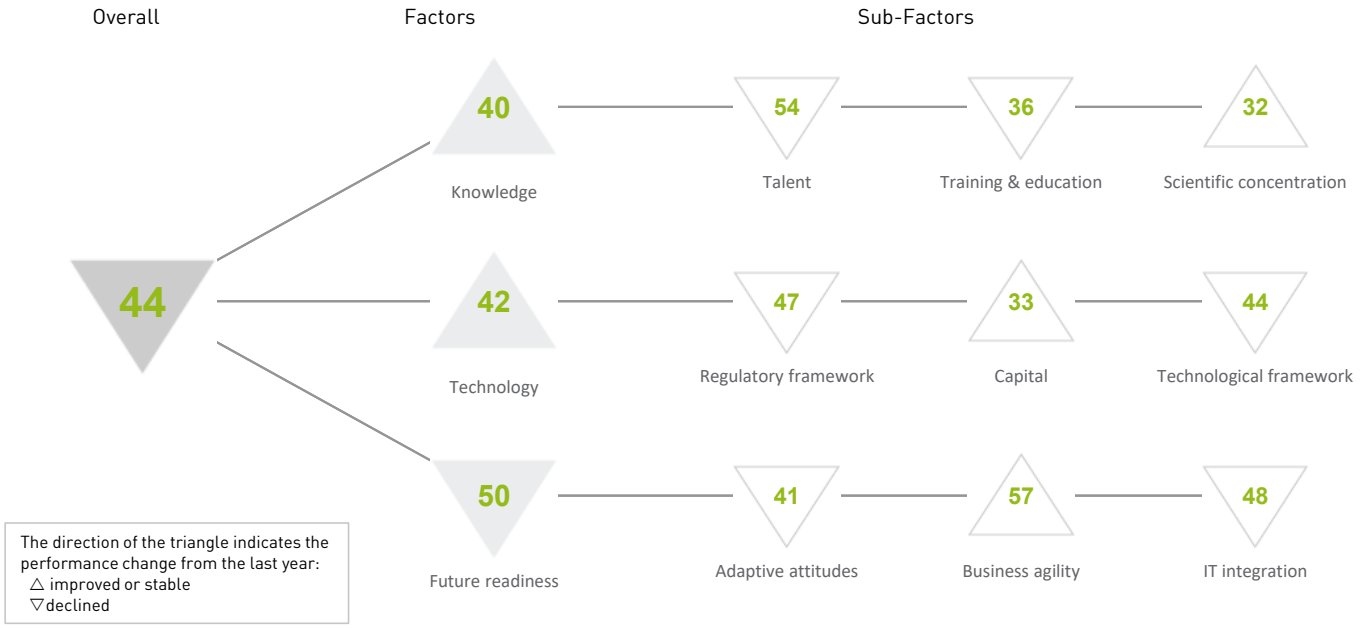
Adaptive attitudes	Rank
E-Participation	34
Internet retailing	55
Tablet possession	60
▶ Smartphone possession	30
Attitudes toward globalization	49

Business agility	Rank
Opportunities and threats	61
World robots distribution	49
Agility of companies	52
Use of big data and analytics	45
Knowledge transfer	41
Entrepreneurial fear of failure	38

IT integration	Rank
E-Government	54
Public-private partnerships	34
Cyber security	52
Software piracy	40
▷ Government cyber security capacity	64
Privacy protection by law content	52

CROATIA

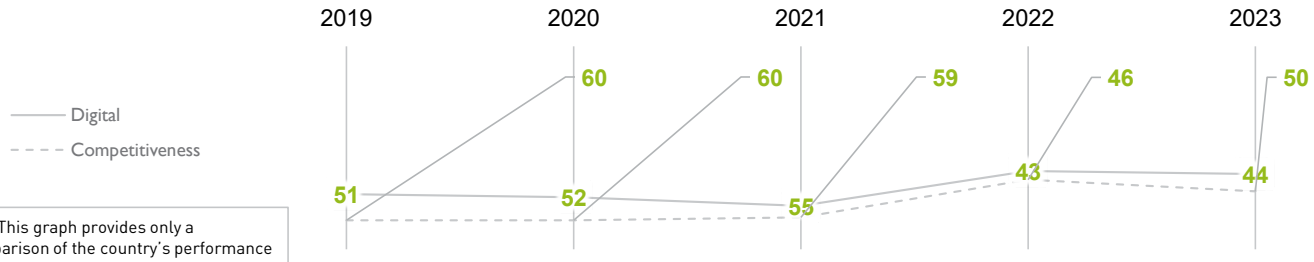
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	51	52	55	43	44
Knowledge	42	41	47	40	40
Technology	50	49	50	42	42
Future readiness	60	62	60	48	50

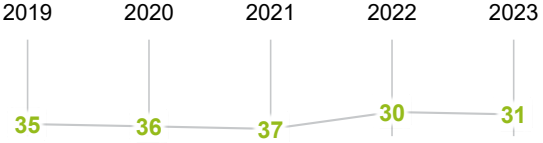
COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS < 20 MILLION (37 countries)

CROATIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	58	61	61	52	54
Training & education	31	26	42	34	36
Scientific concentration	33	32	34	34	32

Talent	Rank
Educational assessment PISA - Math	36
▷ International experience	59
Foreign highly skilled personnel	56
Management of cities	56
Digital/Technological skills	28
Net flow of international students	53

Training & education	Rank
Employee training	49
Total public expenditure on education	25
Higher education achievement	44
▶ Pupil-teacher ratio (tertiary education)	08
▶ Graduates in Sciences	13
Women with degrees	45

Scientific concentration	Rank
Total expenditure on R&D (%)	33
Total R&D personnel per capita	35
▶ Female researchers	09
R&D productivity by publication	49
Scientific and technical employment	34
High-tech patent grants	21
Robots in Education and R&D	39

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	59	59	56	46	47
Capital	50	43	50	35	33
Technological framework	41	40	41	42	44

Regulatory framework	Rank
Starting a business	48
Enforcing contracts	23
Immigration laws	21
▷ Development & application of tech.	61
Scientific research legislation	52
Intellectual property rights	51

Capital	Rank
▶ IT & media stock market capitalization	18
Funding for technological development	47
Banking and financial services	45
Country credit rating	43
Venture capital	42
▶ Investment in Telecommunications	06

Technological framework	Rank
Communications technology	31
Mobile broadband subscribers	24
Wireless broadband	50
Internet users	39
Internet bandwidth speed	57
High-tech exports (%)	41

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	51	46	39	40	41
Business agility	62	63	64	58	57
IT integration	57	59	58	44	48

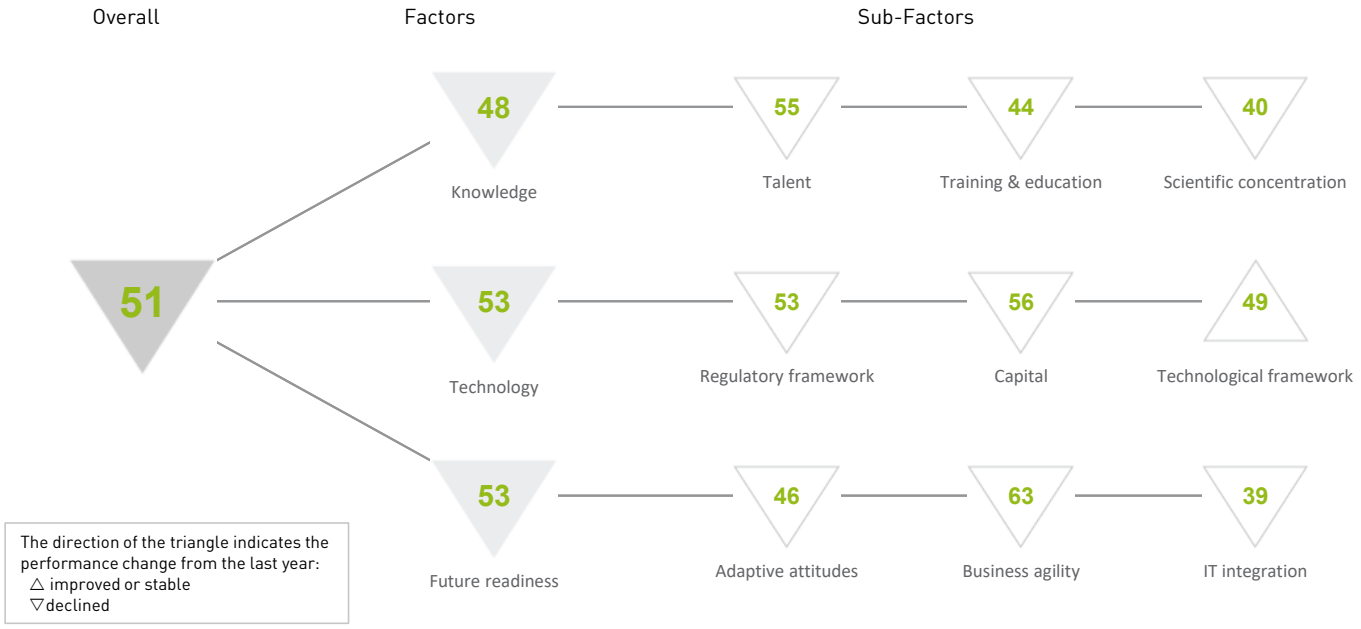
Adaptive attitudes	Rank
E-Participation	26
Internet retailing	47
Tablet possession	31
Smartphone possession	18
▷ Attitudes toward globalization	59

Business agility	Rank
Opportunities and threats	49
World robots distribution	48
Agility of companies	40
Use of big data and analytics	53
▷ Knowledge transfer	58
Entrepreneurial fear of failure	29

IT integration	Rank
E-Government	39
▷ Public-private partnerships	61
Cyber security	45
Software piracy	43
Government cyber security capacity	46
Privacy protection by law content	25

CYPRUS

OVERALL PERFORMANCE (64 countries)

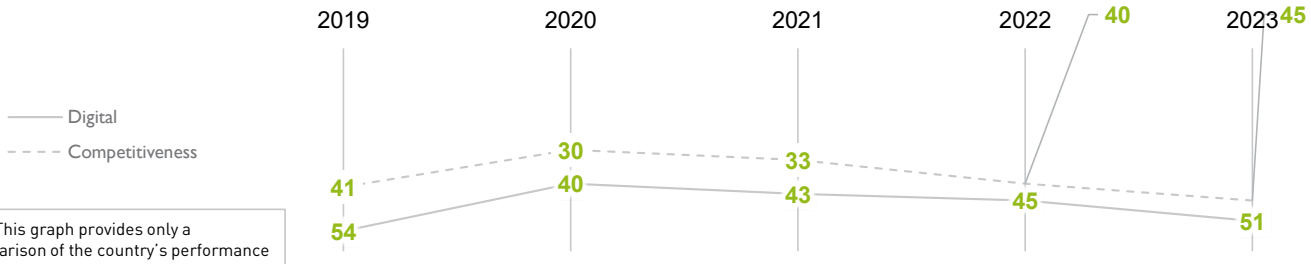


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	54	40	43	45	51
Knowledge	55	40	39	39	48
Technology	59	52	53	52	53
Future readiness	40	29	34	39	53

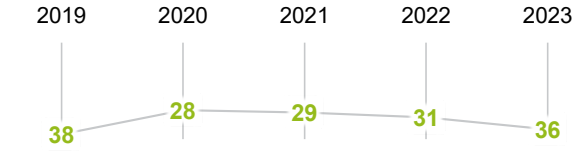
COMPETITIVENESS & DIGITAL RANKINGS



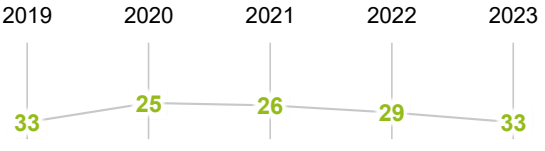
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS < 20 MILLION (37 countries)



CYPRUS

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	62	57	56	53	55
Training & education	33	30	29	40	44
Scientific concentration	53	35	29	26	40

Talent	Rank
Educational assessment PISA - Math	40
International experience	47
Foreign highly skilled personnel	24
Management of cities	43
Digital/Technological skills	40
Net flow of international students	60

Training & education	Rank
Employee training	57
▶ Total public expenditure on education	20
▶ Higher education achievement	11
Pupil-teacher ratio (tertiary education)	56
▷ Graduates in Sciences	61
▶ Women with degrees	19

Scientific concentration	Rank
Total expenditure on R&D (%)	43
Total R&D personnel per capita	42
Female researchers	30
R&D productivity by publication	56
▶ Scientific and technical employment	05
High-tech patent grants	28
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	56	47	47	50	53
Capital	60	52	54	54	56
Technological framework	48	52	52	49	49

Regulatory framework	Rank
Starting a business	28
Enforcing contracts	59
Immigration laws	48
Development & application of tech.	48
Scientific research legislation	55
Intellectual property rights	42

Capital	Rank
IT & media stock market capitalization	39
Funding for technological development	59
Banking and financial services	56
Country credit rating	54
▷ Venture capital	61
▶ Investment in Telecommunications	22

Technological framework	Rank
Communications technology	24
Mobile broadband subscribers	60
Wireless broadband	44
Internet users	30
Internet bandwidth speed	52
High-tech exports (%)	27

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	34	28	27	36	46
Business agility	57	42	50	53	63
IT integration	38	29	33	29	39

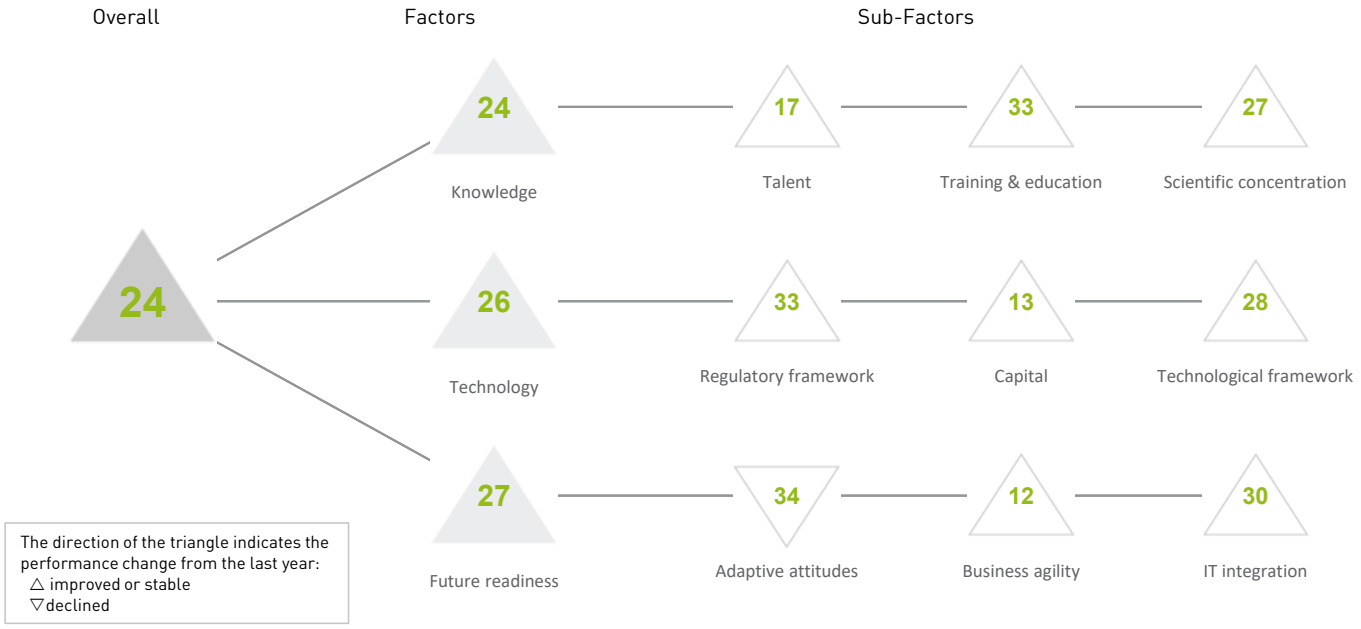
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	-
Tablet possession	43
Smartphone possession	-
Attitudes toward globalization	58

Business agility	Rank
Opportunities and threats	59
World robots distribution	-
▷ Agility of companies	61
▷ Use of big data and analytics	63
▷ Knowledge transfer	62
Entrepreneurial fear of failure	41

IT integration	Rank
E-Government	25
Public-private partnerships	59
Cyber security	60
Software piracy	34
Government cyber security capacity	31
Privacy protection by law content	24

CZECH REPUBLIC

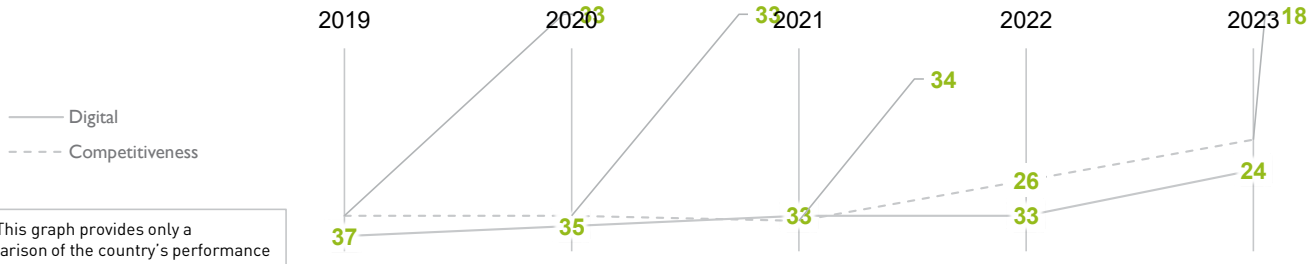
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	37	35	33	33	24
Knowledge	37	37	35	32	24
Technology	34	36	37	35	26
Future readiness	39	36	37	29	27

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

CZECH REPUBLIC

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	35	26	28	22	17
Training & education	44	46	45	38	33
Scientific concentration	30	31	30	29	27

Talent	Rank
Educational assessment PISA - Math	21
▶ International experience	09
Foreign highly skilled personnel	21
Management of cities	27
Digital/Technological skills	23
Net flow of international students	11

Training & education	Rank
Employee training	11
Total public expenditure on education	28
Higher education achievement	45
Pupil-teacher ratio (tertiary education)	30
Graduates in Sciences	24
Women with degrees	42

Scientific concentration	Rank
Total expenditure on R&D (%)	20
Total R&D personnel per capita	17
▷ Female researchers	51
R&D productivity by publication	34
Scientific and technical employment	29
High-tech patent grants	29
Robots in Education and R&D	15

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	43	45	44	37	33
Capital	28	27	29	26	13
Technological framework	28	28	32	30	28

Regulatory framework	Rank
▷ Starting a business	56
▷ Enforcing contracts	52
Immigration laws	13
Development & application of tech.	32
Scientific research legislation	17
Intellectual property rights	15

Capital	Rank
IT & media stock market capitalization	19
Funding for technological development	14
▶ Banking and financial services	07
Country credit rating	25
Venture capital	11
Investment in Telecommunications	41

Technological framework	Rank
Communications technology	18
▶ Mobile broadband subscribers	10
Wireless broadband	26
Internet users	40
Internet bandwidth speed	47
High-tech exports (%)	19

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	46	34	35	31	34
Business agility	37	27	32	24	12
IT integration	35	36	36	36	30

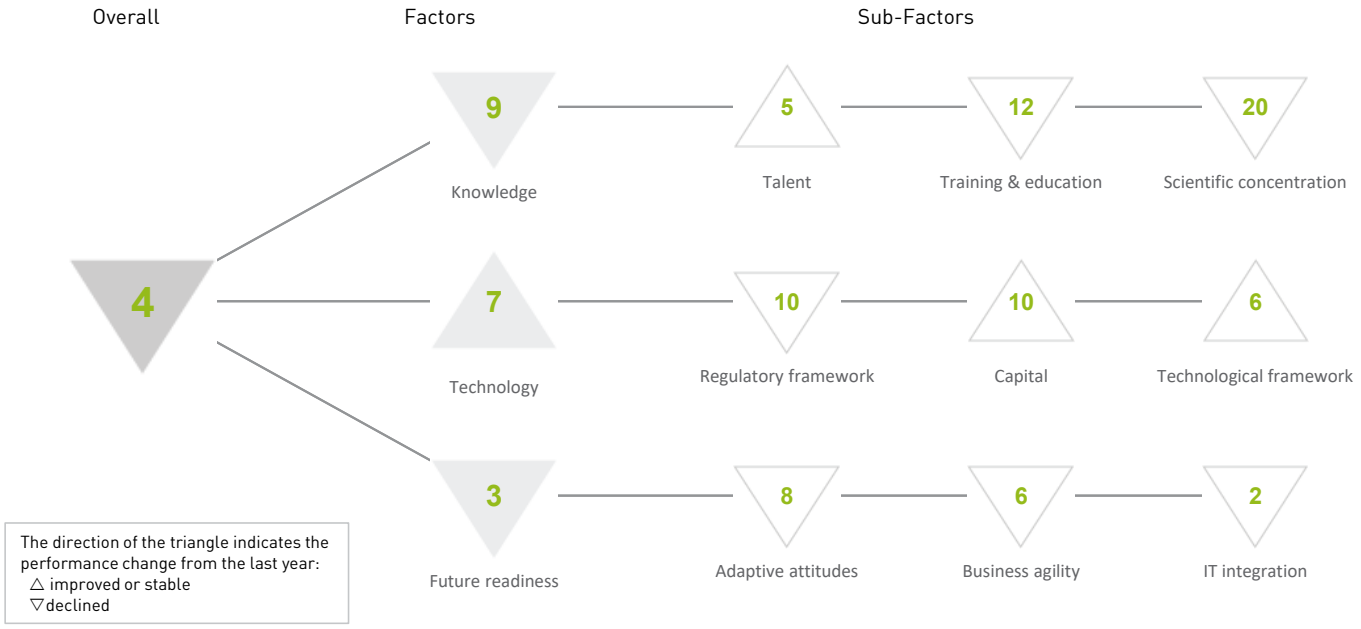
Adaptive attitudes	Rank
▷ E-Participation	48
Internet retailing	25
Tablet possession	46
Smartphone possession	13
Attitudes toward globalization	14

Business agility	Rank
▶ Opportunities and threats	08
World robots distribution	16
▶ Agility of companies	08
Use of big data and analytics	19
Knowledge transfer	19
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	40
Public-private partnerships	39
Cyber security	18
Software piracy	20
▷ Government cyber security capacity	51
Privacy protection by law content	12

DENMARK

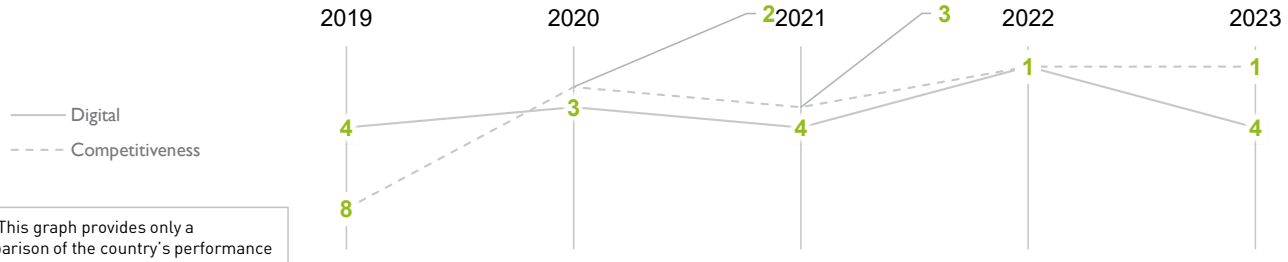
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	04	03	04	01	04
Knowledge	06	06	08	06	09
Technology	11	09	09	07	07
Future readiness	02	01	02	01	03

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

DENMARK

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	06	04	05	05	05
Training & education	06	09	04	07	12
Scientific concentration	17	15	17	17	20

Talent	Rank
Educational assessment PISA - Math	12
International experience	12
Foreign highly skilled personnel	14
Management of cities	02
Digital/Technological skills	04
Net flow of international students	10

Training & education	Rank
▶ Employee training	02
Total public expenditure on education	08
Higher education achievement	25
Pupil-teacher ratio (tertiary education)	19
▷ Graduates in Sciences	33
Women with degrees	26

Scientific concentration	Rank
Total expenditure on R&D (%)	13
Total R&D personnel per capita	05
▷ Female researchers	34
▷ R&D productivity by publication	43
Scientific and technical employment	21
High-tech patent grants	30
Robots in Education and R&D	24

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	10	04	04	06	10
Capital	27	23	13	14	10
Technological framework	08	06	06	06	06

Regulatory framework	Rank
Starting a business	25
Enforcing contracts	13
▷ Immigration laws	51
Development & application of tech.	03
Scientific research legislation	09
Intellectual property rights	04

Capital	Rank
▷ IT & media stock market capitalization	55
Funding for technological development	02
▶ Banking and financial services	01
▶ Country credit rating	01
Venture capital	09
Investment in Telecommunications	16

Technological framework	Rank
▶ Communications technology	01
Mobile broadband subscribers	06
Wireless broadband	11
Internet users	08
Internet bandwidth speed	09
High-tech exports (%)	32

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	01	02	04	05	08
Business agility	10	05	07	01	06
IT integration	01	01	01	01	02

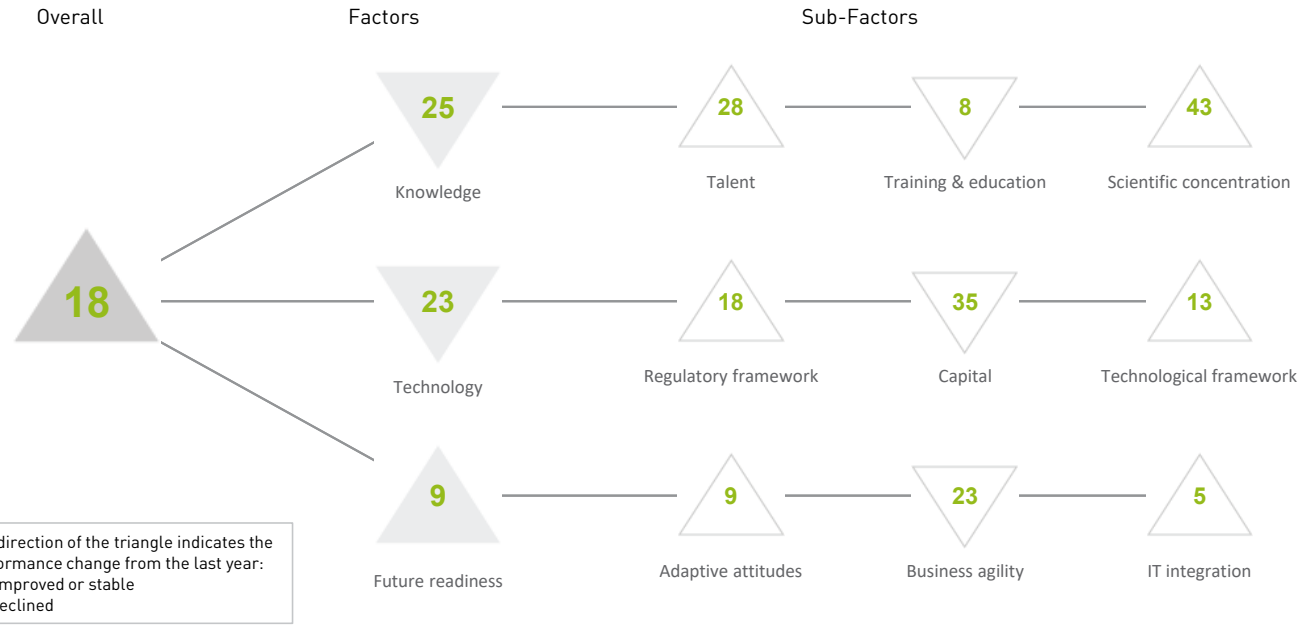
Adaptive attitudes	Rank
E-Participation	12
Internet retailing	05
Tablet possession	33
Smartphone possession	33
Attitudes toward globalization	03

Business agility	Rank
Opportunities and threats	06
World robots distribution	29
Agility of companies	03
Use of big data and analytics	06
Knowledge transfer	04
Entrepreneurial fear of failure	-

IT integration	Rank
▶ E-Government	01
Public-private partnerships	04
Cyber security	11
Software piracy	08
Government cyber security capacity	08
Privacy protection by law content	26

ESTONIA

OVERALL PERFORMANCE (64 countries)

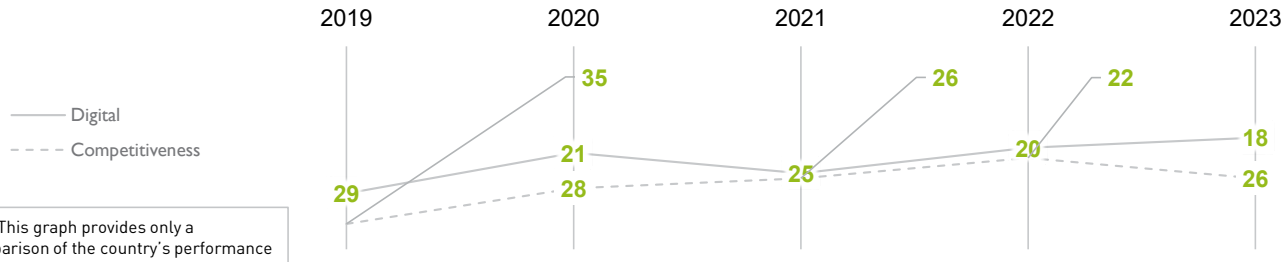


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	29	21	25	20	18
Knowledge	30	23	27	23	25
Technology	22	23	25	21	23
Future readiness	30	20	20	12	09

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

ESTONIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	37	31	29	30	28
Training & education	10	03	08	05	08
Scientific concentration	46	47	45	43	43

Talent	Rank
Educational assessment PISA - Math	07
International experience	45
Foreign highly skilled personnel	32
Management of cities	37
Digital/Technological skills	38
Net flow of international students	28

Training & education	Rank
Employee training	12
Total public expenditure on education	10
Higher education achievement	34
Pupil-teacher ratio (tertiary education)	13
Graduates in Sciences	17
Women with degrees	16

Scientific concentration	Rank
Total expenditure on R&D (%)	23
Total R&D personnel per capita	32
Female researchers	20
▷ R&D productivity by publication	58
Scientific and technical employment	36
High-tech patent grants	11
▷ Robots in Education and R&D	48

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	31	30	28	30	18
Capital	24	29	33	29	35
Technological framework	16	17	20	21	13

Regulatory framework	Rank
Starting a business	07
Enforcing contracts	08
Immigration laws	36
Development & application of tech.	17
Scientific research legislation	28
Intellectual property rights	23

Capital	Rank
▷ IT & media stock market capitalization	51
Funding for technological development	30
Banking and financial services	27
Country credit rating	26
Venture capital	24
Investment in Telecommunications	43

Technological framework	Rank
▷ Communications technology	46
Mobile broadband subscribers	07
▶ Wireless broadband	05
Internet users	13
Internet bandwidth speed	35
High-tech exports (%)	22

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	26	18	20	14	09
Business agility	43	26	25	20	23
IT integration	26	22	25	07	05

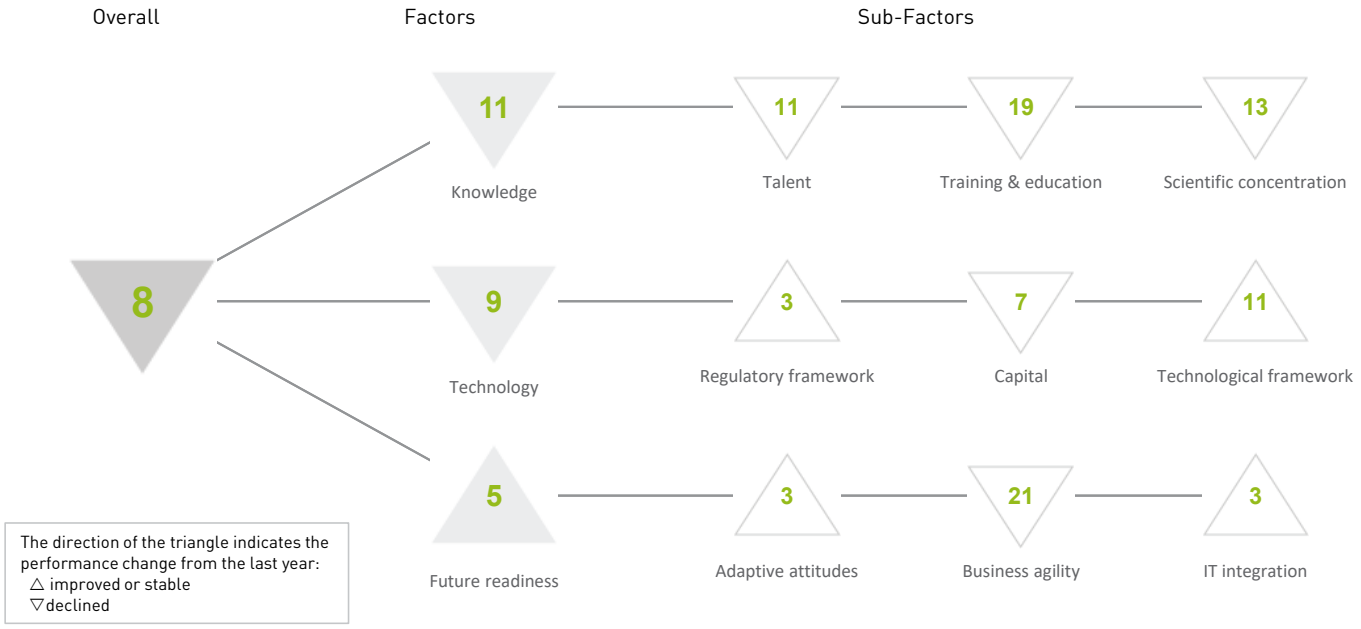
Adaptive attitudes	Rank
▶ E-Participation	03
Internet retailing	19
▶ Tablet possession	04
Smartphone possession	19
Attitudes toward globalization	24

Business agility	Rank
Opportunities and threats	22
▷ World robots distribution	46
Agility of companies	09
Use of big data and analytics	34
Knowledge transfer	35
▶ Entrepreneurial fear of failure	07

IT integration	Rank
E-Government	08
Public-private partnerships	44
Cyber security	15
Software piracy	30
▶ Government cyber security capacity	02
Privacy protection by law content	09

FINLAND

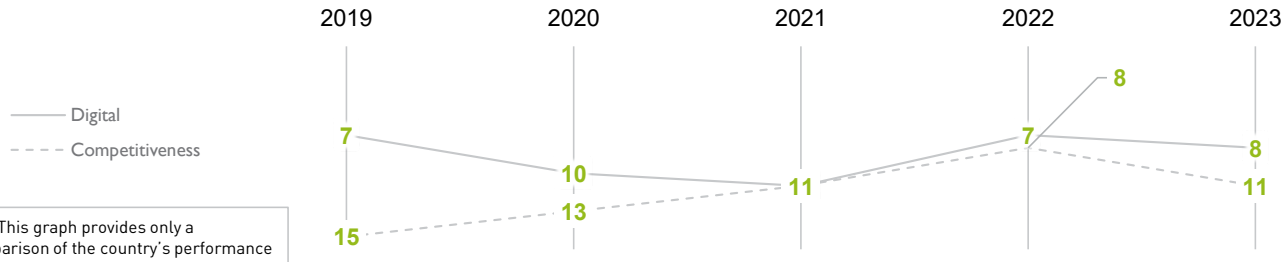
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	07	10	11	07	08
Knowledge	09	15	09	09	11
Technology	08	10	12	08	09
Future readiness	07	09	09	06	05

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

FINLAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	09	11	10	09	11
Training & education	16	20	19	17	19
Scientific concentration	10	12	10	10	13

Talent	Rank
Educational assessment PISA - Math	15
International experience	22
Foreign highly skilled personnel	38
Management of cities	04
▶ Digital/Technological skills	02
Net flow of international students	19

Training & education	Rank
Employee training	05
Total public expenditure on education	13
▷ Higher education achievement	40
▷ Pupil-teacher ratio (tertiary education)	44
Graduates in Sciences	15
Women with degrees	20

Scientific concentration	Rank
Total expenditure on R&D (%)	11
Total R&D personnel per capita	07
▷ Female researchers	40
▷ R&D productivity by publication	48
Scientific and technical employment	11
High-tech patent grants	09
Robots in Education and R&D	25

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	09	13	11	05	03
Capital	11	06	10	05	07
Technological framework	13	10	14	12	11

Regulatory framework	Rank
Starting a business	18
Enforcing contracts	33
Immigration laws	37
▶ Development & application of tech.	01
Scientific research legislation	03
Intellectual property rights	03

Capital	Rank
IT & media stock market capitalization	15
Funding for technological development	03
▶ Banking and financial services	02
Country credit rating	12
Venture capital	08
▷ Investment in Telecommunications	56

Technological framework	Rank
Communications technology	03
Mobile broadband subscribers	15
Wireless broadband	07
Internet users	16
Internet bandwidth speed	32
High-tech exports (%)	38

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	06	10	07	03	03
Business agility	27	22	21	16	21
IT integration	02	02	02	03	03

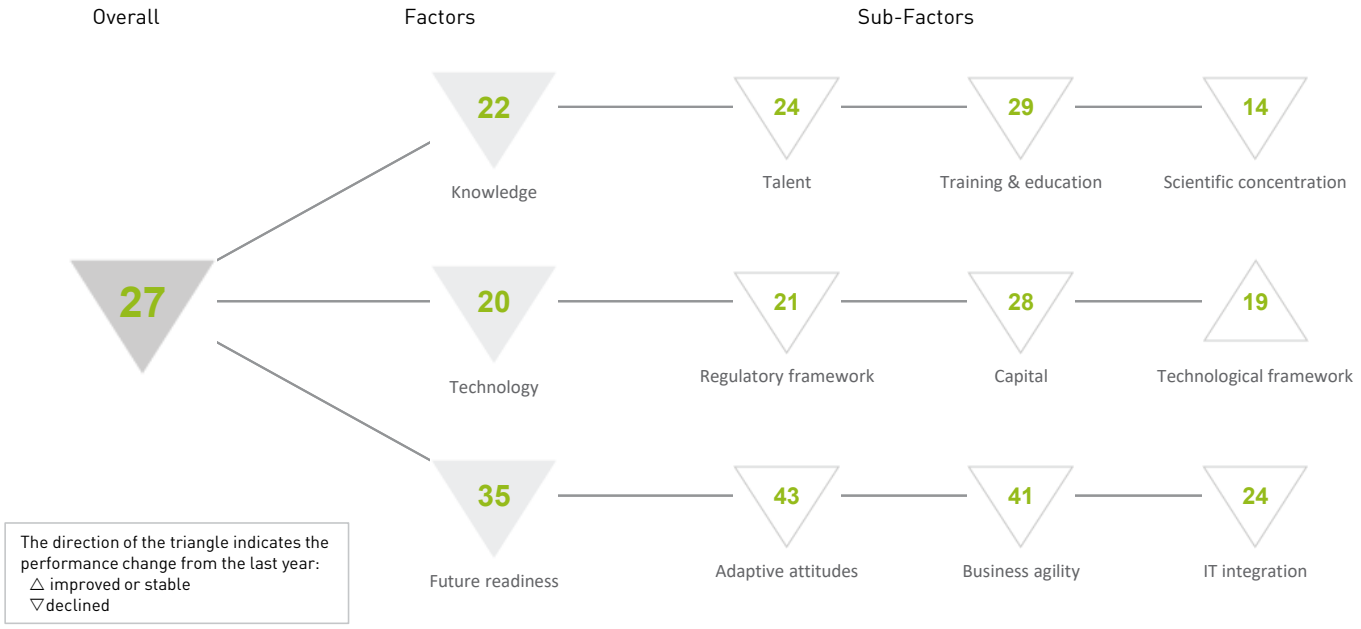
Adaptive attitudes	Rank
E-Participation	06
Internet retailing	13
Tablet possession	05
Smartphone possession	21
Attitudes toward globalization	04

Business agility	Rank
Opportunities and threats	27
World robots distribution	34
Agility of companies	23
Use of big data and analytics	18
Knowledge transfer	07
Entrepreneurial fear of failure	24

IT integration	Rank
▶ E-Government	02
Public-private partnerships	03
▶ Cyber security	03
Software piracy	13
Government cyber security capacity	35
Privacy protection by law content	14

FRANCE

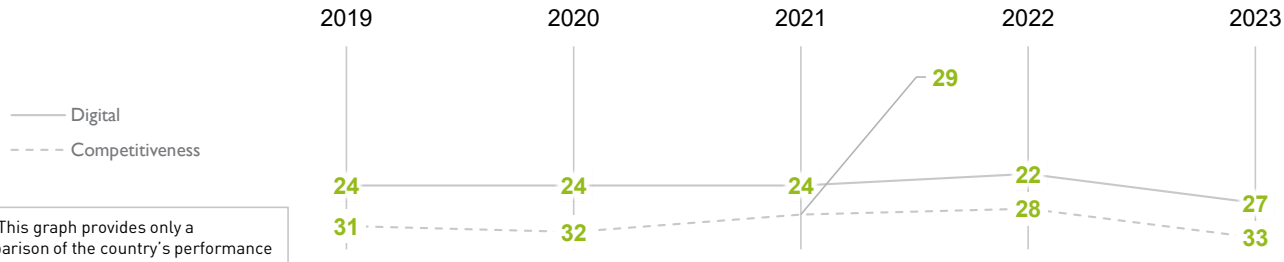
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	24	24	24	22	27
Knowledge	20	20	20	20	22
Technology	16	15	16	16	20
Future readiness	29	31	31	34	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 (41 countries)

POPULATIONS > 20 MILLION (27 countries)

FRANCE

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	24	25	23	23	24
Training & education	28	36	27	27	29
Scientific concentration	12	13	12	13	14

Talent	Rank
Educational assessment PISA - Math	24
International experience	33
Foreign highly skilled personnel	22
Management of cities	26
Digital/Technological skills	31
Net flow of international students	20

Training & education	Rank
Employee training	36
Total public expenditure on education	24
Higher education achievement	23
Pupil-teacher ratio (tertiary education)	39
Graduates in Sciences	23
Women with degrees	30

Scientific concentration	Rank
Total expenditure on R&D (%)	17
Total R&D personnel per capita	21
▷ Female researchers	49
R&D productivity by publication	17
Scientific and technical employment	17
High-tech patent grants	15
▶ Robots in Education and R&D	05

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	08	09	10	15	21
Capital	18	20	21	19	28
Technological framework	22	19	17	20	19

Regulatory framework	Rank
Starting a business	21
▶ Enforcing contracts	15
Immigration laws	25
Development & application of tech.	38
Scientific research legislation	25
▶ Intellectual property rights	13

Capital	Rank
IT & media stock market capitalization	32
Funding for technological development	29
Banking and financial services	47
Country credit rating	16
Venture capital	27
Investment in Telecommunications	20

Technological framework	Rank
Communications technology	17
Mobile broadband subscribers	31
Wireless broadband	38
Internet users	28
▶ Internet bandwidth speed	06
High-tech exports (%)	17

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	36	36	48	41	43
Business agility	39	36	33	38	41
IT integration	19	21	22	21	24

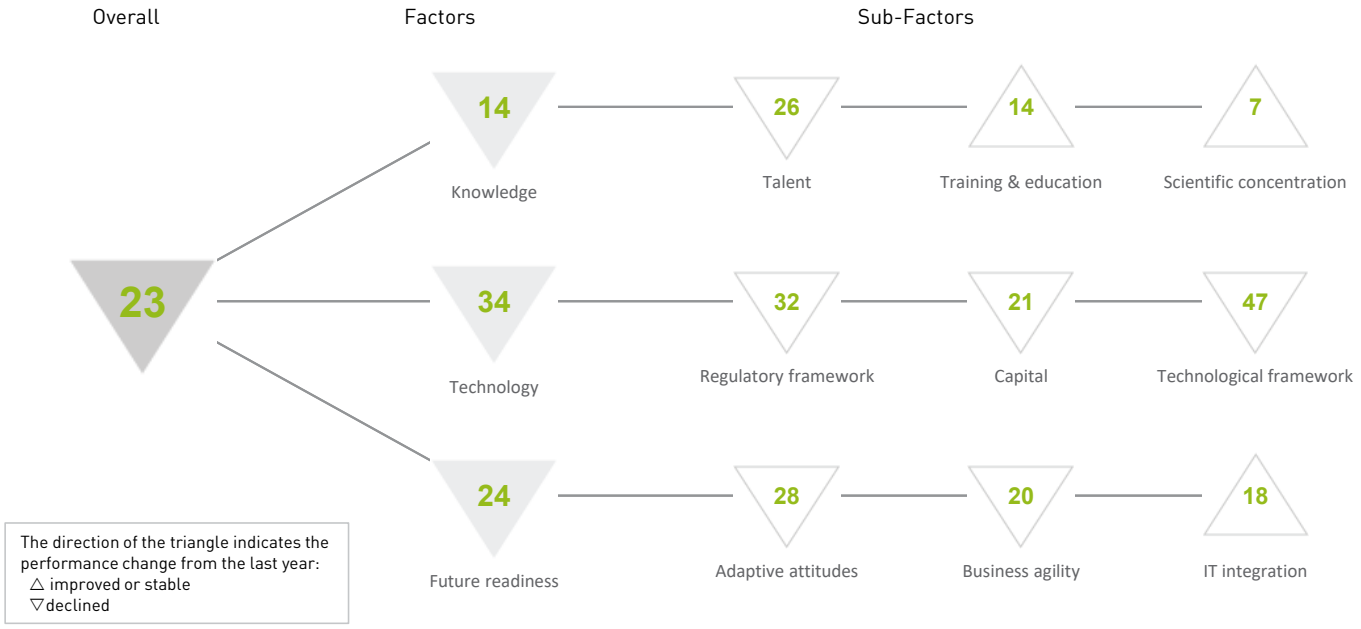
Adaptive attitudes	Rank
E-Participation	34
Internet retailing	23
Tablet possession	25
Smartphone possession	25
▷ Attitudes toward globalization	64

Business agility	Rank
▷ Opportunities and threats	55
▶ World robots distribution	08
▷ Agility of companies	50
▷ Use of big data and analytics	47
Knowledge transfer	33
Entrepreneurial fear of failure	23

IT integration	Rank
E-Government	18
Public-private partnerships	35
Cyber security	27
Software piracy	20
Government cyber security capacity	21
Privacy protection by law content	30

GERMANY

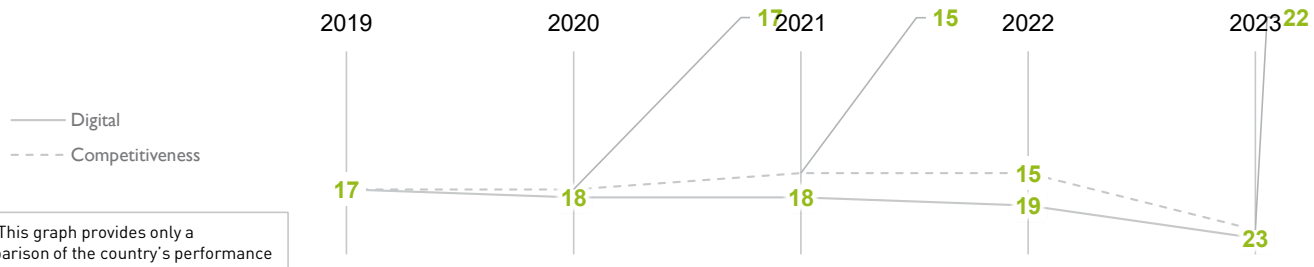
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	17	18	18	19	23
Knowledge	12	12	14	11	14
Technology	31	31	31	27	34
Future readiness	16	19	18	19	24

COMPETITIVENESS & DIGITAL RANKINGS

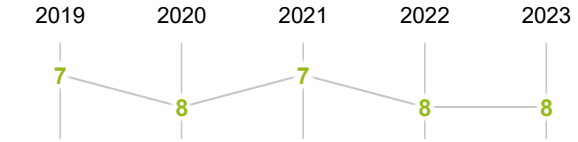


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS > 20 MILLION (27 countries)



GERMANY

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	25	22	21	20	26
Training & education	14	17	17	15	14
Scientific concentration	04	05	06	07	07

Talent	Rank
Educational assessment PISA - Math	19
International experience	16
Foreign highly skilled personnel	25
Management of cities	28
▷ Digital/Technological skills	58
Net flow of international students	14

Training & education	Rank
▶ Employee training	03
Total public expenditure on education	40
Higher education achievement	43
▶ Pupil-teacher ratio (tertiary education)	04
▶ Graduates in Sciences	04
Women with degrees	43

Scientific concentration	Rank
Total expenditure on R&D (%)	10
Total R&D personnel per capita	14
Female researchers	50
R&D productivity by publication	12
Scientific and technical employment	25
High-tech patent grants	18
▶ Robots in Education and R&D	02

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	27	28	25	20	32
Capital	17	16	23	16	21
Technological framework	40	45	43	43	47

Regulatory framework	Rank
Starting a business	51
Enforcing contracts	12
Immigration laws	45
Development & application of tech.	42
Scientific research legislation	27
Intellectual property rights	05

Capital	Rank
IT & media stock market capitalization	09
Funding for technological development	34
Banking and financial services	30
▶ Country credit rating	01
Venture capital	33
Investment in Telecommunications	34

Technological framework	Rank
▷ Communications technology	54
▷ Mobile broadband subscribers	57
Wireless broadband	44
Internet users	17
Internet bandwidth speed	30
High-tech exports (%)	28

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	16	23	23	27	28
Business agility	11	15	15	15	20
IT integration	17	20	20	19	18

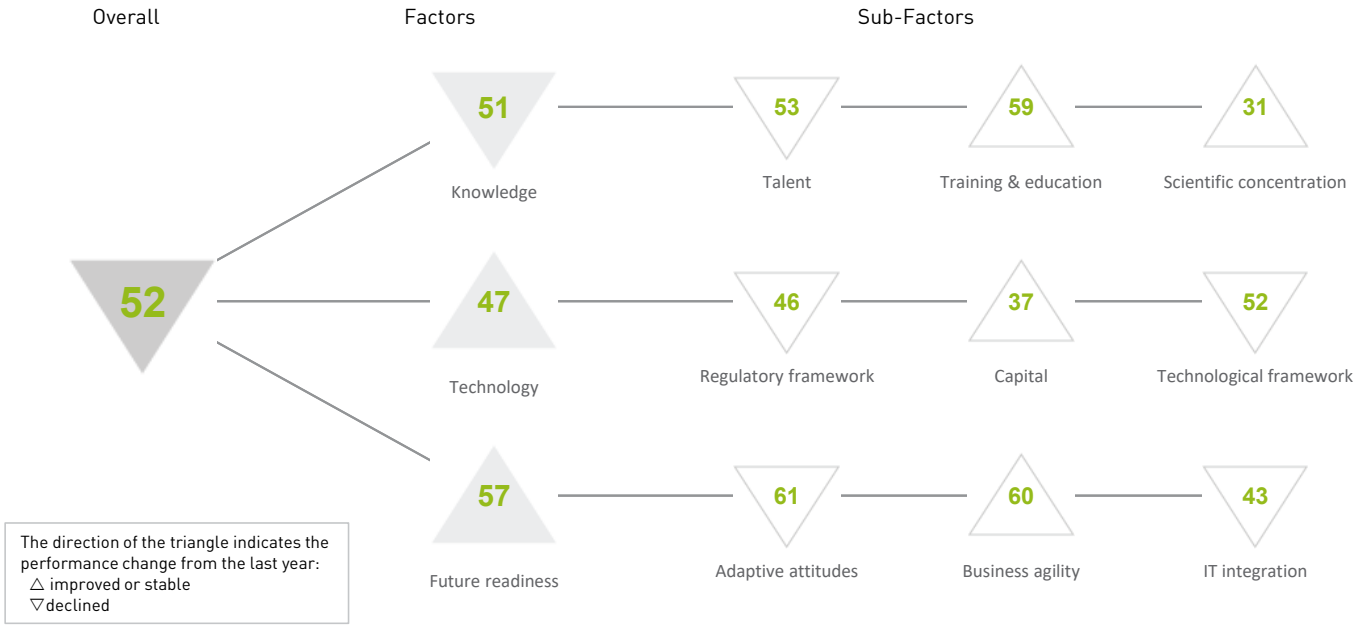
Adaptive attitudes	Rank
E-Participation	29
Internet retailing	14
Tablet possession	35
▷ Smartphone possession	51
Attitudes toward globalization	40

Business agility	Rank
▷ Opportunities and threats	51
World robots distribution	05
Agility of companies	42
Use of big data and analytics	49
Knowledge transfer	11
Entrepreneurial fear of failure	13

IT integration	Rank
E-Government	21
Public-private partnerships	36
Cyber security	37
Software piracy	08
Government cyber security capacity	30
Privacy protection by law content	18

GREECE

OVERALL PERFORMANCE (64 countries)

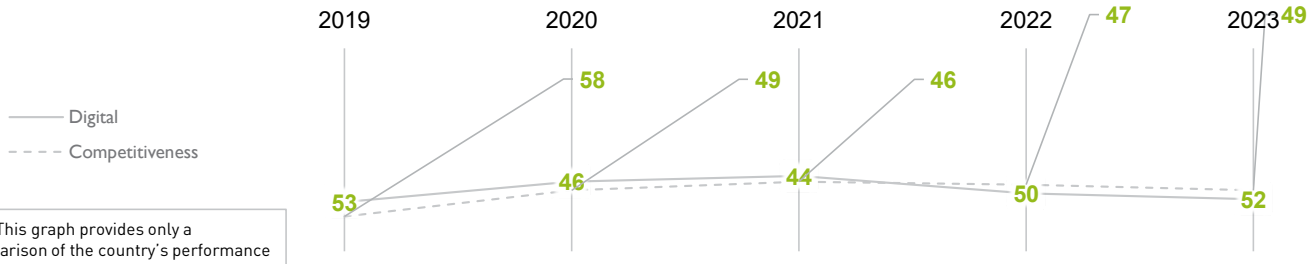


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	53	46	44	50	52
Knowledge	53	48	45	47	51
Technology	54	43	46	47	47
Future readiness	53	46	43	60	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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

GREECE

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	53	50	42	49	53
Training & education	60	56	55	59	59
Scientific concentration	34	36	35	33	31

Talent	Rank
Educational assessment PISA - Math	39
International experience	38
▷ Foreign highly skilled personnel	57
Management of cities	51
Digital/Technological skills	44
Net flow of international students	55

Training & education	Rank
Employee training	53
Total public expenditure on education	46
Higher education achievement	33
▷ Pupil-teacher ratio (tertiary education)	60
▶ Graduates in Sciences	18
Women with degrees	35

Scientific concentration	Rank
Total expenditure on R&D (%)	29
Total R&D personnel per capita	29
Female researchers	26
R&D productivity by publication	31
▶ Scientific and technical employment	12
High-tech patent grants	48
Robots in Education and R&D	40

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	52	41	43	42	46
Capital	52	49	52	46	37
Technological framework	49	46	50	50	52

Regulatory framework	Rank
▶ Starting a business	06
▷ Enforcing contracts	60
Immigration laws	23
Development & application of tech.	41
Scientific research legislation	44
Intellectual property rights	48

Capital	Rank
▶ IT & media stock market capitalization	16
Funding for technological development	37
▷ Banking and financial services	58
Country credit rating	56
Venture capital	43
▶ Investment in Telecommunications	03

Technological framework	Rank
Communications technology	50
Mobile broadband subscribers	49
Wireless broadband	25
Internet users	51
Internet bandwidth speed	56
High-tech exports (%)	52

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	41	44	43	60	61
Business agility	60	55	51	61	60
IT integration	50	45	41	41	43

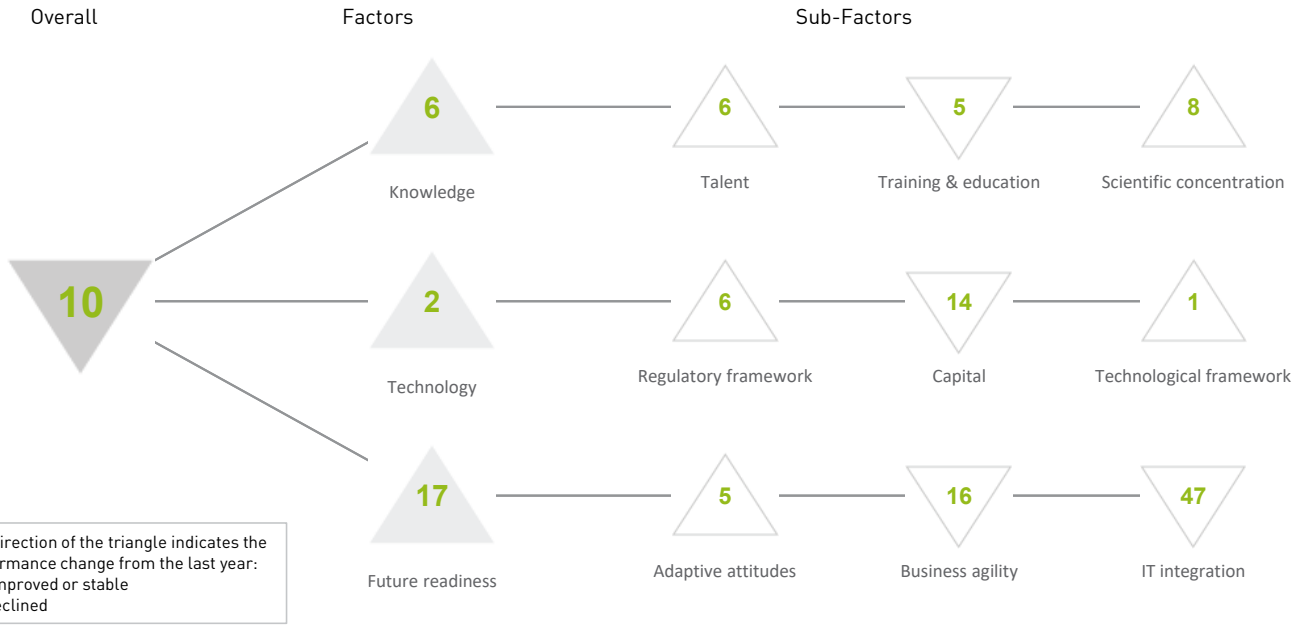
Adaptive attitudes	Rank
E-Participation	47
Internet retailing	33
Tablet possession	36
▷ Smartphone possession	60
Attitudes toward globalization	47

Business agility	Rank
Opportunities and threats	42
World robots distribution	44
Agility of companies	55
Use of big data and analytics	51
Knowledge transfer	53
Entrepreneurial fear of failure	43

IT integration	Rank
E-Government	31
Public-private partnerships	38
Cyber security	50
Software piracy	53
Government cyber security capacity	36
Privacy protection by law content	35

HONG KONG SAR

OVERALL PERFORMANCE (64 countries)

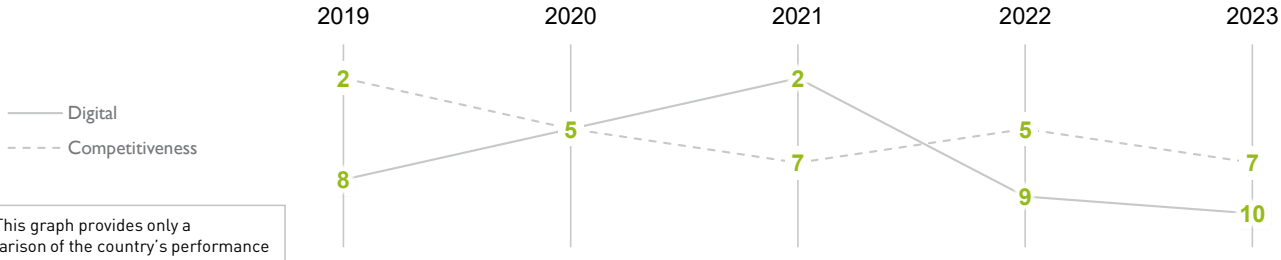


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	08	05	02	09	10
Knowledge	07	07	05	07	06
Technology	04	02	01	02	02
Future readiness	15	10	10	18	17

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 (37 countries)

HONG KONG SAR

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	04	07	06	10	06
Training & education	12	05	01	02	05
Scientific concentration	16	17	14	18	08

Talent	Rank
Educational assessment PISA - Math	03
International experience	08
Foreign highly skilled personnel	23
Management of cities	03
Digital/Technological skills	15
Net flow of international students	26

Training & education	Rank
Employee training	32
▷ Total public expenditure on education	50
Higher education achievement	09
Pupil-teacher ratio (tertiary education)	27
▶ Graduates in Sciences	01
Women with degrees	-

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	41
Total R&D personnel per capita	33
Female researchers	-
R&D productivity by publication	25
Scientific and technical employment	08
▶ High-tech patent grants	02
Robots in Education and R&D	34

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	12	07	06	09	06
Capital	06	12	07	08	14
Technological framework	03	02	01	01	01

Regulatory framework	Rank
Starting a business	04
Enforcing contracts	24
Immigration laws	12
Development & application of tech.	14
Scientific research legislation	18
Intellectual property rights	12

Capital	Rank
IT & media stock market capitalization	04
Funding for technological development	13
Banking and financial services	13
Country credit rating	16
Venture capital	21
▷ Investment in Telecommunications	57

Technological framework	Rank
Communications technology	10
Mobile broadband subscribers	21
▶ Wireless broadband	03
Internet users	23
Internet bandwidth speed	23
▶ High-tech exports (%)	01

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	12	04	03	09	05
Business agility	08	14	09	11	16
IT integration	22	19	17	45	47

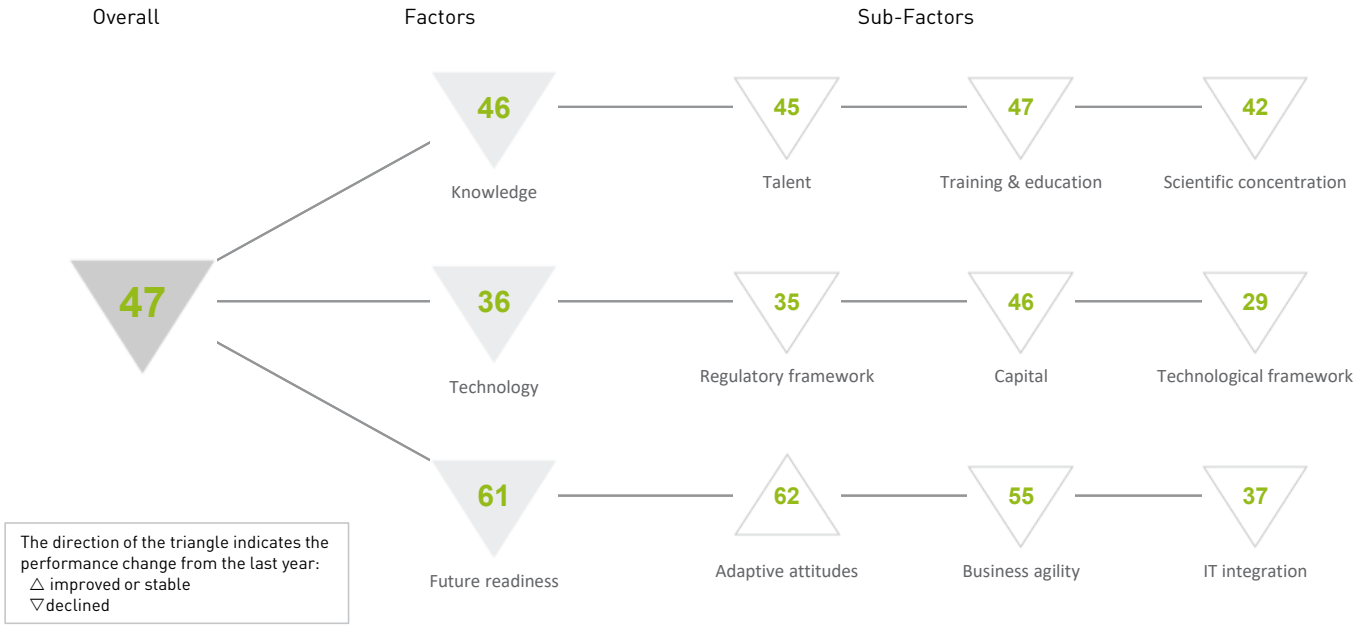
Adaptive attitudes	Rank
E-Participation	-
Internet retailing	08
Tablet possession	13
▶ Smartphone possession	02
Attitudes toward globalization	12

Business agility	Rank
Opportunities and threats	04
World robots distribution	37
Agility of companies	06
Use of big data and analytics	23
Knowledge transfer	15
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	-
Public-private partnerships	15
Cyber security	14
Software piracy	28
▷ Government cyber security capacity	49
▷ Privacy protection by law content	64

HUNGARY

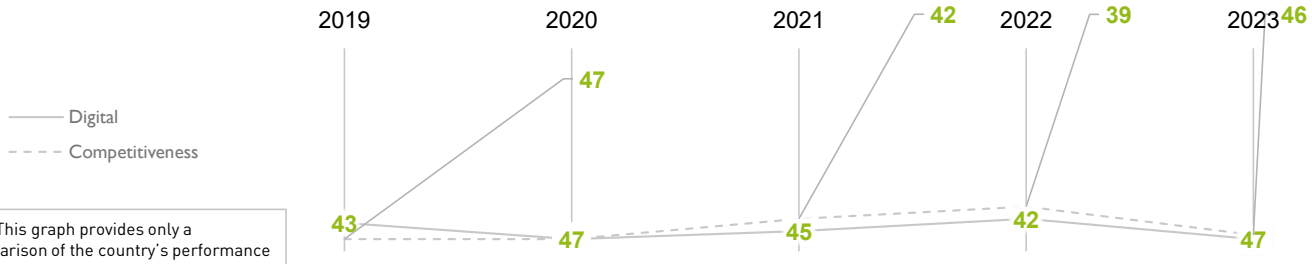
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	43	47	45	42	47
Knowledge	44	44	43	43	46
Technology	36	39	36	31	36
Future readiness	57	60	61	57	61

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

HUNGARY

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	47	44	43	40	45
Training & education	43	45	47	44	47
Scientific concentration	45	44	42	38	42

Talent	Rank
Educational assessment PISA - Math	34
International experience	43
Foreign highly skilled personnel	55
Management of cities	41
▷ Digital/Technological skills	60
▶ Net flow of international students	17

Training & education	Rank
Employee training	59
Total public expenditure on education	30
Higher education achievement	48
▶ Pupil-teacher ratio (tertiary education)	15
Graduates in Sciences	57
Women with degrees	38

Scientific concentration	Rank
Total expenditure on R&D (%)	25
Total R&D personnel per capita	27
Female researchers	48
R&D productivity by publication	46
Scientific and technical employment	30
High-tech patent grants	39
Robots in Education and R&D	31

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	35	39	36	26	35
Capital	46	46	45	42	46
Technological framework	19	24	21	19	29

Regulatory framework	Rank
Starting a business	38
Enforcing contracts	21
▶ Immigration laws	15
Development & application of tech.	43
Scientific research legislation	40
Intellectual property rights	40

Capital	Rank
IT & media stock market capitalization	31
Funding for technological development	41
Banking and financial services	46
Country credit rating	48
Venture capital	54
Investment in Telecommunications	31

Technological framework	Rank
Communications technology	39
▶ Mobile broadband subscribers	13
Wireless broadband	49
Internet users	35
Internet bandwidth speed	24
High-tech exports (%)	26

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	62	62	62	62	62
Business agility	53	59	62	48	55
IT integration	37	41	42	35	37

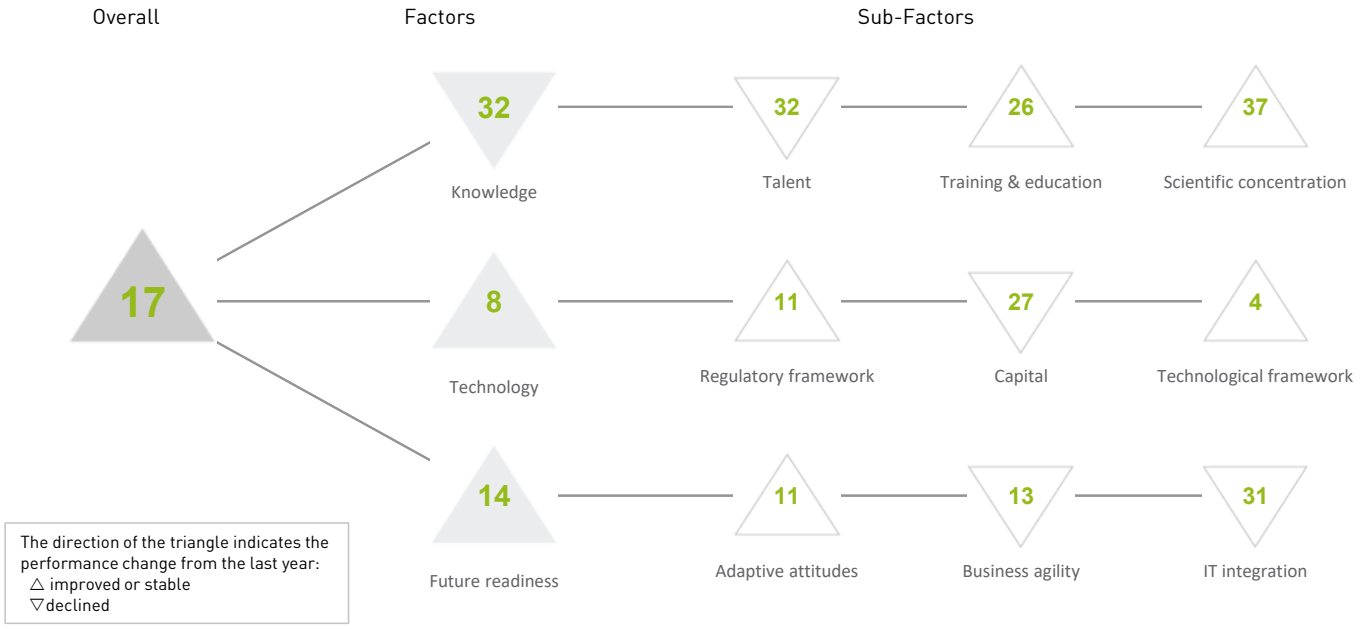
Adaptive attitudes	Rank
E-Participation	55
Internet retailing	41
Tablet possession	52
▷ Smartphone possession	59
▷ Attitudes toward globalization	63

Business agility	Rank
▷ Opportunities and threats	60
World robots distribution	25
▷ Agility of companies	60
Use of big data and analytics	59
Knowledge transfer	52
▶ Entrepreneurial fear of failure	09

IT integration	Rank
E-Government	44
Public-private partnerships	47
Cyber security	48
Software piracy	27
Government cyber security capacity	25
Privacy protection by law content	28

ICELAND

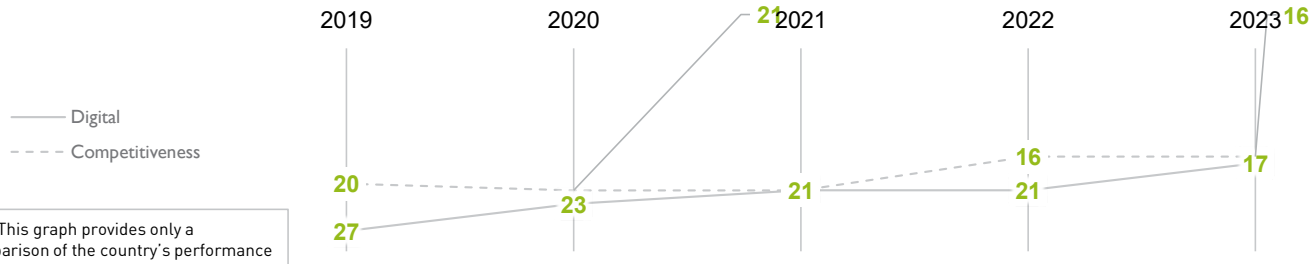
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	27	23	21	21	17
Knowledge	29	27	33	31	32
Technology	20	21	10	11	08
Future readiness	26	22	25	21	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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

ICELAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	34	33	35	24	32
Training & education	18	15	22	26	26
Scientific concentration	39	46	39	45	37

Talent	Rank
Educational assessment PISA - Math	25
International experience	49
Foreign highly skilled personnel	37
Management of cities	40
Digital/Technological skills	08
▷ Net flow of international students	58

Training & education	Rank
Employee training	30
▶ Total public expenditure on education	03
Higher education achievement	36
Pupil-teacher ratio (tertiary education)	42
Graduates in Sciences	53
Women with degrees	18

Scientific concentration	Rank
Total expenditure on R&D (%)	14
▶ Total R&D personnel per capita	02
Female researchers	13
▷ R&D productivity by publication	60
Scientific and technical employment	26
High-tech patent grants	47
▷ Robots in Education and R&D	54

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	15	15	14	11	11
Capital	39	35	26	17	27
Technological framework	15	16	03	05	04

Regulatory framework	Rank
Starting a business	32
Enforcing contracts	25
Immigration laws	10
Development & application of tech.	09
Scientific research legislation	11
Intellectual property rights	08

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	12
Banking and financial services	12
Country credit rating	34
Venture capital	20
Investment in Telecommunications	50

Technological framework	Rank
Communications technology	05
Mobile broadband subscribers	04
Wireless broadband	15
Internet users	03
▶ Internet bandwidth speed	02
High-tech exports (%)	07

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	28	25	31	21	11
Business agility	24	19	16	12	13
IT integration	28	27	27	30	31

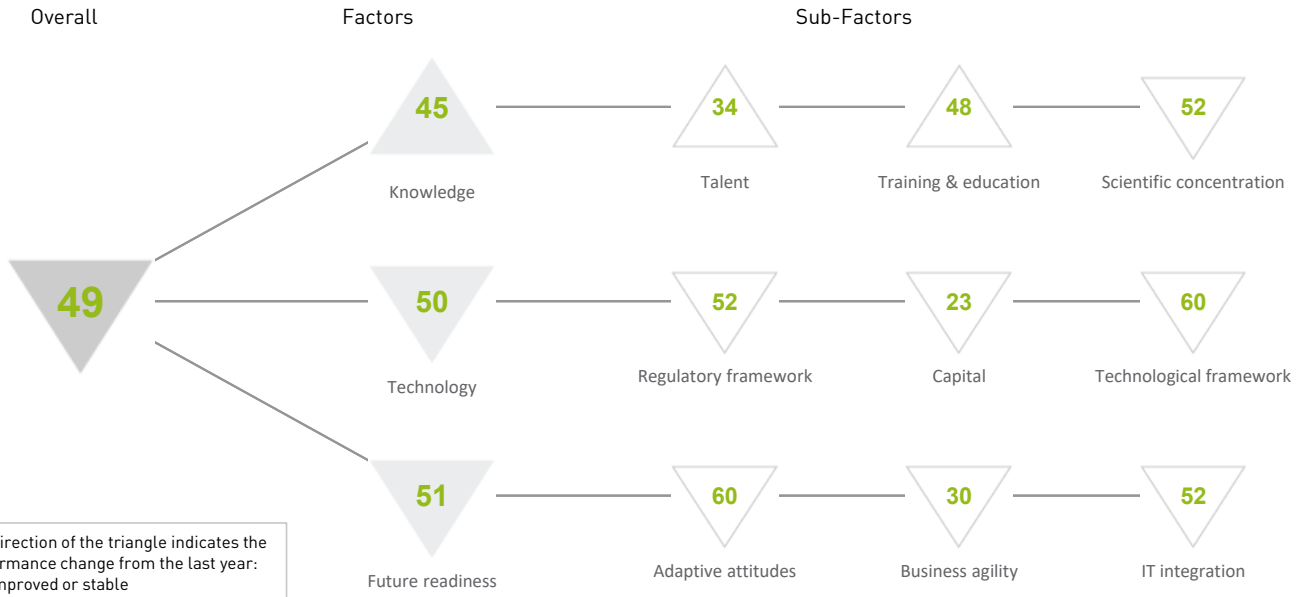
Adaptive attitudes	Rank
E-Participation	16
Internet retailing	20
Tablet possession	-
▶ Smartphone possession	01
Attitudes toward globalization	09

Business agility	Rank
▶ Opportunities and threats	02
▷ World robots distribution	54
Agility of companies	04
Use of big data and analytics	14
Knowledge transfer	21
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	05
Public-private partnerships	43
Cyber security	21
Software piracy	34
▷ Government cyber security capacity	53
Privacy protection by law content	32

INDIA

OVERALL PERFORMANCE (64 countries)

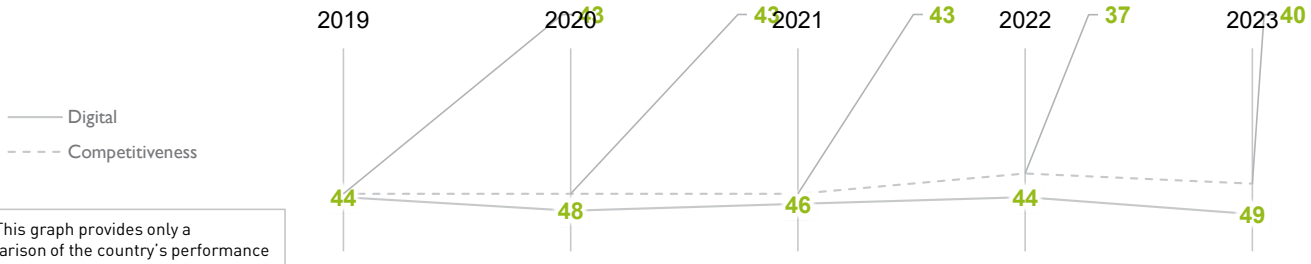


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	44	48	46	44	49
Knowledge	38	39	41	46	45
Technology	49	50	44	43	50
Future readiness	46	56	50	42	51

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 (27 countries)

INDIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	38	41	38	34	34
Training & education	47	51	43	56	48
Scientific concentration	28	29	47	50	52

Talent	Rank
Educational assessment PISA - Math	-
International experience	29
Foreign highly skilled personnel	33
Management of cities	46
Digital/Technological skills	21
Net flow of international students	45

Training & education	Rank
Employee training	31
Total public expenditure on education	39
Higher education achievement	56
Pupil-teacher ratio (tertiary education)	53
▶ Graduates in Sciences	05
Women with degrees	58

Scientific concentration	Rank
Total expenditure on R&D (%)	47
Total R&D personnel per capita	56
Female researchers	-
▶ R&D productivity by publication	02
Scientific and technical employment	59
High-tech patent grants	52
Robots in Education and R&D	22

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	55	53	52	48	52
Capital	03	07	04	01	23
Technological framework	62	62	62	58	60

Regulatory framework	Rank
Starting a business	57
▷ Enforcing contracts	63
Immigration laws	35
Development & application of tech.	23
Scientific research legislation	33
Intellectual property rights	44

Capital	Rank
▶ IT & media stock market capitalization	14
Funding for technological development	23
Banking and financial services	23
Country credit rating	52
Venture capital	16
▶ Investment in Telecommunications	15

Technological framework	Rank
Communications technology	43
Mobile broadband subscribers	50
▷ Wireless broadband	62
▷ Internet users	64
Internet bandwidth speed	53
High-tech exports (%)	39

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	54	55	55	56	60
Business agility	29	52	36	25	30
IT integration	56	55	51	48	52

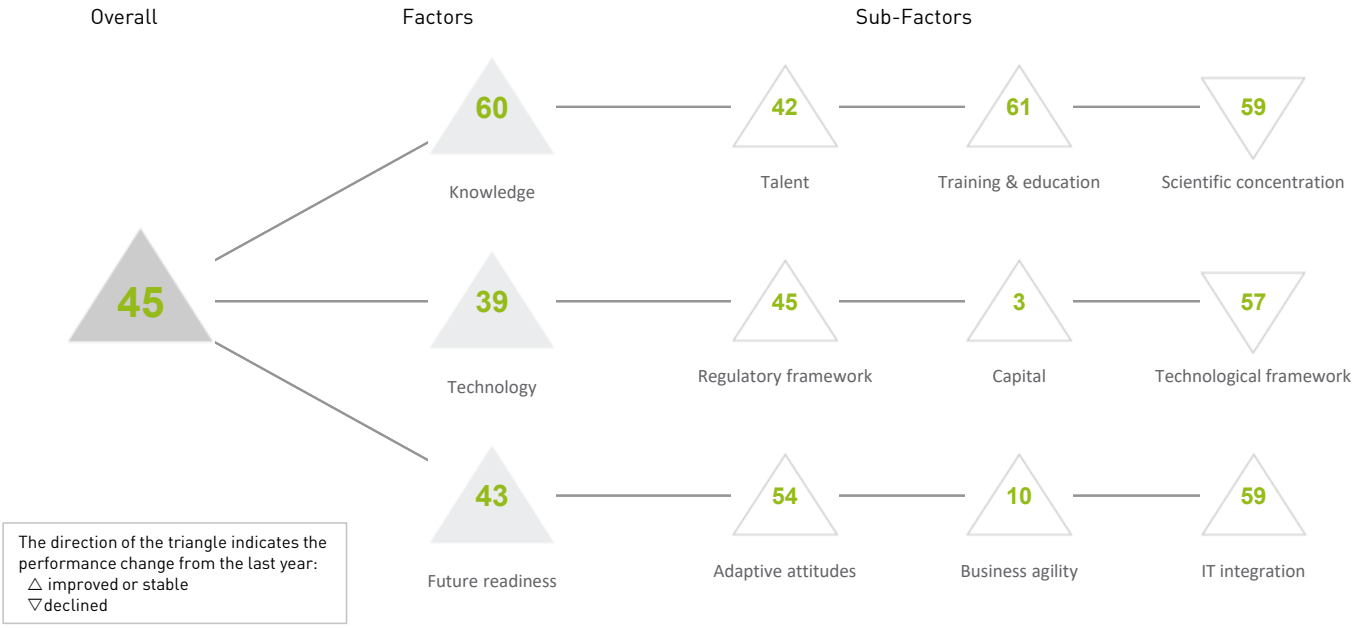
Adaptive attitudes	Rank
E-Participation	50
Internet retailing	58
▷ Tablet possession	59
Smartphone possession	54
Attitudes toward globalization	29

Business agility	Rank
Opportunities and threats	21
▶ World robots distribution	12
Agility of companies	33
Use of big data and analytics	20
Knowledge transfer	34
Entrepreneurial fear of failure	49

IT integration	Rank
▷ E-Government	60
Public-private partnerships	19
Cyber security	33
Software piracy	49
Government cyber security capacity	32
Privacy protection by law content	48

INDONESIA

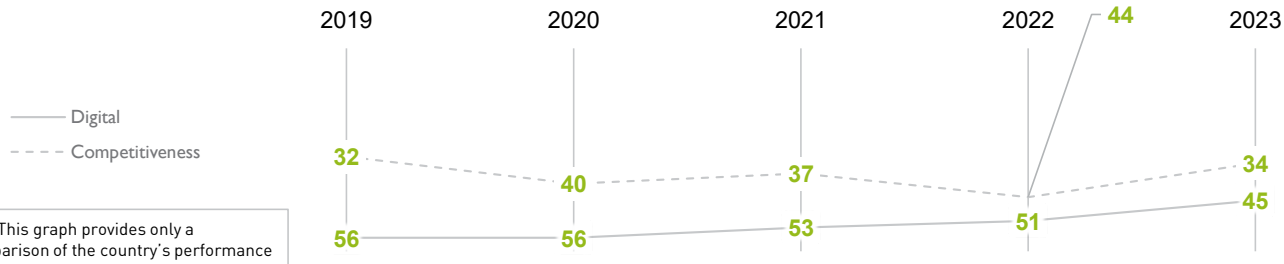
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	56	56	53	51	45
Knowledge	56	63	60	60	60
Technology	47	54	49	45	39
Future readiness	58	48	48	52	43

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 (27 countries)

INDONESIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	42	43	48	45	42
Training & education	61	63	64	62	61
Scientific concentration	52	51	44	54	59

Talent	Rank
Educational assessment PISA - Math	55
International experience	24
Foreign highly skilled personnel	16
Management of cities	30
Digital/Technological skills	33
Net flow of international students	42

Training & education	Rank
Employee training	14
Total public expenditure on education	55
Higher education achievement	59
Pupil-teacher ratio (tertiary education)	57
Graduates in Sciences	45
Women with degrees	57

Scientific concentration	Rank
Total expenditure on R&D (%)	56
Total R&D personnel per capita	57
Female researchers	18
▶ R&D productivity by publication	04
▷ Scientific and technical employment	60
▷ High-tech patent grants	61
Robots in Education and R&D	44

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	51	51	50	49	45
Capital	26	41	25	18	03
Technological framework	56	55	55	56	57

Regulatory framework	Rank
Starting a business	60
Enforcing contracts	58
Immigration laws	20
Development & application of tech.	22
Scientific research legislation	38
Intellectual property rights	41

Capital	Rank
IT & media stock market capitalization	13
Funding for technological development	21
▶ Banking and financial services	05
Country credit rating	47
▶ Venture capital	05
▶ Investment in Telecommunications	02

Technological framework	Rank
Communications technology	47
Mobile broadband subscribers	45
Wireless broadband	46
▷ Internet users	60
▷ Internet bandwidth speed	62
High-tech exports (%)	49

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	60	58	57	55	54
Business agility	21	24	26	22	10
IT integration	60	60	60	60	59

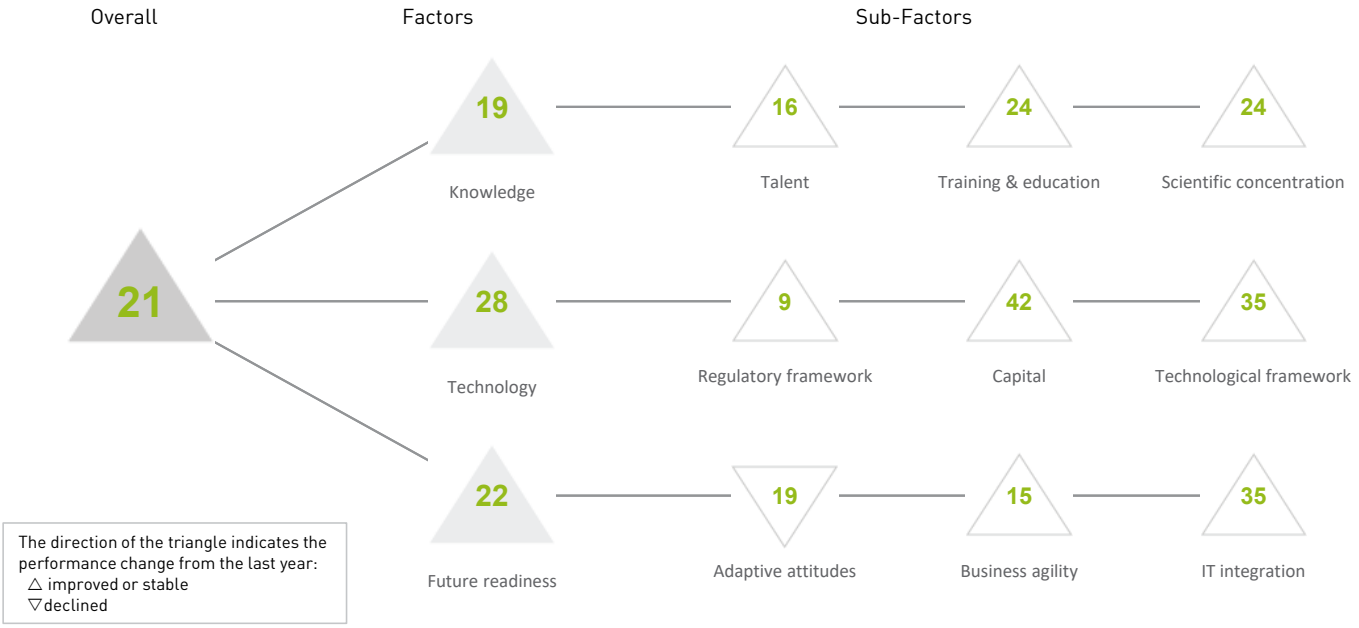
Adaptive attitudes	Rank
E-Participation	34
Internet retailing	46
Tablet possession	58
Smartphone possession	49
Attitudes toward globalization	15

Business agility	Rank
Opportunities and threats	24
World robots distribution	27
Agility of companies	18
Use of big data and analytics	15
Knowledge transfer	23
▶ Entrepreneurial fear of failure	03

IT integration	Rank
E-Government	56
Public-private partnerships	16
Cyber security	34
▷ Software piracy	61
Government cyber security capacity	59
Privacy protection by law content	58

IRELAND

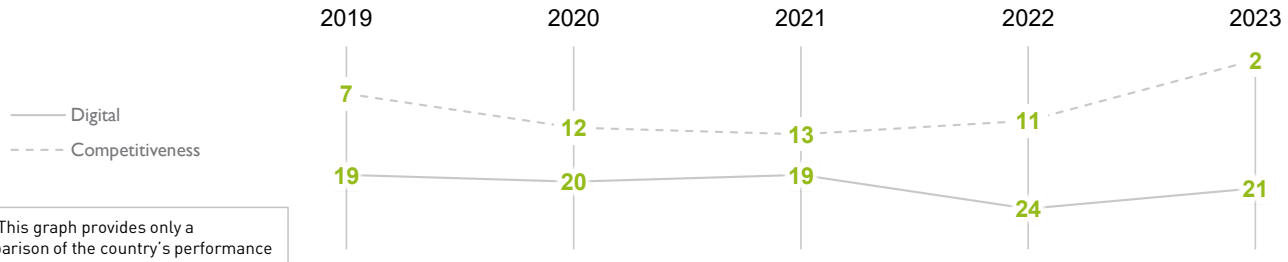
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	19	20	19	24	21
Knowledge	24	24	23	22	19
Technology	28	30	28	37	28
Future readiness	05	14	14	22	22

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

IRELAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	10	19	18	19	16
Training & education	30	35	32	31	24
Scientific concentration	29	25	26	24	24

Talent	Rank
Educational assessment PISA - Math	20
International experience	10
Foreign highly skilled personnel	08
Management of cities	39
Digital/Technological skills	27
Net flow of international students	23

Training & education	Rank
Employee training	08
▷ Total public expenditure on education	60
Higher education achievement	08
Pupil-teacher ratio (tertiary education)	46
Graduates in Sciences	21
▶ Women with degrees	05

Scientific concentration	Rank
Total expenditure on R&D (%)	38
Total R&D personnel per capita	26
Female researchers	29
R&D productivity by publication	36
Scientific and technical employment	16
High-tech patent grants	07
Robots in Education and R&D	27

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	13	14	19	22	09
Capital	49	45	35	44	42
Technological framework	24	30	34	38	35

Regulatory framework	Rank
Starting a business	12
Enforcing contracts	48
▶ Immigration laws	04
Development & application of tech.	19
Scientific research legislation	06
Intellectual property rights	10

Capital	Rank
▷ IT & media stock market capitalization	59
Funding for technological development	10
Banking and financial services	25
Country credit rating	23
Venture capital	14
▷ Investment in Telecommunications	59

Technological framework	Rank
Communications technology	25
Mobile broadband subscribers	47
Wireless broadband	41
Internet users	21
Internet bandwidth speed	34
High-tech exports (%)	12

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	03	12	12	11	19
Business agility	09	09	14	18	15
IT integration	20	25	19	38	35

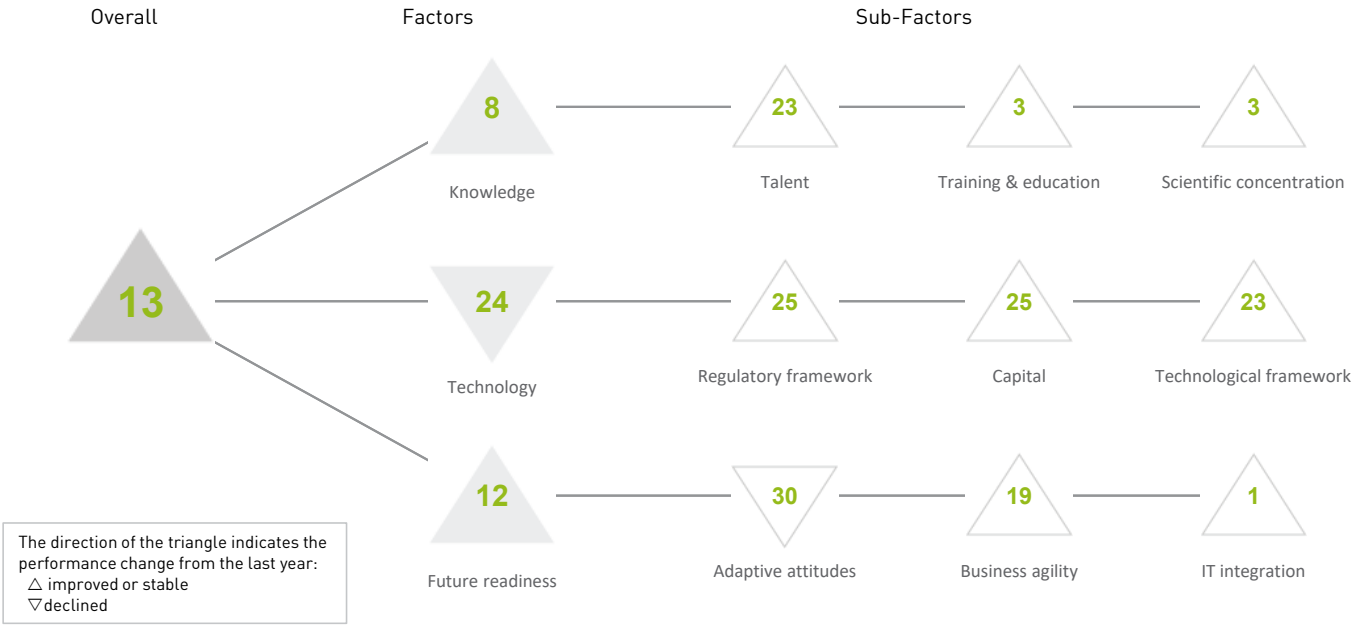
Adaptive attitudes	Rank
E-Participation	42
Internet retailing	06
Tablet possession	19
▷ Smartphone possession	56
▶ Attitudes toward globalization	01

Business agility	Rank
▶ Opportunities and threats	01
World robots distribution	41
▶ Agility of companies	02
Use of big data and analytics	22
Knowledge transfer	14
Entrepreneurial fear of failure	40

IT integration	Rank
E-Government	28
Public-private partnerships	20
Cyber security	32
Software piracy	19
▷ Government cyber security capacity	57
Privacy protection by law content	51

ISRAEL

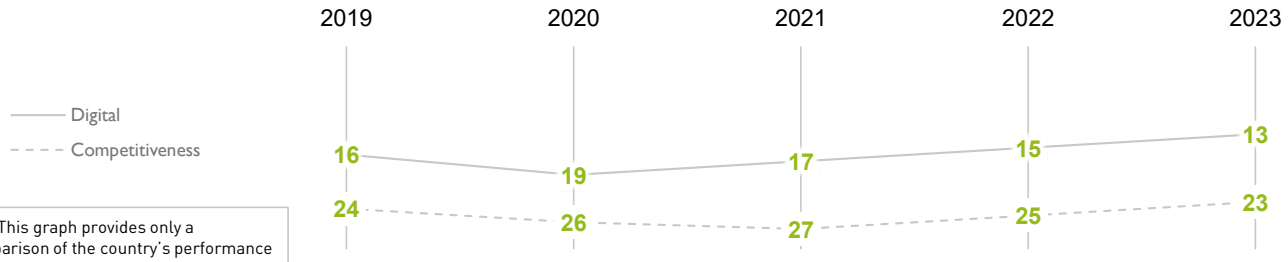
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	16	19	17	15	13
Knowledge	08	09	12	10	08
Technology	30	32	27	22	24
Future readiness	19	23	21	14	12

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

ISRAEL

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	27	28	27	26	23
Training & education	03	01	03	06	03
Scientific concentration	05	03	09	05	03

Talent	Rank
Educational assessment PISA - Math	37
International experience	15
Foreign highly skilled personnel	26
Management of cities	25
Digital/Technological skills	14
▷ Net flow of international students	48

Training & education	Rank
Employee training	33
▶ Total public expenditure on education	04
Higher education achievement	29
Pupil-teacher ratio (tertiary education)	07
Graduates in Sciences	20
Women with degrees	09

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	01
Total R&D personnel per capita	-
Female researchers	-
▷ R&D productivity by publication	53
▶ Scientific and technical employment	04
High-tech patent grants	19
Robots in Education and R&D	36

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	32	32	31	31	25
Capital	20	26	28	25	25
Technological framework	35	36	26	23	23

Regulatory framework	Rank
Starting a business	17
▷ Enforcing contracts	47
Immigration laws	39
Development & application of tech.	13
Scientific research legislation	13
Intellectual property rights	27

Capital	Rank
IT & media stock market capitalization	11
Funding for technological development	15
Banking and financial services	34
Country credit rating	27
Venture capital	22
▷ Investment in Telecommunications	55

Technological framework	Rank
Communications technology	40
Mobile broadband subscribers	25
Wireless broadband	20
Internet users	38
Internet bandwidth speed	26
High-tech exports (%)	10

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	21	26	25	24	30
Business agility	19	29	31	23	19
IT integration	16	14	13	05	01

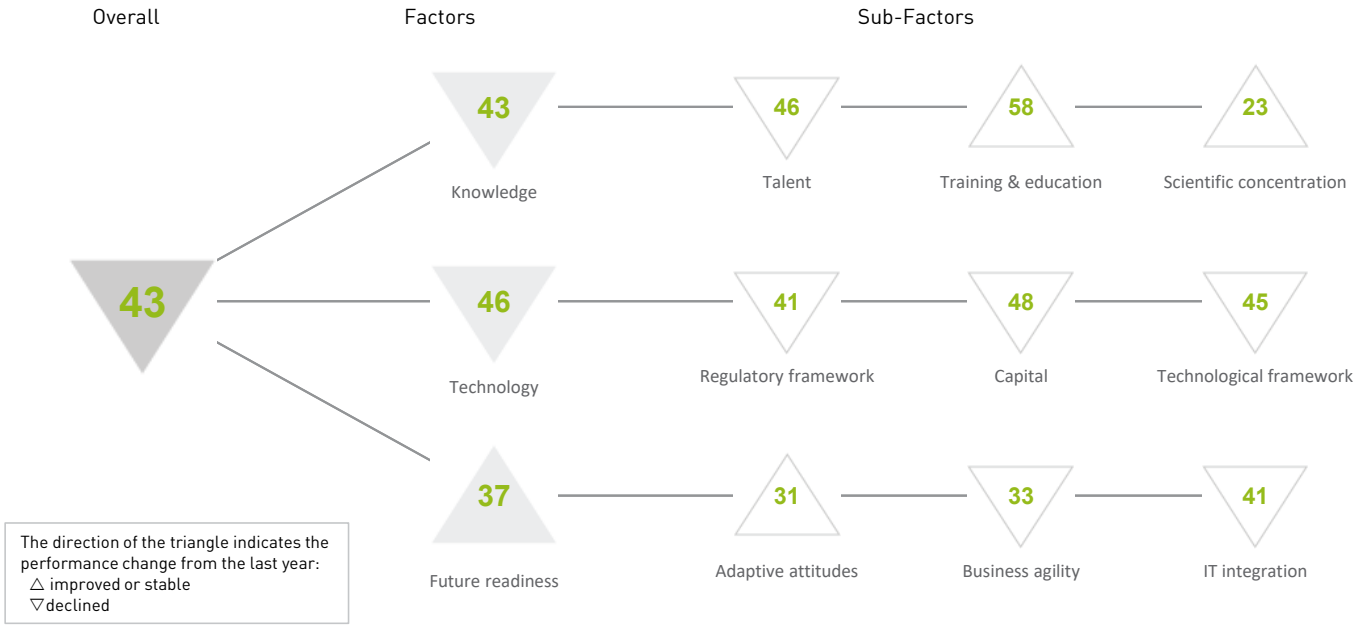
Adaptive attitudes	Rank
E-Participation	34
Internet retailing	21
▷ Tablet possession	45
Smartphone possession	41
Attitudes toward globalization	27

Business agility	Rank
Opportunities and threats	17
World robots distribution	38
Agility of companies	16
▶ Use of big data and analytics	05
Knowledge transfer	16
Entrepreneurial fear of failure	31

IT integration	Rank
E-Government	15
Public-private partnerships	11
Cyber security	06
Software piracy	17
▶ Government cyber security capacity	01
Privacy protection by law content	22

ITALY

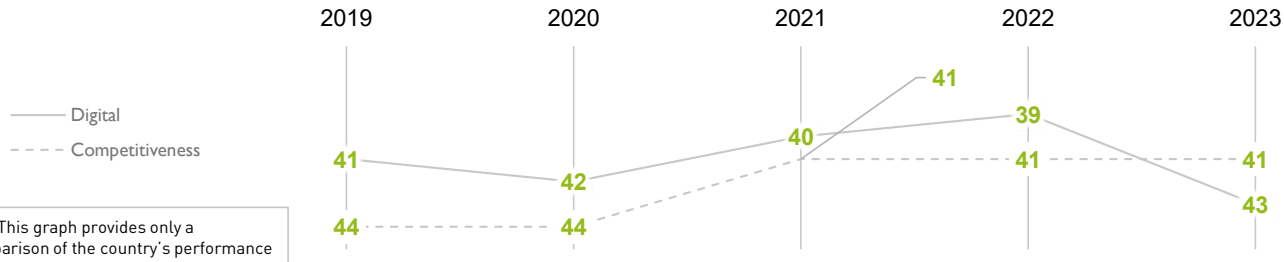
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	41	42	40	39	43
Knowledge	41	42	40	41	43
Technology	46	46	42	44	46
Future readiness	31	38	30	38	37

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS > 20 MILLION (27 countries)

ITALY

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	44	42	40	43	46
Training & education	57	58	60	58	58
Scientific concentration	23	22	25	23	23

Talent	Rank
Educational assessment PISA - Math	29
▷ International experience	57
Foreign highly skilled personnel	52
Management of cities	44
Digital/Technological skills	42
Net flow of international students	46

Training & education	Rank
▷ Employee training	52
Total public expenditure on education	45
Higher education achievement	50
Pupil-teacher ratio (tertiary education)	49
Graduates in Sciences	36
Women with degrees	51

Scientific concentration	Rank
Total expenditure on R&D (%)	28
Total R&D personnel per capita	28
Female researchers	36
▶ R&D productivity by publication	06
▶ Scientific and technical employment	14
High-tech patent grants	46
▶ Robots in Education and R&D	12

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	44	48	42	38	41
Capital	53	54	48	41	48
Technological framework	46	43	44	44	45

Regulatory framework	Rank
Starting a business	42
▷ Enforcing contracts	56
▶ Immigration laws	17
Development & application of tech.	45
Scientific research legislation	42
Intellectual property rights	25

Capital	Rank
IT & media stock market capitalization	40
Funding for technological development	40
Banking and financial services	49
Country credit rating	50
▷ Venture capital	57
Investment in Telecommunications	18

Technological framework	Rank
Communications technology	45
Mobile broadband subscribers	44
Wireless broadband	21
Internet users	44
Internet bandwidth speed	43
High-tech exports (%)	48

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	35	42	36	32	31
Business agility	31	23	19	30	33
IT integration	34	39	38	40	41

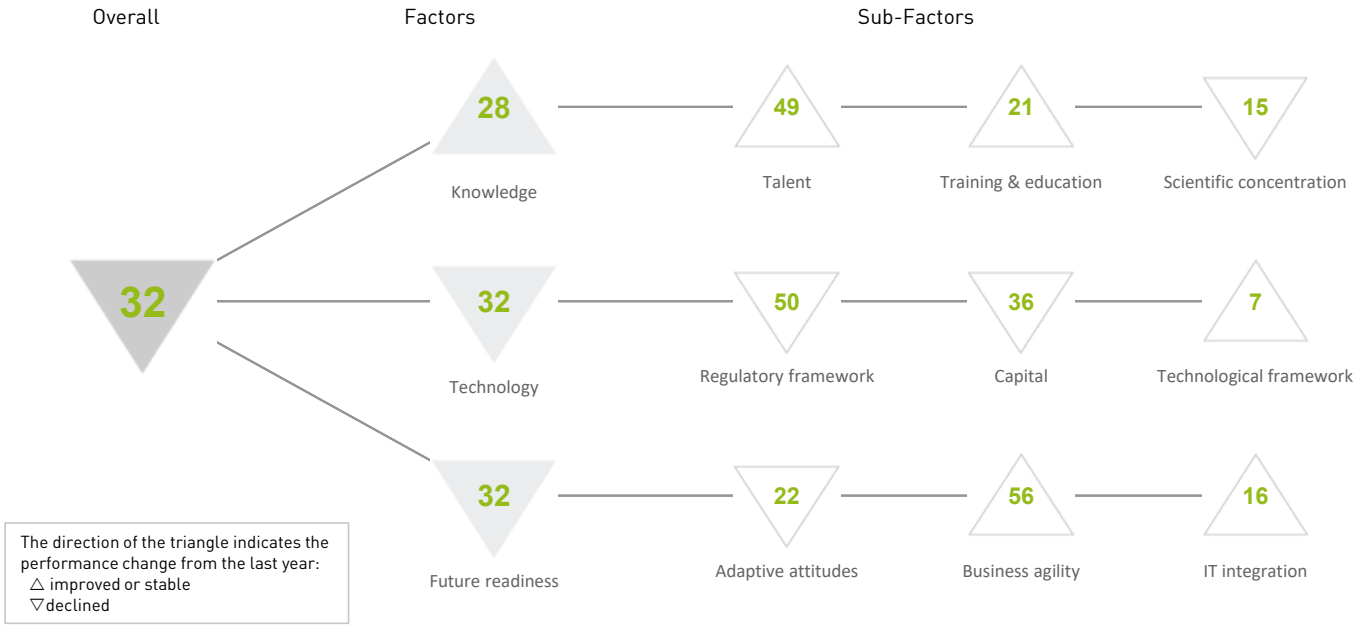
Adaptive attitudes	Rank
E-Participation	29
Internet retailing	31
Tablet possession	40
Smartphone possession	27
Attitudes toward globalization	43

Business agility	Rank
Opportunities and threats	26
▶ World robots distribution	06
Agility of companies	39
▷ Use of big data and analytics	56
Knowledge transfer	39
Entrepreneurial fear of failure	28

IT integration	Rank
E-Government	34
Public-private partnerships	46
Cyber security	42
Software piracy	33
Government cyber security capacity	48
Privacy protection by law content	34

JAPAN

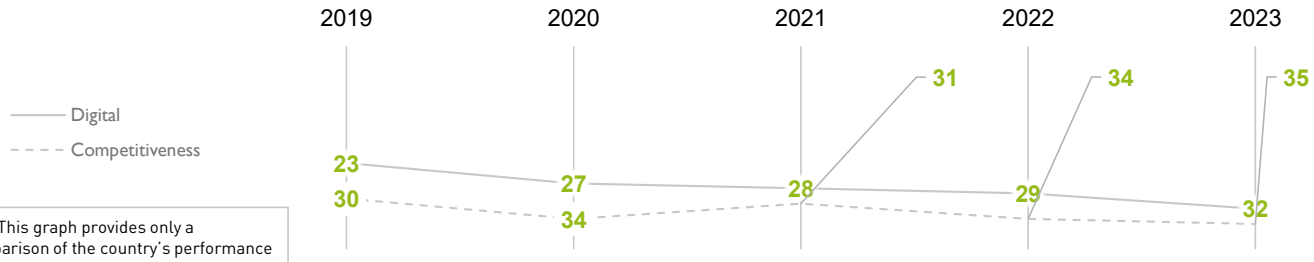
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	23	27	28	29	32
Knowledge	25	22	25	28	28
Technology	24	26	30	30	32
Future readiness	24	26	27	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 (27 countries)

JAPAN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	46	46	47	50	49
Training & education	19	18	21	21	21
Scientific concentration	11	11	13	14	15

Talent	Rank
Educational assessment PISA - Math	05
▷ International experience	64
Foreign highly skilled personnel	54
Management of cities	09
▷ Digital/Technological skills	63
Net flow of international students	27

Training & education	Rank
Employee training	35
Total public expenditure on education	53
Higher education achievement	06
▶ Pupil-teacher ratio (tertiary education)	03
Graduates in Sciences	39
Women with degrees	06

Scientific concentration	Rank
Total expenditure on R&D (%)	06
Total R&D personnel per capita	20
Female researchers	57
R&D productivity by publication	16
Scientific and technical employment	39
High-tech patent grants	06
Robots in Education and R&D	06

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	42	44	48	47	50
Capital	37	33	37	32	36
Technological framework	02	05	08	08	07

Regulatory framework	Rank
Starting a business	44
Enforcing contracts	35
Immigration laws	62
Development & application of tech.	49
Scientific research legislation	48
Intellectual property rights	34

Capital	Rank
IT & media stock market capitalization	10
Funding for technological development	43
Banking and financial services	42
Country credit rating	30
Venture capital	39
Investment in Telecommunications	44

Technological framework	Rank
Communications technology	26
Mobile broadband subscribers	19
▶ Wireless broadband	02
Internet users	20
Internet bandwidth speed	11
High-tech exports (%)	24

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	15	19	18	20	22
Business agility	41	56	53	62	56
IT integration	18	23	23	18	16

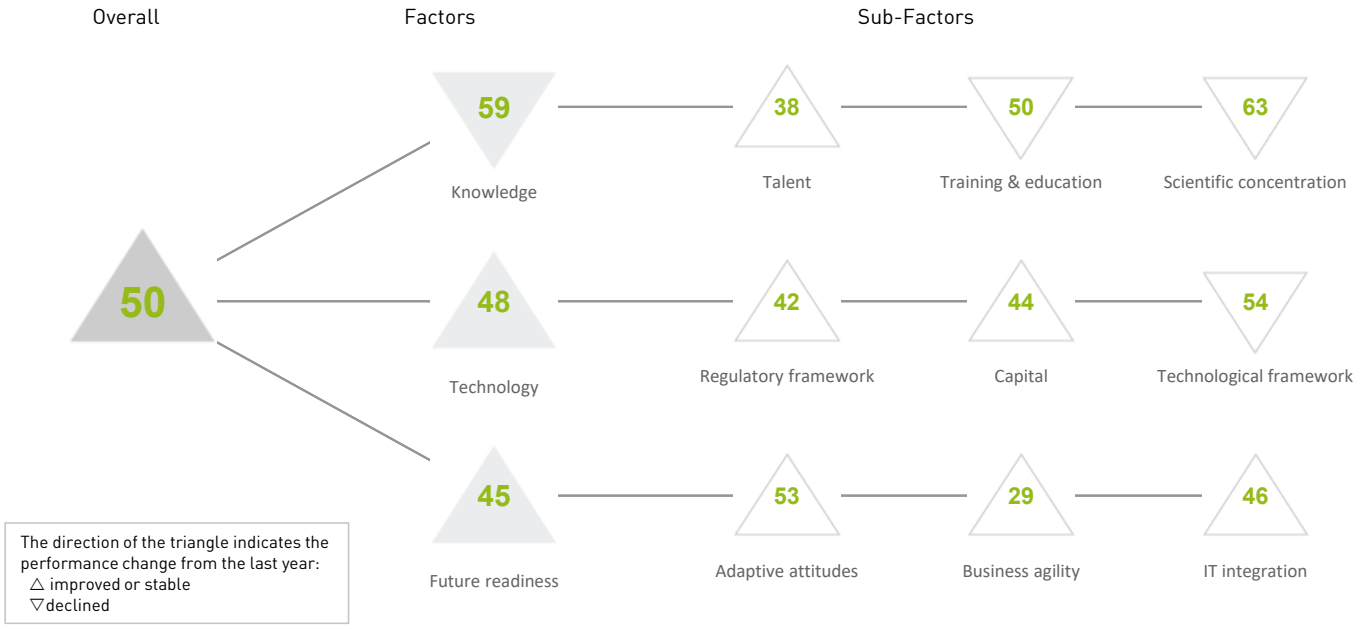
Adaptive attitudes	Rank
▶ E-Participation	01
Internet retailing	17
Tablet possession	32
Smartphone possession	55
Attitudes toward globalization	46

Business agility	Rank
▷ Opportunities and threats	62
▶ World robots distribution	02
▷ Agility of companies	64
▷ Use of big data and analytics	64
Knowledge transfer	43
Entrepreneurial fear of failure	36

IT integration	Rank
E-Government	14
Public-private partnerships	41
Cyber security	43
▶ Software piracy	02
Government cyber security capacity	24
Privacy protection by law content	11

JORDAN

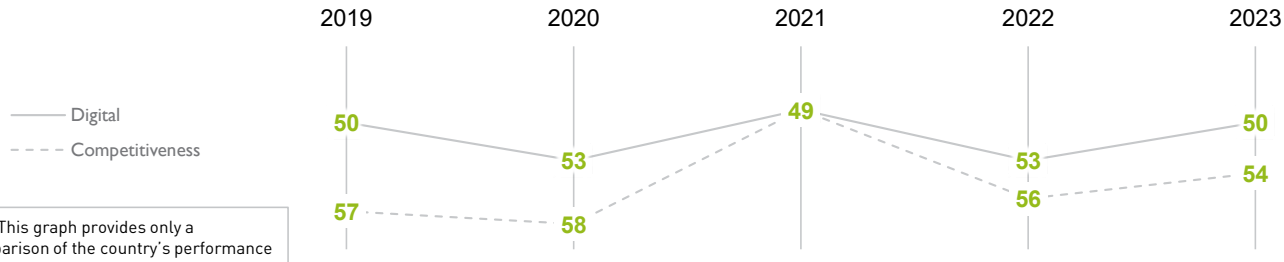
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	50	53	49	53	50
Knowledge	49	54	48	53	59
Technology	53	44	43	50	48
Future readiness	52	58	56	55	45

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

JORDAN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	43	40	34	41	38
Training & education	32	33	33	41	50
Scientific concentration	63	63	62	62	63

Talent	Rank
Educational assessment PISA - Math	51
International experience	18
Foreign highly skilled personnel	41
Management of cities	36
▶ Digital/Technological skills	11
Net flow of international students	31

Training & education	Rank
Employee training	25
Total public expenditure on education	57
Higher education achievement	-
Pupil-teacher ratio (tertiary education)	58
▶ Graduates in Sciences	14
Women with degrees	46

Scientific concentration	Rank
Total expenditure on R&D (%)	-
Total R&D personnel per capita	-
Female researchers	56
R&D productivity by publication	-
Scientific and technical employment	44
High-tech patent grants	53
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	47	42	38	45	42
Capital	41	38	41	45	44
Technological framework	55	53	53	53	54

Regulatory framework	Rank
Starting a business	50
Enforcing contracts	53
Immigration laws	43
Development & application of tech.	20
Scientific research legislation	26
Intellectual property rights	39

Capital	Rank
IT & media stock market capitalization	52
Funding for technological development	24
Banking and financial services	28
▷ Country credit rating	59
Venture capital	26
Investment in Telecommunications	21

Technological framework	Rank
Communications technology	29
Mobile broadband subscribers	42
▷ Wireless broadband	60
Internet users	52
Internet bandwidth speed	51
▷ High-tech exports (%)	60

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	61	61	61	61	53
Business agility	22	37	28	34	29
IT integration	54	57	54	52	46

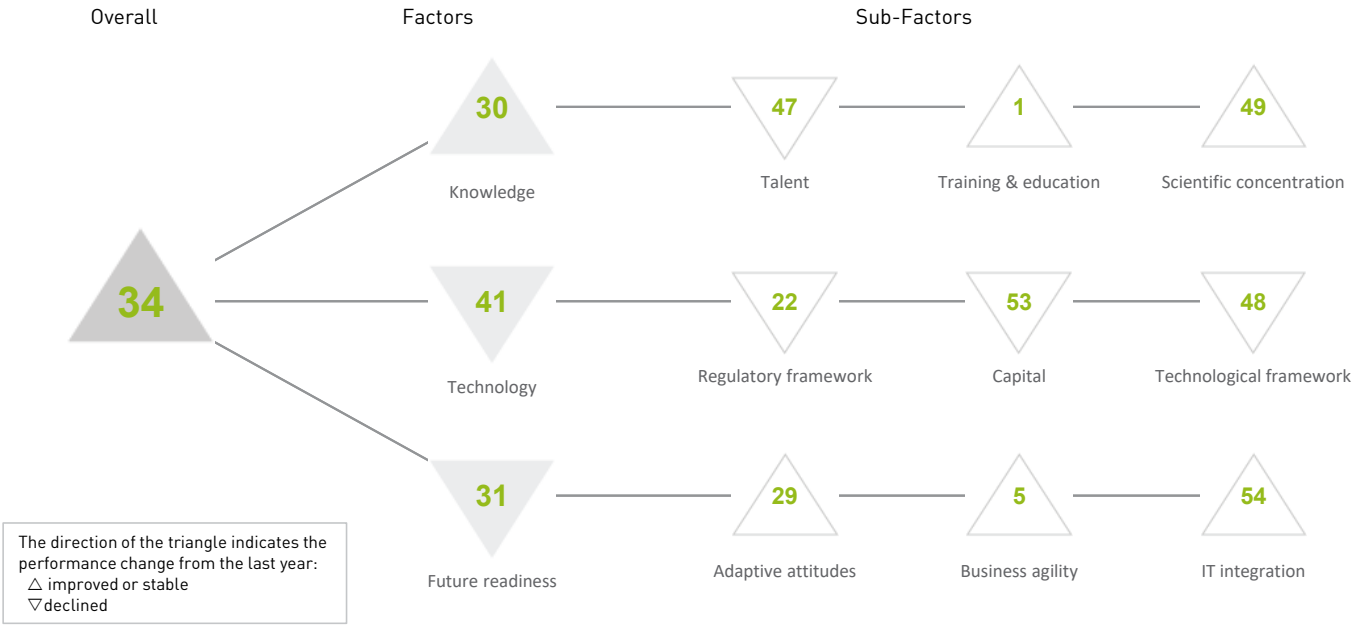
Adaptive attitudes	Rank
E-Participation	52
▷ Internet retailing	59
Tablet possession	50
▶ Smartphone possession	09
Attitudes toward globalization	37

Business agility	Rank
Opportunities and threats	23
World robots distribution	-
Agility of companies	43
▶ Use of big data and analytics	08
Knowledge transfer	29
Entrepreneurial fear of failure	50

IT integration	Rank
▷ E-Government	59
Public-private partnerships	27
▶ Cyber security	16
Software piracy	47
Government cyber security capacity	29
Privacy protection by law content	45

KAZAKHSTAN

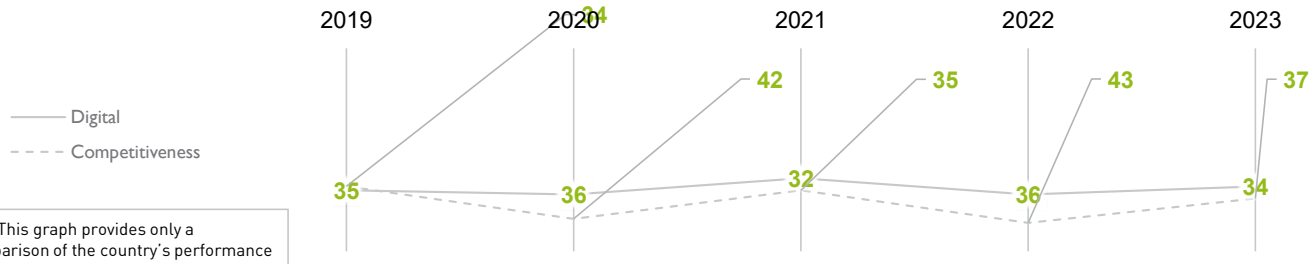
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	35	36	32	36	34
Knowledge	32	34	36	30	30
Technology	39	41	40	40	41
Future readiness	35	33	28	30	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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

KAZAKHSTAN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	39	49	45	46	47
Training & education	01	04	14	01	01
Scientific concentration	55	54	54	51	49

Talent	Rank
Educational assessment PISA - Math	45
International experience	32
Foreign highly skilled personnel	30
Management of cities	38
Digital/Technological skills	53
Net flow of international students	56

Training & education	Rank
Employee training	17
Total public expenditure on education	27
▶ Higher education achievement	01
Pupil-teacher ratio (tertiary education)	38
Graduates in Sciences	28
▶ Women with degrees	01

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	57
Total R&D personnel per capita	51
▶ Female researchers	05
R&D productivity by publication	21
Scientific and technical employment	46
High-tech patent grants	51
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	16	23	22	21	22
Capital	54	55	51	50	53
Technological framework	43	48	47	47	48

Regulatory framework	Rank
Starting a business	11
▶ Enforcing contracts	04
Immigration laws	22
Development & application of tech.	33
Scientific research legislation	35
Intellectual property rights	45

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	31
Banking and financial services	35
Country credit rating	51
Venture capital	48
▷ Investment in Telecommunications	62

Technological framework	Rank
Communications technology	52
Mobile broadband subscribers	43
Wireless broadband	57
Internet users	43
▷ Internet bandwidth speed	60
High-tech exports (%)	08

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	39	33	32	34	29
Business agility	15	13	06	06	05
IT integration	46	46	44	56	54

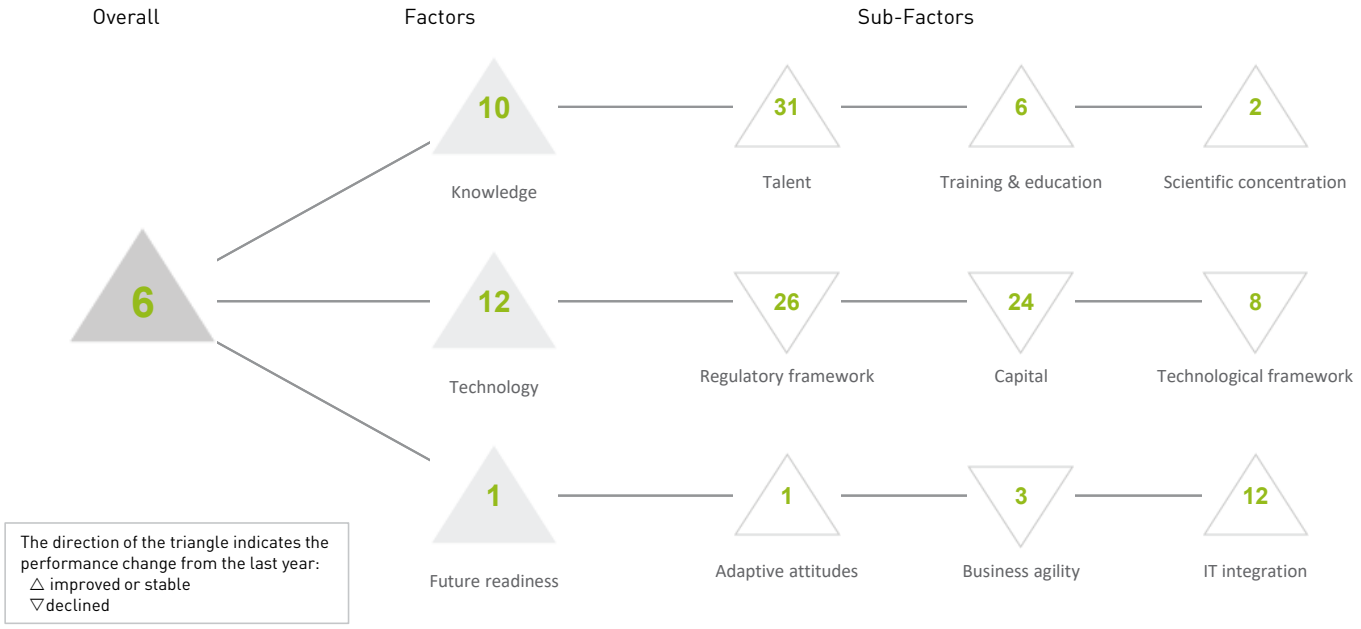
Adaptive attitudes	Rank
E-Participation	15
Internet retailing	52
Tablet possession	36
Smartphone possession	36
Attitudes toward globalization	39

Business agility	Rank
Opportunities and threats	35
World robots distribution	-
Agility of companies	25
Use of big data and analytics	10
Knowledge transfer	31
▶ Entrepreneurial fear of failure	01

IT integration	Rank
E-Government	26
Public-private partnerships	25
Cyber security	44
▷ Software piracy	59
Government cyber security capacity	40
▷ Privacy protection by law content	59

KOREA REP.

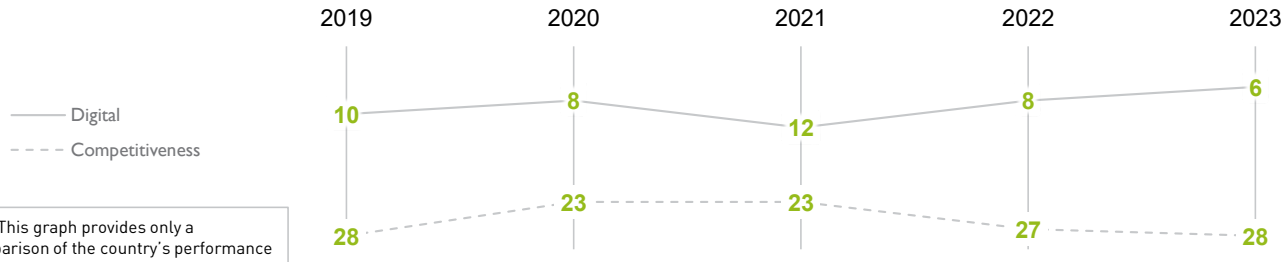
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	10	08	12	08	06
Knowledge	11	10	15	16	10
Technology	17	12	13	13	12
Future readiness	04	03	05	02	01

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 (27 countries)

KOREA REP.

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	30	21	26	33	31
Training & education	05	11	16	16	06
Scientific concentration	06	04	03	03	02

Talent	Rank
Educational assessment PISA - Math	06
▷ International experience	51
Foreign highly skilled personnel	47
Management of cities	08
▷ Digital/Technological skills	48
Net flow of international students	37

Training & education	Rank
Employee training	23
Total public expenditure on education	26
Higher education achievement	04
Pupil-teacher ratio (tertiary education)	25
Graduates in Sciences	09
Women with degrees	21

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	02
Total R&D personnel per capita	04
▷ Female researchers	55
R&D productivity by publication	26
Scientific and technical employment	31
High-tech patent grants	03
Robots in Education and R&D	04

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	26	26	23	23	26
Capital	29	25	16	15	24
Technological framework	07	03	07	07	08

Regulatory framework	Rank
Starting a business	19
▶ Enforcing contracts	02
Immigration laws	46
▷ Development & application of tech.	52
Scientific research legislation	32
Intellectual property rights	28

Capital	Rank
IT & media stock market capitalization	03
Funding for technological development	36
▷ Banking and financial services	50
Country credit rating	16
Venture capital	44
Investment in Telecommunications	23

Technological framework	Rank
Communications technology	11
Mobile broadband subscribers	12
Wireless broadband	28
Internet users	09
Internet bandwidth speed	15
High-tech exports (%)	06

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	04	01	02	01	01
Business agility	05	03	05	02	03
IT integration	21	15	16	14	12

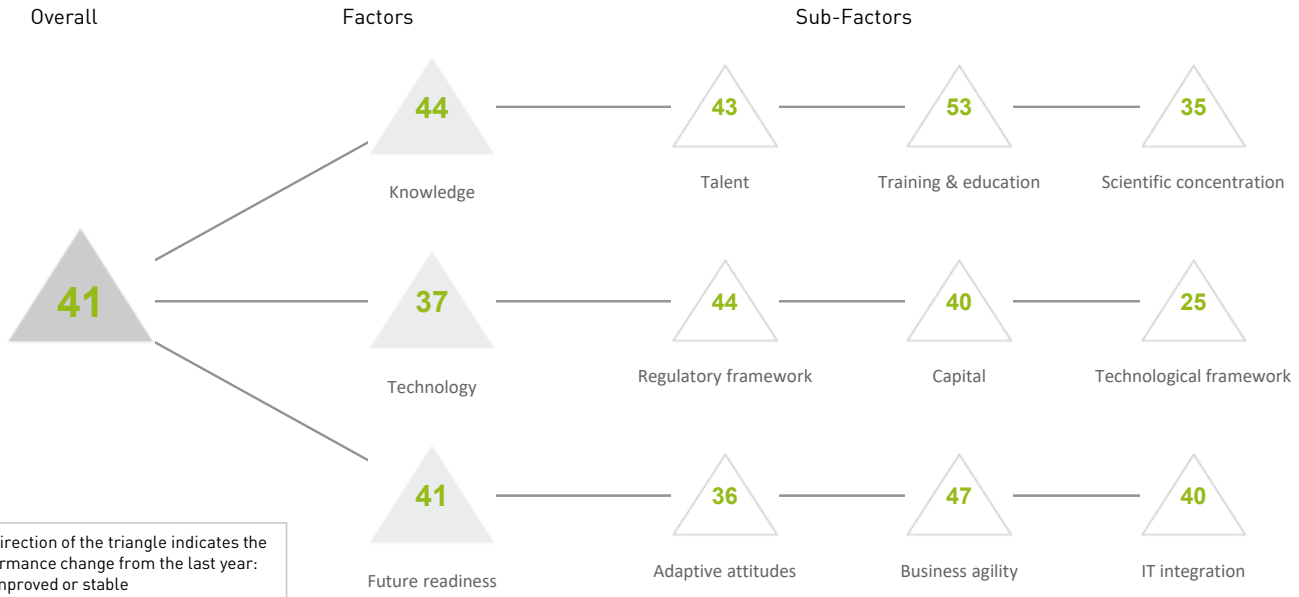
Adaptive attitudes	Rank
E-Participation	09
▶ Internet retailing	02
Tablet possession	21
Smartphone possession	06
Attitudes toward globalization	07

Business agility	Rank
Opportunities and threats	43
▶ World robots distribution	03
Agility of companies	28
Use of big data and analytics	31
Knowledge transfer	26
▶ Entrepreneurial fear of failure	02

IT integration	Rank
E-Government	03
Public-private partnerships	40
Cyber security	24
Software piracy	20
Government cyber security capacity	06
Privacy protection by law content	33

KUWAIT

OVERALL PERFORMANCE (64 countries)

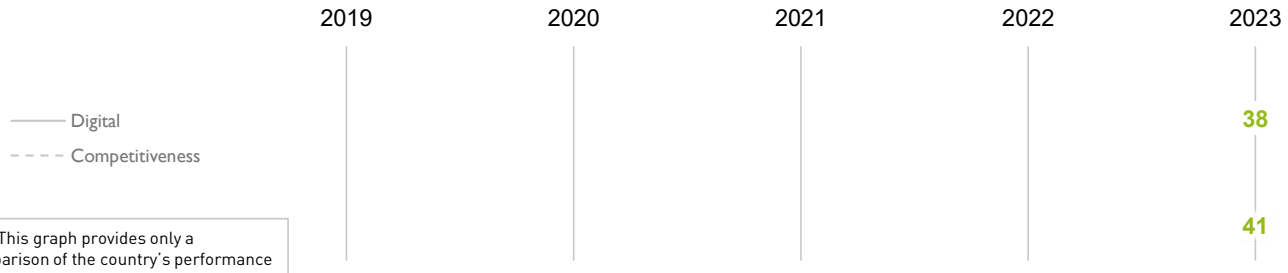


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	-	-	-	-	41
Knowledge	-	-	-	-	44
Technology	-	-	-	-	37
Future readiness	-	-	-	-	41

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

KUWAIT

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	-	-	-	-	43
Training & education	-	-	-	-	53
Scientific concentration	-	-	-	-	35

Talent	Rank
Educational assessment PISA - Math	-
International experience	27
Foreign highly skilled personnel	43
Management of cities	49
Digital/Technological skills	45
Net flow of international students	-

Training & education	Rank
Employee training	34
▶ Total public expenditure on education	06
▷ Higher education achievement	61
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	-
Women with degrees	56

Scientific concentration	Rank
▷ Total expenditure on R&D (%)	60
▶ Total R&D personnel per capita	03
▶ Female researchers	10
R&D productivity by publication	33
Scientific and technical employment	-
High-tech patent grants	-
Robots in Education and R&D	54

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	-	-	-	-	44
Capital	-	-	-	-	40
Technological framework	-	-	-	-	25

Regulatory framework	Rank
Starting a business	37
Enforcing contracts	43
Immigration laws	44
Development & application of tech.	40
Scientific research legislation	46
Intellectual property rights	52

Capital	Rank
IT & media stock market capitalization	27
Funding for technological development	38
▶ Banking and financial services	09
Country credit rating	24
Venture capital	38
▷ Investment in Telecommunications	63

Technological framework	Rank
Communications technology	38
Mobile broadband subscribers	14
Wireless broadband	19
▶ Internet users	04
Internet bandwidth speed	28
▷ High-tech exports (%)	61

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	-	-	-	-	36
Business agility	-	-	-	-	47
IT integration	-	-	-	-	40

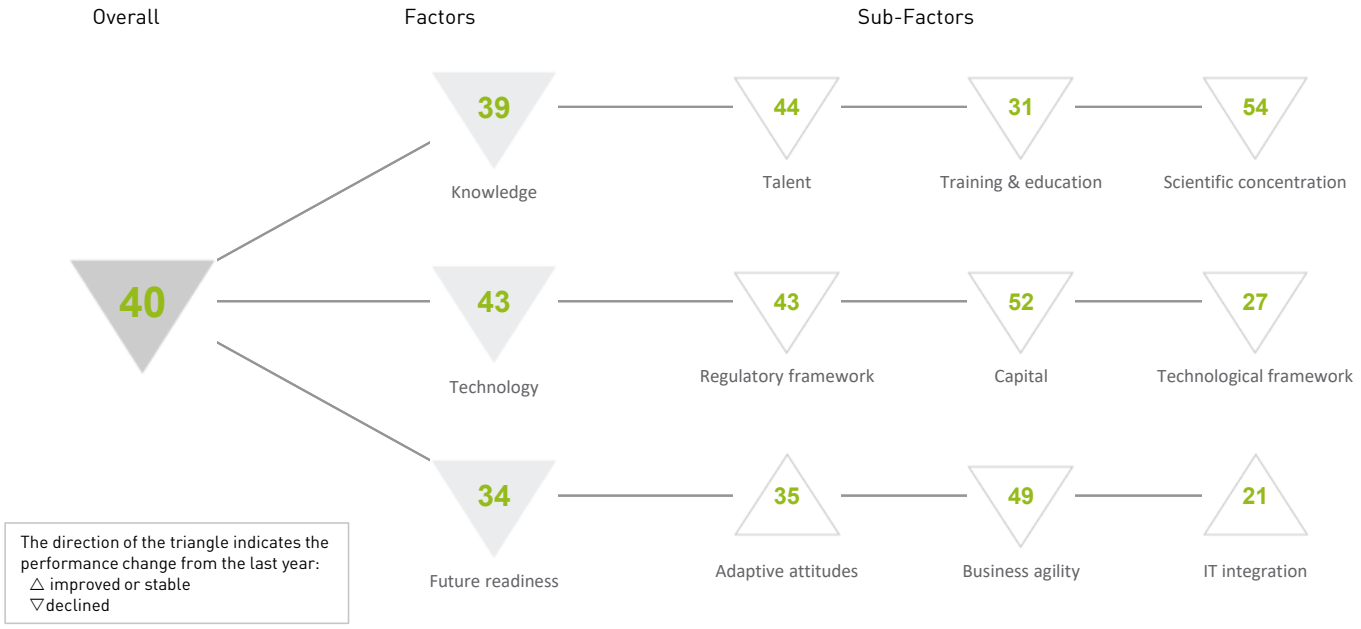
Adaptive attitudes	Rank
E-Participation	52
Internet retailing	39
Tablet possession	12
Smartphone possession	23
Attitudes toward globalization	45

Business agility	Rank
Opportunities and threats	54
▷ World robots distribution	57
Agility of companies	51
Use of big data and analytics	26
Knowledge transfer	47
Entrepreneurial fear of failure	35

IT integration	Rank
E-Government	51
Public-private partnerships	42
Cyber security	22
Software piracy	-
Government cyber security capacity	16
Privacy protection by law content	54

LATVIA

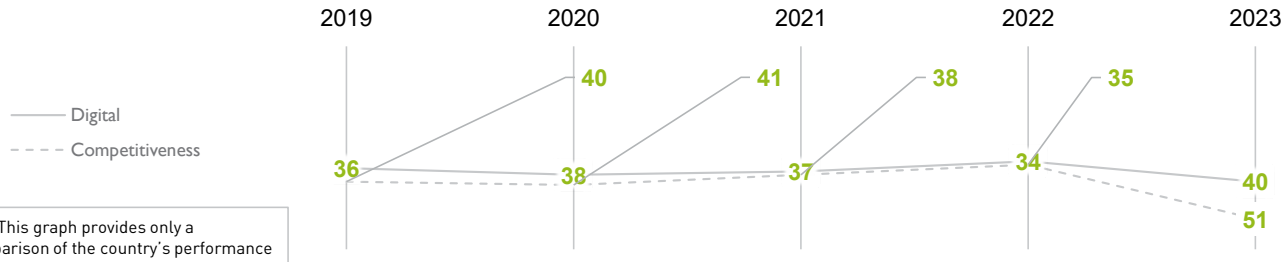
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	36	38	37	34	40
Knowledge	36	36	34	36	39
Technology	23	34	34	34	43
Future readiness	45	42	42	32	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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

LATVIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	32	27	24	25	44
Training & education	27	27	30	28	31
Scientific concentration	47	49	51	52	54

Talent	Rank
Educational assessment PISA - Math	23
International experience	54
Foreign highly skilled personnel	49
Management of cities	47
Digital/Technological skills	49
Net flow of international students	15

Training & education	Rank
Employee training	45
Total public expenditure on education	16
Higher education achievement	30
Pupil-teacher ratio (tertiary education)	16
Graduates in Sciences	49
Women with degrees	24

Scientific concentration	Rank
Total expenditure on R&D (%)	45
Total R&D personnel per capita	38
▶ Female researchers	06
R&D productivity by publication	54
Scientific and technical employment	40
High-tech patent grants	43
Robots in Education and R&D	48

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	30	37	34	36	43
Capital	35	50	46	39	52
Technological framework	14	13	18	22	27

Regulatory framework	Rank
Starting a business	15
▶ Enforcing contracts	14
Immigration laws	55
Development & application of tech.	44
▷ Scientific research legislation	58
▷ Intellectual property rights	56

Capital	Rank
IT & media stock market capitalization	26
Funding for technological development	49
▷ Banking and financial services	61
Country credit rating	36
Venture capital	53
Investment in Telecommunications	53

Technological framework	Rank
Communications technology	44
Mobile broadband subscribers	26
Wireless broadband	17
Internet users	29
Internet bandwidth speed	33
High-tech exports (%)	25

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	52	51	51	44	35
Business agility	47	45	48	31	49
IT integration	44	37	37	23	21

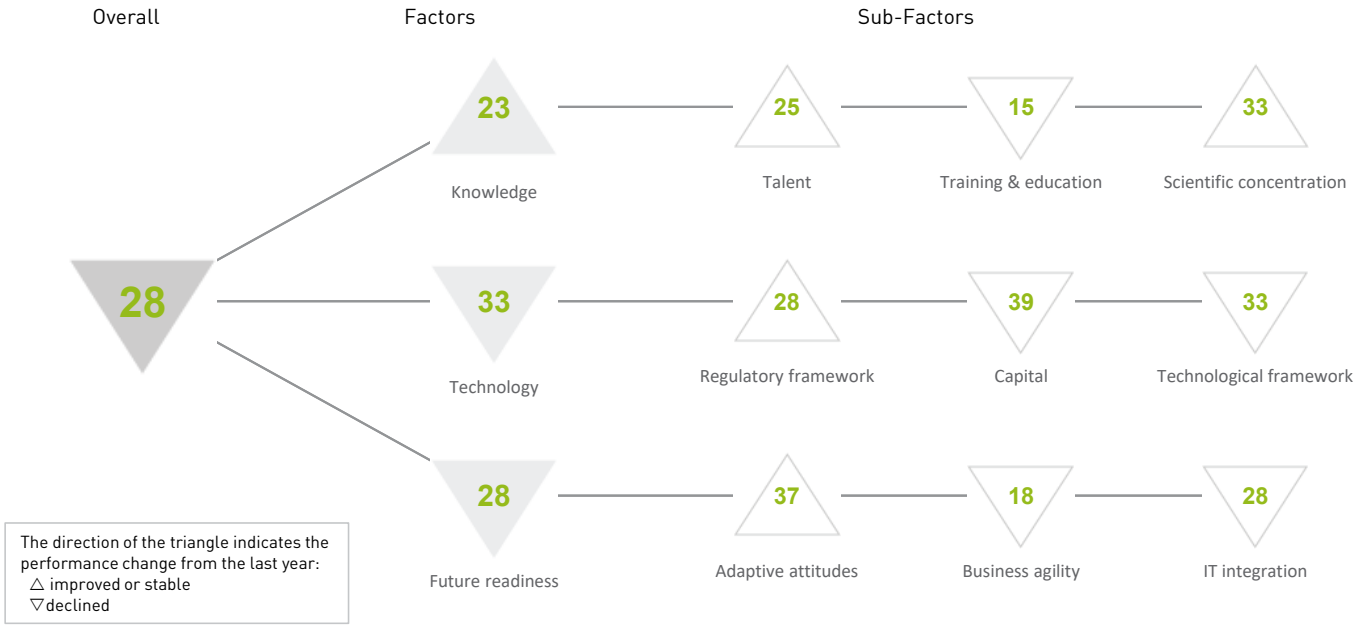
Adaptive attitudes	Rank
E-Participation	26
Internet retailing	37
Tablet possession	23
Smartphone possession	22
▷ Attitudes toward globalization	56

Business agility	Rank
Opportunities and threats	48
World robots distribution	52
▷ Agility of companies	58
Use of big data and analytics	48
Knowledge transfer	46
▶ Entrepreneurial fear of failure	12

IT integration	Rank
E-Government	27
Public-private partnerships	47
Cyber security	36
Software piracy	40
▶ Government cyber security capacity	11
▶ Privacy protection by law content	02

LITHUANIA

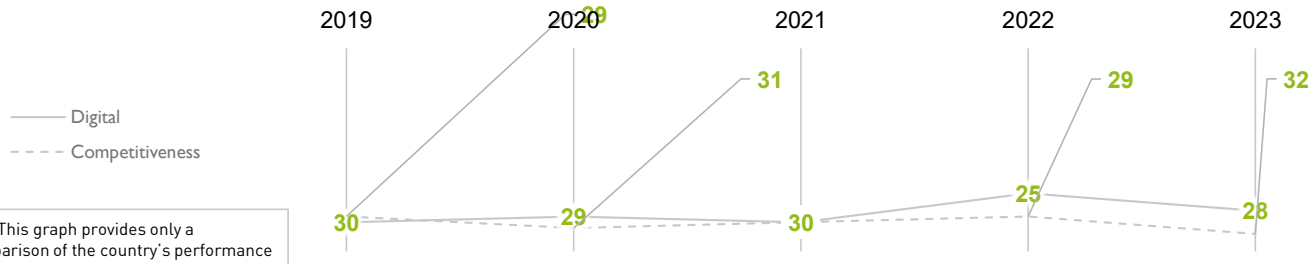
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	30	29	30	25	28
Knowledge	26	25	26	24	23
Technology	25	29	29	32	33
Future readiness	32	30	33	24	28

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

LITHUANIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	23	23	25	27	25
Training & education	13	16	15	13	15
Scientific concentration	41	40	37	37	33

Talent	Rank
Educational assessment PISA - Math	33
International experience	30
Foreign highly skilled personnel	35
Management of cities	32
▶ Digital/Technological skills	01
▷ Net flow of international students	54

Training & education	Rank
Employee training	24
Total public expenditure on education	34
Higher education achievement	13
Pupil-teacher ratio (tertiary education)	11
Graduates in Sciences	22
Women with degrees	14

Scientific concentration	Rank
Total expenditure on R&D (%)	37
Total R&D personnel per capita	30
Female researchers	08
R&D productivity by publication	52
Scientific and technical employment	28
High-tech patent grants	17
Robots in Education and R&D	47

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	24	27	32	28	28
Capital	36	42	30	37	39
Technological framework	21	18	30	32	33

Regulatory framework	Rank
Starting a business	20
▶ Enforcing contracts	07
▷ Immigration laws	53
Development & application of tech.	29
Scientific research legislation	29
Intellectual property rights	33

Capital	Rank
IT & media stock market capitalization	07
Funding for technological development	33
▷ Banking and financial services	55
Country credit rating	31
Venture capital	35
▷ Investment in Telecommunications	60

Technological framework	Rank
▶ Communications technology	04
▷ Mobile broadband subscribers	53
Wireless broadband	16
Internet users	33
Internet bandwidth speed	25
High-tech exports (%)	35

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	45	47	47	38	37
Business agility	18	18	24	17	18
IT integration	32	32	34	26	28

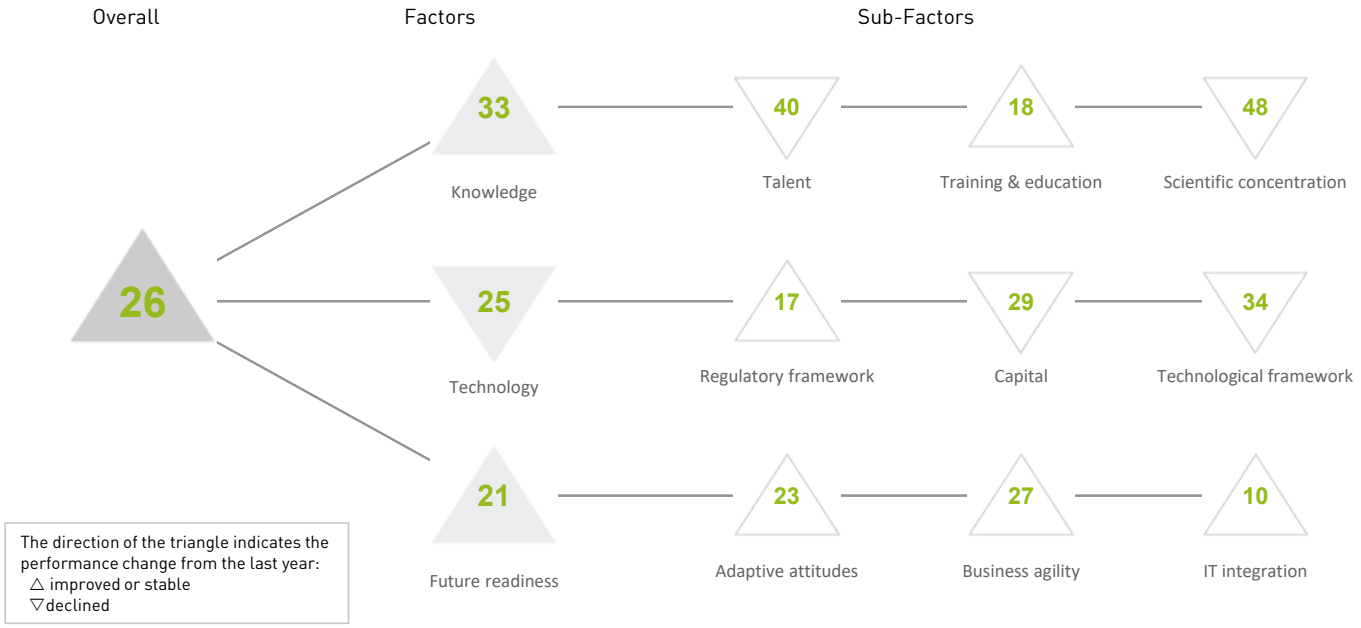
Adaptive attitudes	Rank
E-Participation	52
Internet retailing	27
Tablet possession	28
Smartphone possession	35
Attitudes toward globalization	38

Business agility	Rank
▶ Opportunities and threats	03
World robots distribution	45
▶ Agility of companies	05
Use of big data and analytics	21
Knowledge transfer	37
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	23
Public-private partnerships	29
Cyber security	31
Software piracy	43
Government cyber security capacity	33
Privacy protection by law content	08

LUXEMBOURG

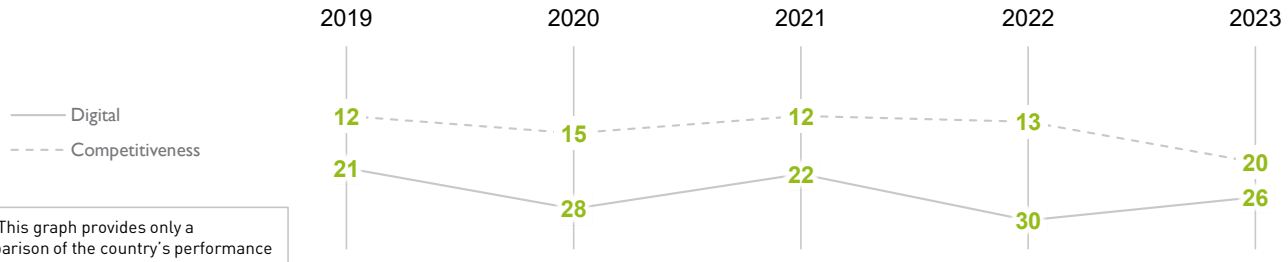
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	21	28	22	30	26
Knowledge	34	35	29	35	33
Technology	12	17	14	19	25
Future readiness	17	27	24	35	21

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

LUXEMBOURG

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	31	39	33	35	40
Training & education	24	23	20	20	18
Scientific concentration	42	41	38	42	48

Talent	Rank
Educational assessment PISA - Math	31
▶ International experience	05
Foreign highly skilled personnel	09
Management of cities	20
Digital/Technological skills	34
▷ Net flow of international students	61

Training & education	Rank
Employee training	16
Total public expenditure on education	36
Higher education achievement	07
▶ Pupil-teacher ratio (tertiary education)	01
Graduates in Sciences	50
Women with degrees	17

Scientific concentration	Rank
Total expenditure on R&D (%)	39
Total R&D personnel per capita	12
Female researchers	52
▷ R&D productivity by publication	59
Scientific and technical employment	23
High-tech patent grants	25
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	04	08	08	18	17
Capital	09	15	08	24	29
Technological framework	34	35	25	27	34

Regulatory framework	Rank
Starting a business	34
Enforcing contracts	17
Immigration laws	14
Development & application of tech.	18
Scientific research legislation	12
Intellectual property rights	14

Capital	Rank
IT & media stock market capitalization	08
Funding for technological development	22
Banking and financial services	41
▶ Country credit rating	01
Venture capital	37
▷ Investment in Telecommunications	61

Technological framework	Rank
Communications technology	22
▷ Mobile broadband subscribers	55
Wireless broadband	31
Internet users	06
Internet bandwidth speed	17
▷ High-tech exports (%)	53

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	22	48	38	47	23
Business agility	20	34	22	36	27
IT integration	06	16	12	17	10

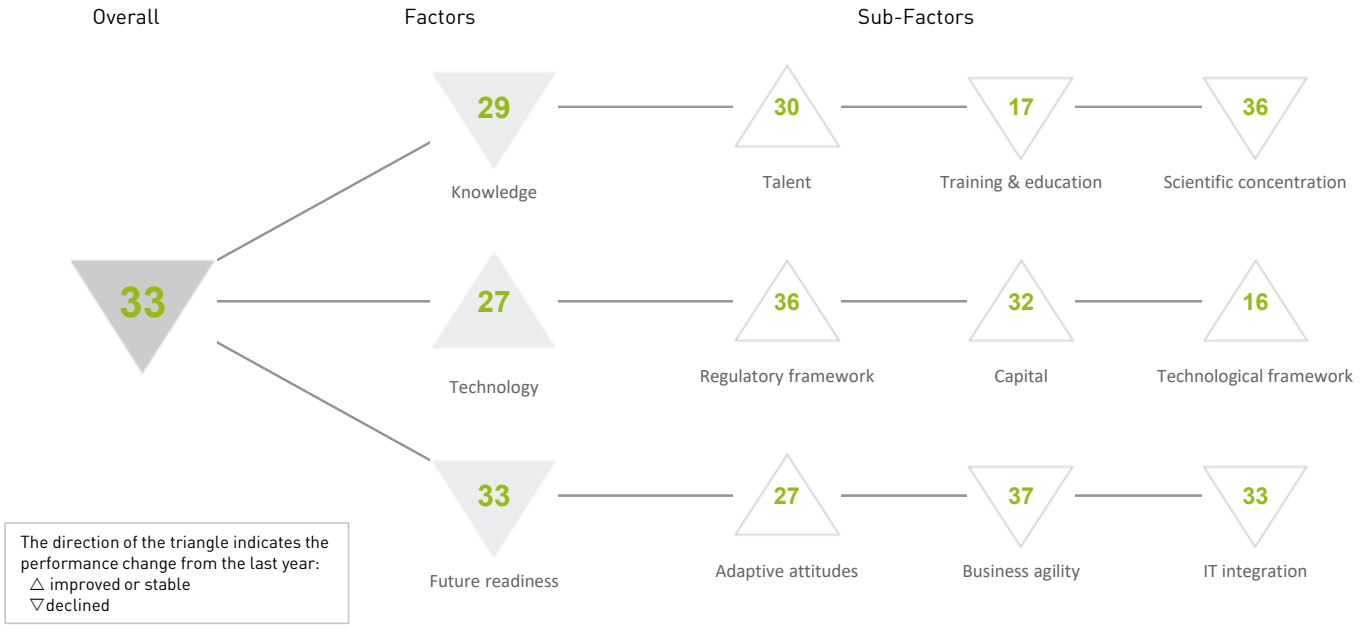
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	-
Tablet possession	-
Smartphone possession	-
Attitudes toward globalization	31

Business agility	Rank
Opportunities and threats	28
World robots distribution	-
Agility of companies	20
Use of big data and analytics	39
Knowledge transfer	22
Entrepreneurial fear of failure	20

IT integration	Rank
E-Government	24
Public-private partnerships	23
Cyber security	13
▶ Software piracy	04
Government cyber security capacity	37
▶ Privacy protection by law content	04

MALAYSIA

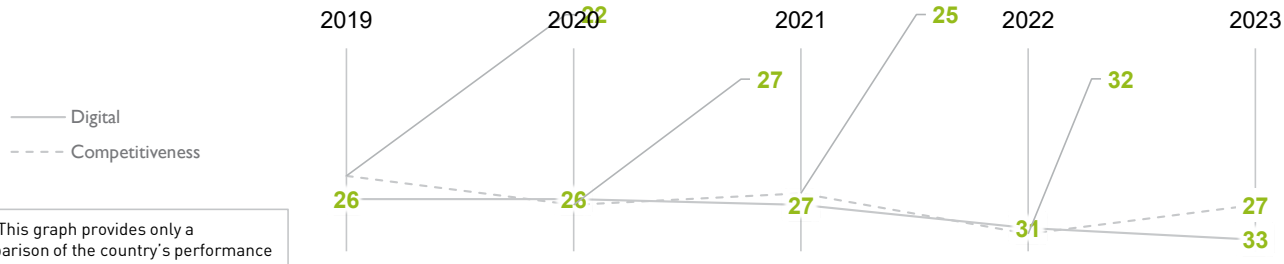
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	26	26	27	31	33
Knowledge	19	19	22	25	29
Technology	19	20	26	29	27
Future readiness	28	32	29	31	33

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 (27 countries)

MALAYSIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	22	30	30	36	30
Training & education	11	08	09	10	17
Scientific concentration	27	26	32	35	36

Talent	Rank
Educational assessment PISA - Math	41
International experience	34
Foreign highly skilled personnel	27
Management of cities	16
Digital/Technological skills	25
Net flow of international students	30

Training & education	Rank
Employee training	39
Total public expenditure on education	44
Higher education achievement	37
Pupil-teacher ratio (tertiary education)	33
▶ Graduates in Sciences	02
▶ Women with degrees	04

Scientific concentration	Rank
Total expenditure on R&D (%)	40
Total R&D personnel per capita	43
▶ Female researchers	07
R&D productivity by publication	23
▷ Scientific and technical employment	49
▷ High-tech patent grants	49
Robots in Education and R&D	29

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	29	35	35	40	36
Capital	14	18	31	33	32
Technological framework	20	15	15	16	16

Regulatory framework	Rank
▷ Starting a business	52
Enforcing contracts	27
Immigration laws	33
Development & application of tech.	27
Scientific research legislation	31
Intellectual property rights	30

Capital	Rank
IT & media stock market capitalization	17
Funding for technological development	28
Banking and financial services	21
Country credit rating	39
Venture capital	28
Investment in Telecommunications	40

Technological framework	Rank
Communications technology	42
Mobile broadband subscribers	29
Wireless broadband	27
Internet users	27
Internet bandwidth speed	36
▶ High-tech exports (%)	05

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	30	30	29	30	27
Business agility	17	30	27	35	37
IT integration	33	33	31	31	33

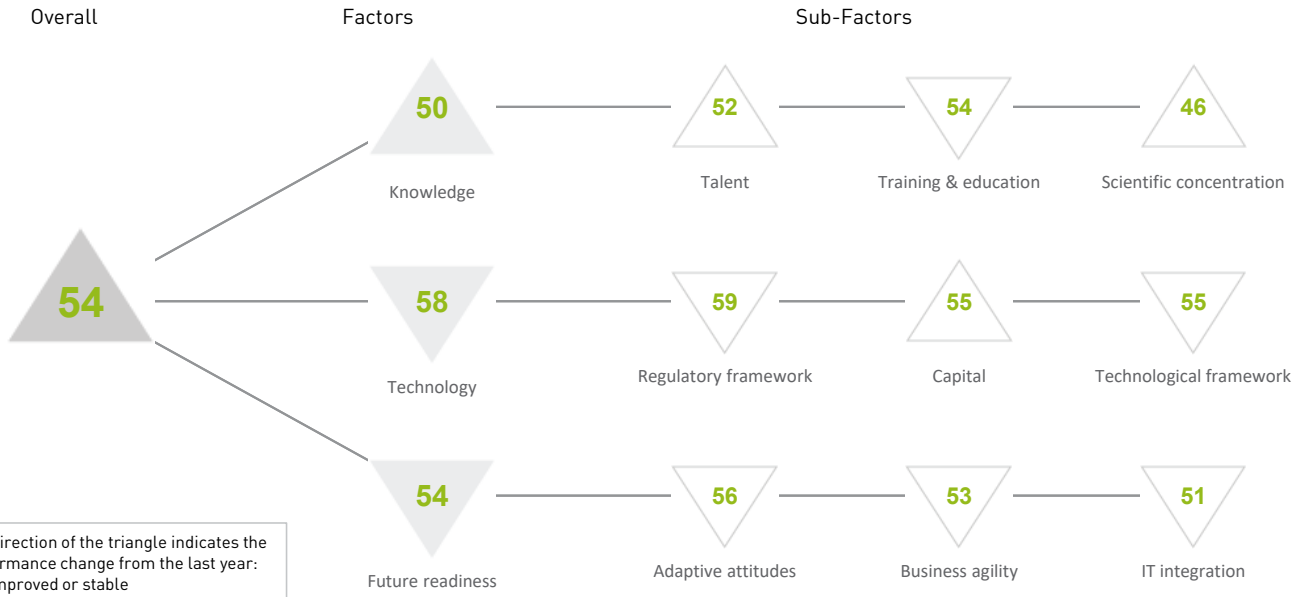
Adaptive attitudes	Rank
E-Participation	42
▷ Internet retailing	48
Tablet possession	24
Smartphone possession	08
Attitudes toward globalization	32

Business agility	Rank
Opportunities and threats	39
World robots distribution	22
Agility of companies	38
Use of big data and analytics	32
Knowledge transfer	36
Entrepreneurial fear of failure	26

IT integration	Rank
E-Government	46
Public-private partnerships	22
Cyber security	35
Software piracy	45
▶ Government cyber security capacity	05
▷ Privacy protection by law content	56

MEXICO

OVERALL PERFORMANCE (64 countries)

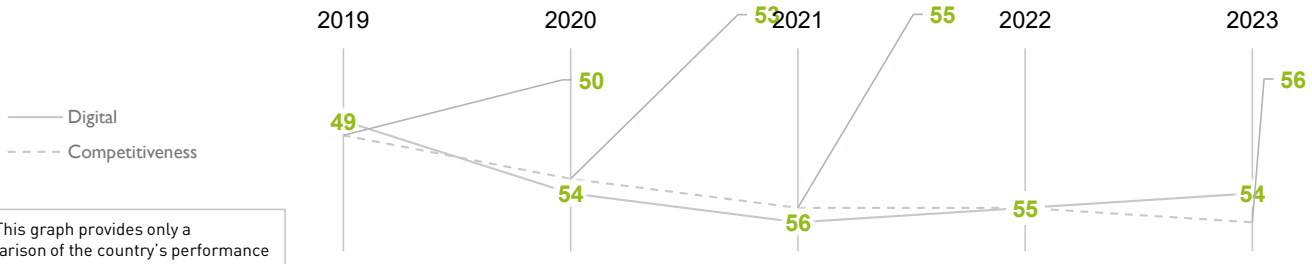


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	49	54	56	55	54
Knowledge	52	52	54	52	50
Technology	52	56	57	56	58
Future readiness	49	52	51	53	54

COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

MEXICO

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	55	45	51	54	52
Training & education	53	57	57	53	54
Scientific concentration	40	43	50	49	46

Talent	Rank
Educational assessment PISA - Math	49
International experience	25
Foreign highly skilled personnel	31
Management of cities	58
▷ Digital/Technological skills	61
Net flow of international students	38

Training & education	Rank
Employee training	51
Total public expenditure on education	59
Higher education achievement	52
Pupil-teacher ratio (tertiary education)	23
Graduates in Sciences	25
Women with degrees	53

Scientific concentration	Rank
Total expenditure on R&D (%)	54
Total R&D personnel per capita	54
Female researchers	43
▶ R&D productivity by publication	05
Scientific and technical employment	33
High-tech patent grants	56
▶ Robots in Education and R&D	10

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	48	50	54	56	59
Capital	47	53	57	55	55
Technological framework	53	54	54	54	55

Regulatory framework	Rank
Starting a business	45
Enforcing contracts	32
Immigration laws	50
▷ Development & application of tech.	60
▷ Scientific research legislation	62
Intellectual property rights	58

Capital	Rank
▶ IT & media stock market capitalization	20
▷ Funding for technological development	62
Banking and financial services	52
Country credit rating	48
Venture capital	58
Investment in Telecommunications	27

Technological framework	Rank
Communications technology	59
Mobile broadband subscribers	48
Wireless broadband	54
Internet users	55
Internet bandwidth speed	55
High-tech exports (%)	21

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	47	52	52	54	56
Business agility	51	50	41	46	53
IT integration	53	53	52	47	51

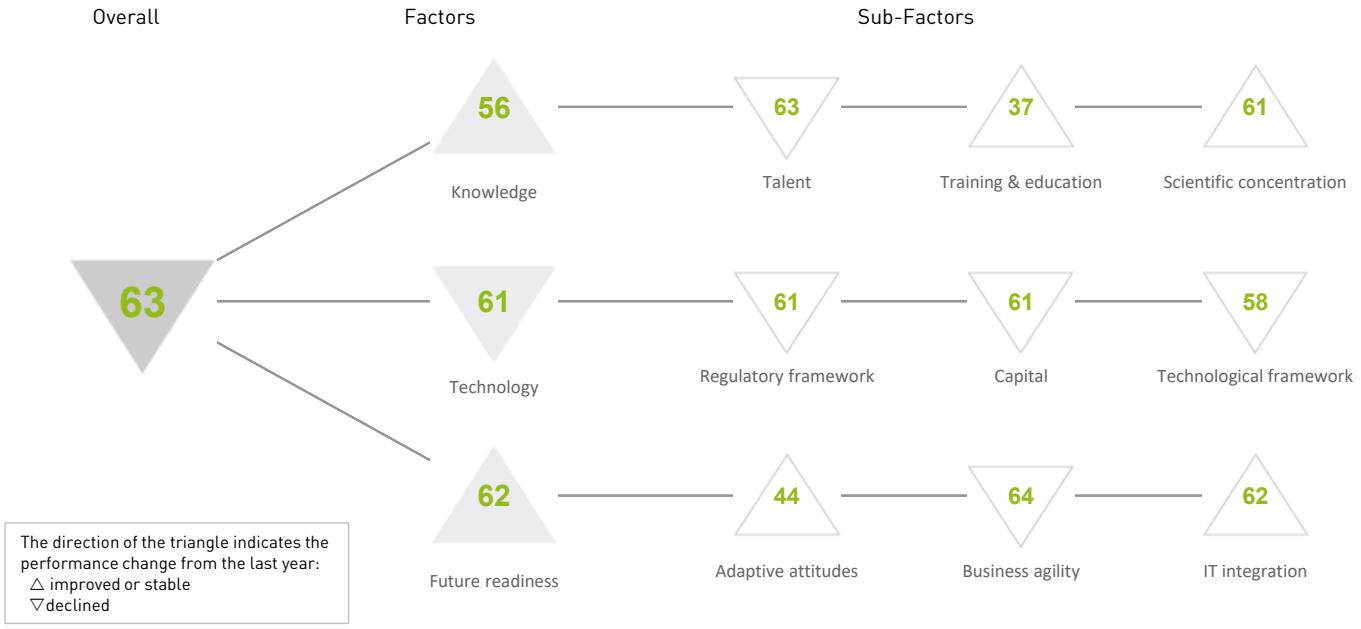
Adaptive attitudes	Rank
E-Participation	29
Internet retailing	45
Tablet possession	49
Smartphone possession	58
Attitudes toward globalization	33

Business agility	Rank
Opportunities and threats	53
▶ World robots distribution	09
Agility of companies	48
Use of big data and analytics	54
Knowledge transfer	54
Entrepreneurial fear of failure	34

IT integration	Rank
E-Government	52
Public-private partnerships	55
▷ Cyber security	61
Software piracy	42
Government cyber security capacity	38
▶ Privacy protection by law content	20

MONGOLIA

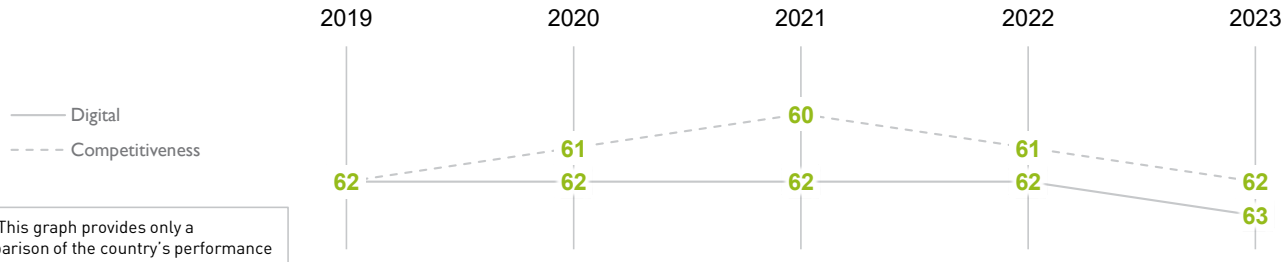
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	62	62	62	62	63
Knowledge	62	58	58	61	56
Technology	62	60	61	60	61
Future readiness	61	59	62	62	62

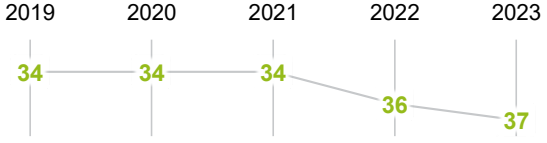
COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

ASIA - PACIFIC (14 countries)

POPULATIONS < 20 MILLION (37 countries)



MONGOLIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	60	60	60	60	63
Training & education	45	41	39	47	37
Scientific concentration	60	61	61	61	61

Talent	Rank
Educational assessment PISA - Math	-
International experience	62
Foreign highly skilled personnel	60
▷ Management of cities	63
Digital/Technological skills	50
Net flow of international students	59

Training & education	Rank
Employee training	26
Total public expenditure on education	47
▶ Higher education achievement	15
Pupil-teacher ratio (tertiary education)	52
Graduates in Sciences	32
Women with degrees	22

Scientific concentration	Rank
Total expenditure on R&D (%)	59
Total R&D personnel per capita	45
▶ Female researchers	01
R&D productivity by publication	57
Scientific and technical employment	56
High-tech patent grants	61
Robots in Education and R&D	-

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	62	58	58	60	61
Capital	58	60	62	59	61
Technological framework	58	60	60	57	58

Regulatory framework	Rank
Starting a business	43
Enforcing contracts	44
Immigration laws	56
Development & application of tech.	63
Scientific research legislation	63
▷ Intellectual property rights	63

Capital	Rank
IT & media stock market capitalization	-
Funding for technological development	61
Banking and financial services	62
Country credit rating	61
Venture capital	62
▶ Investment in Telecommunications	11

Technological framework	Rank
Communications technology	53
▷ Mobile broadband subscribers	63
Wireless broadband	48
Internet users	53
Internet bandwidth speed	58
▶ High-tech exports (%)	15

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	31	40	37	51	44
Business agility	63	61	63	63	64
IT integration	62	61	62	62	62

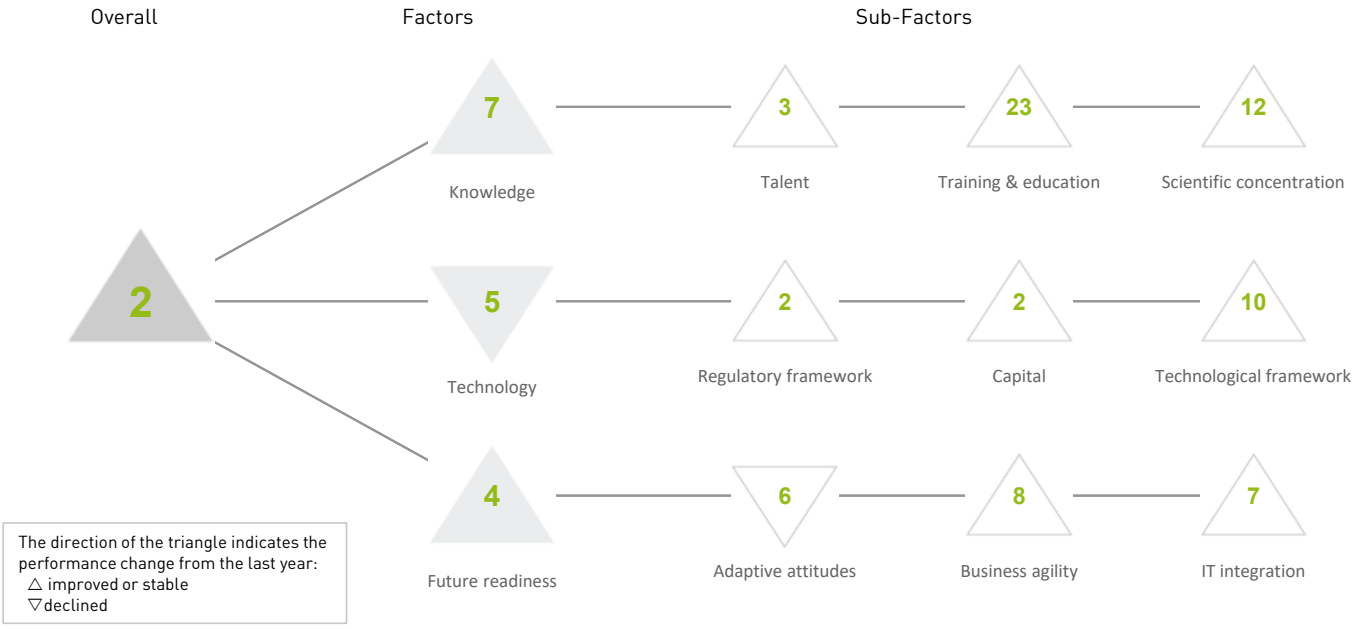
Adaptive attitudes	Rank
E-Participation	48
Internet retailing	60
Tablet possession	-
▶ Smartphone possession	05
Attitudes toward globalization	48

Business agility	Rank
▷ Opportunities and threats	64
World robots distribution	-
Agility of companies	63
Use of big data and analytics	62
▷ Knowledge transfer	64
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	55
Public-private partnerships	63
Cyber security	63
Software piracy	-
Government cyber security capacity	56
Privacy protection by law content	44

NETHERLANDS

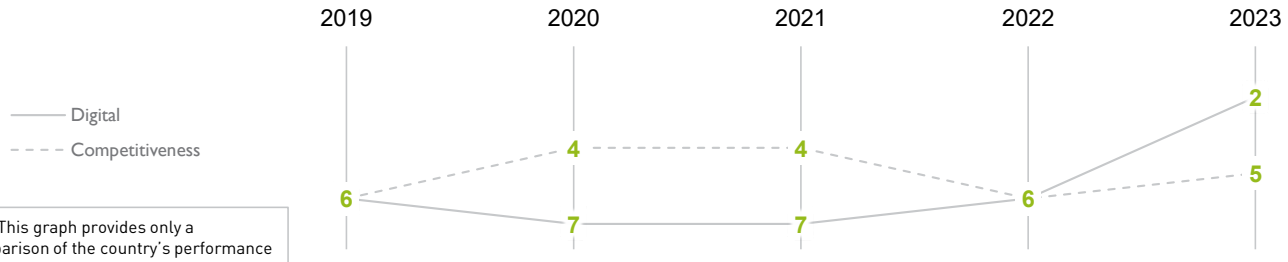
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	06	07	07	06	02
Knowledge	13	14	11	08	07
Technology	06	08	07	04	05
Future readiness	03	04	04	05	04

COMPETITIVENESS & DIGITAL RANKINGS

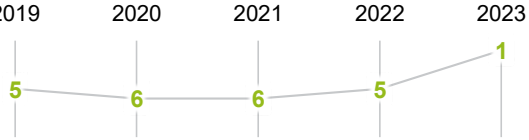


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)



NETHERLANDS

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	03	03	04	04	03
Training & education	36	29	28	25	23
Scientific concentration	19	16	16	12	12

Talent	Rank
Educational assessment PISA - Math	08
International experience	03
▶ Foreign highly skilled personnel	02
Management of cities	11
Digital/Technological skills	05
Net flow of international students	06

Training & education	Rank
Employee training	06
Total public expenditure on education	22
Higher education achievement	16
Pupil-teacher ratio (tertiary education)	24
▷ Graduates in Sciences	51
Women with degrees	28

Scientific concentration	Rank
Total expenditure on R&D (%)	16
Total R&D personnel per capita	09
▷ Female researchers	47
R&D productivity by publication	27
Scientific and technical employment	03
High-tech patent grants	12
Robots in Education and R&D	23

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	06	11	07	07	02
Capital	05	02	03	03	02
Technological framework	10	12	10	10	10

Regulatory framework	Rank
Starting a business	13
▷ Enforcing contracts	45
Immigration laws	07
Development & application of tech.	08
Scientific research legislation	04
▶ Intellectual property rights	02

Capital	Rank
▶ IT & media stock market capitalization	02
Funding for technological development	08
Banking and financial services	16
▶ Country credit rating	01
Venture capital	04
▷ Investment in Telecommunications	45

Technological framework	Rank
▶ Communications technology	02
Mobile broadband subscribers	17
Wireless broadband	35
Internet users	14
Internet bandwidth speed	16
High-tech exports (%)	16

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	09	06	06	02	06
Business agility	07	07	08	08	08
IT integration	03	05	06	09	07

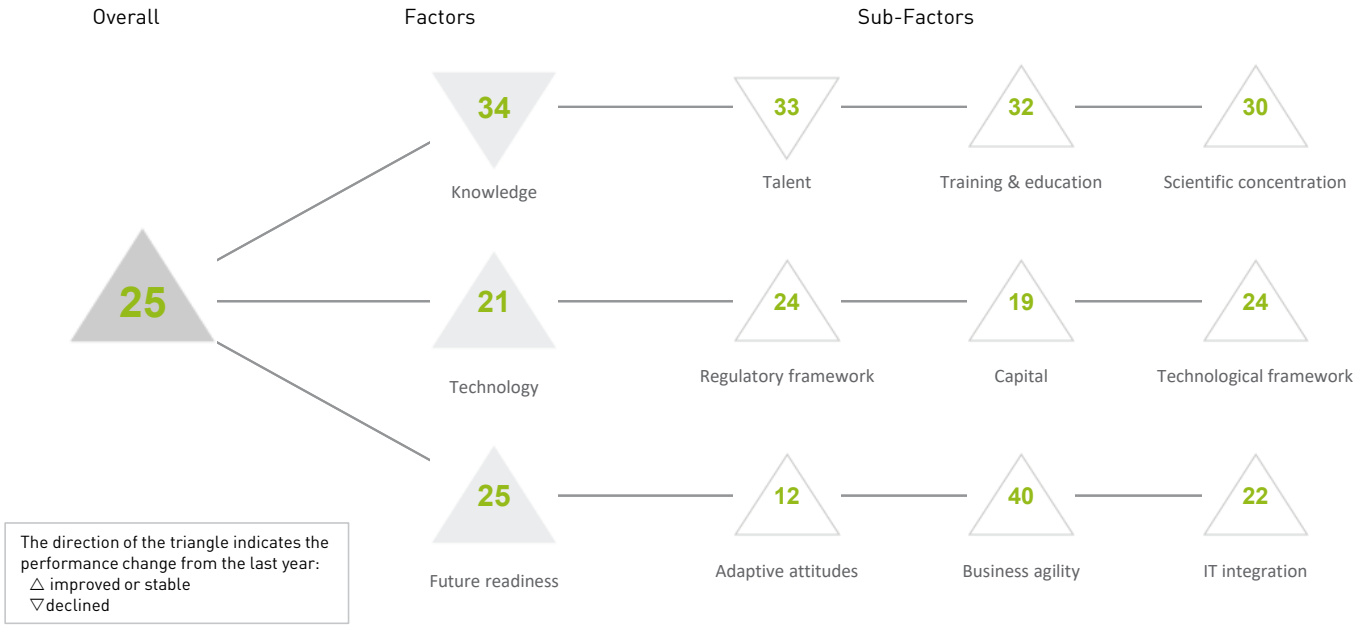
Adaptive attitudes	Rank
E-Participation	05
Internet retailing	09
Tablet possession	11
Smartphone possession	25
Attitudes toward globalization	11

Business agility	Rank
Opportunities and threats	09
World robots distribution	20
Agility of companies	10
Use of big data and analytics	13
Knowledge transfer	03
Entrepreneurial fear of failure	11

IT integration	Rank
E-Government	09
Public-private partnerships	05
Cyber security	12
Software piracy	13
▷ Government cyber security capacity	41
Privacy protection by law content	07

NEW ZEALAND

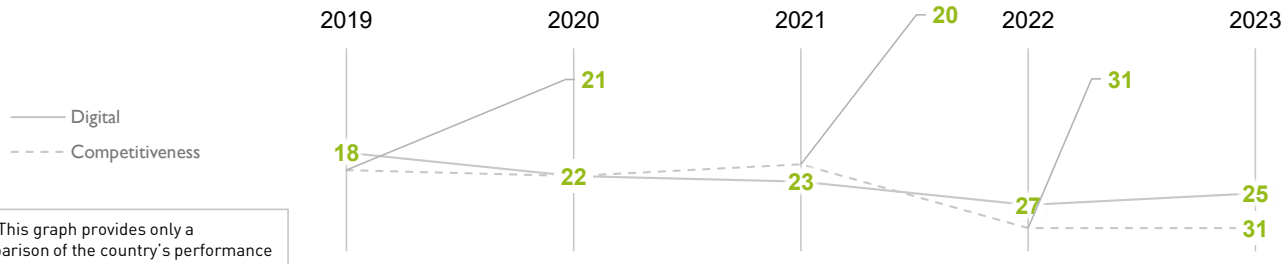
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	18	22	23	27	25
Knowledge	21	28	28	33	34
Technology	15	18	21	28	21
Future readiness	20	21	19	26	25

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 (37 countries)

NEW ZEALAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	11	17	14	32	33
Training & education	34	37	36	32	32
Scientific concentration	26	34	33	32	30

Talent	Rank
Educational assessment PISA - Math	26
▷ International experience	55
Foreign highly skilled personnel	40
▷ Management of cities	53
▷ Digital/Technological skills	50
▶ Net flow of international students	04

Training & education	Rank
Employee training	43
Total public expenditure on education	19
Higher education achievement	31
Pupil-teacher ratio (tertiary education)	35
Graduates in Sciences	29
Women with degrees	29

Scientific concentration	Rank
Total expenditure on R&D (%)	32
Total R&D personnel per capita	18
Female researchers	-
R&D productivity by publication	40
Scientific and technical employment	09
High-tech patent grants	41
Robots in Education and R&D	45

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	11	21	24	33	24
Capital	15	24	22	30	19
Technological framework	25	21	23	25	24

Regulatory framework	Rank
▶ Starting a business	01
Enforcing contracts	19
▷ Immigration laws	64
Development & application of tech.	15
Scientific research legislation	21
Intellectual property rights	07

Capital	Rank
IT & media stock market capitalization	25
Funding for technological development	44
Banking and financial services	15
Country credit rating	12
Venture capital	31
Investment in Telecommunications	13

Technological framework	Rank
Communications technology	20
Mobile broadband subscribers	46
Wireless broadband	13
Internet users	24
Internet bandwidth speed	14
High-tech exports (%)	40

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	13	13	16	15	12
Business agility	32	46	30	49	40
IT integration	10	18	18	27	22

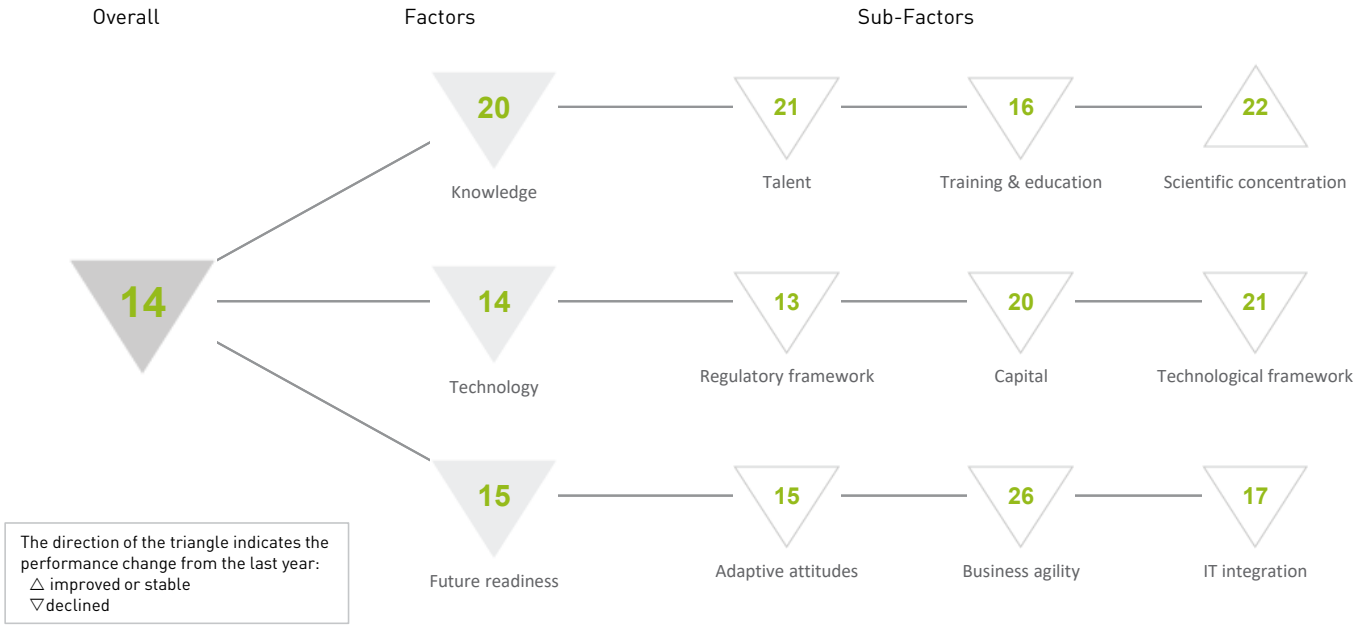
Adaptive attitudes	Rank
▶ E-Participation	06
Internet retailing	18
Tablet possession	08
Smartphone possession	40
Attitudes toward globalization	19

Business agility	Rank
Opportunities and threats	40
World robots distribution	42
Agility of companies	36
Use of big data and analytics	42
Knowledge transfer	25
Entrepreneurial fear of failure	-

IT integration	Rank
▶ E-Government	04
▷ Public-private partnerships	56
Cyber security	40
▶ Software piracy	02
Government cyber security capacity	20
Privacy protection by law content	39

NORWAY

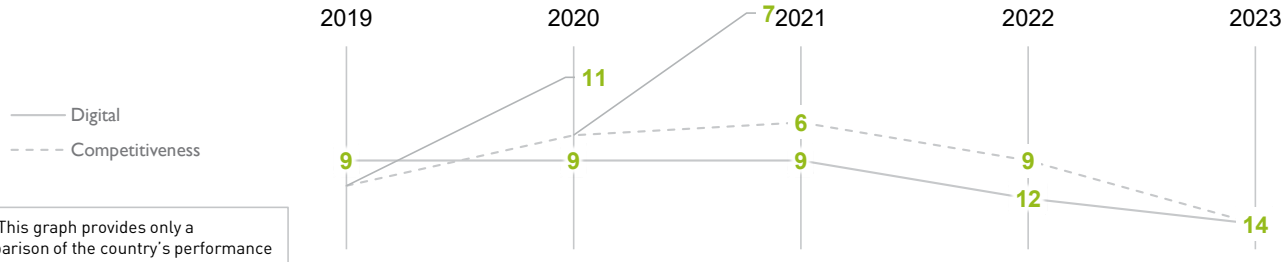
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	09	09	09	12	14
Knowledge	16	16	17	19	20
Technology	03	03	06	10	14
Future readiness	08	06	08	09	15

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

NORWAY

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	16	16	16	18	21
Training & education	17	10	11	14	16
Scientific concentration	21	23	22	22	22

Talent	Rank
Educational assessment PISA - Math	18
International experience	21
Foreign highly skilled personnel	20
Management of cities	24
Digital/Technological skills	20
▷ Net flow of international students	49

Training & education	Rank
Employee training	13
Total public expenditure on education	31
Higher education achievement	17
▶ Pupil-teacher ratio (tertiary education)	05
▷ Graduates in Sciences	41
Women with degrees	13

Scientific concentration	Rank
Total expenditure on R&D (%)	21
Total R&D personnel per capita	11
Female researchers	27
▷ R&D productivity by publication	41
Scientific and technical employment	20
High-tech patent grants	27
Robots in Education and R&D	26

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	03	02	01	04	13
Capital	07	09	06	04	20
Technological framework	06	09	12	14	21

Regulatory framework	Rank
Starting a business	14
▶ Enforcing contracts	03
Immigration laws	29
Development & application of tech.	31
Scientific research legislation	19
Intellectual property rights	24

Capital	Rank
IT & media stock market capitalization	34
Funding for technological development	32
Banking and financial services	20
▶ Country credit rating	01
Venture capital	17
Investment in Telecommunications	30

Technological framework	Rank
Communications technology	41
Mobile broadband subscribers	23
Wireless broadband	36
Internet users	07
Internet bandwidth speed	22
High-tech exports (%)	18

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	05	07	08	06	15
Business agility	23	08	11	13	26
IT integration	09	06	08	12	17

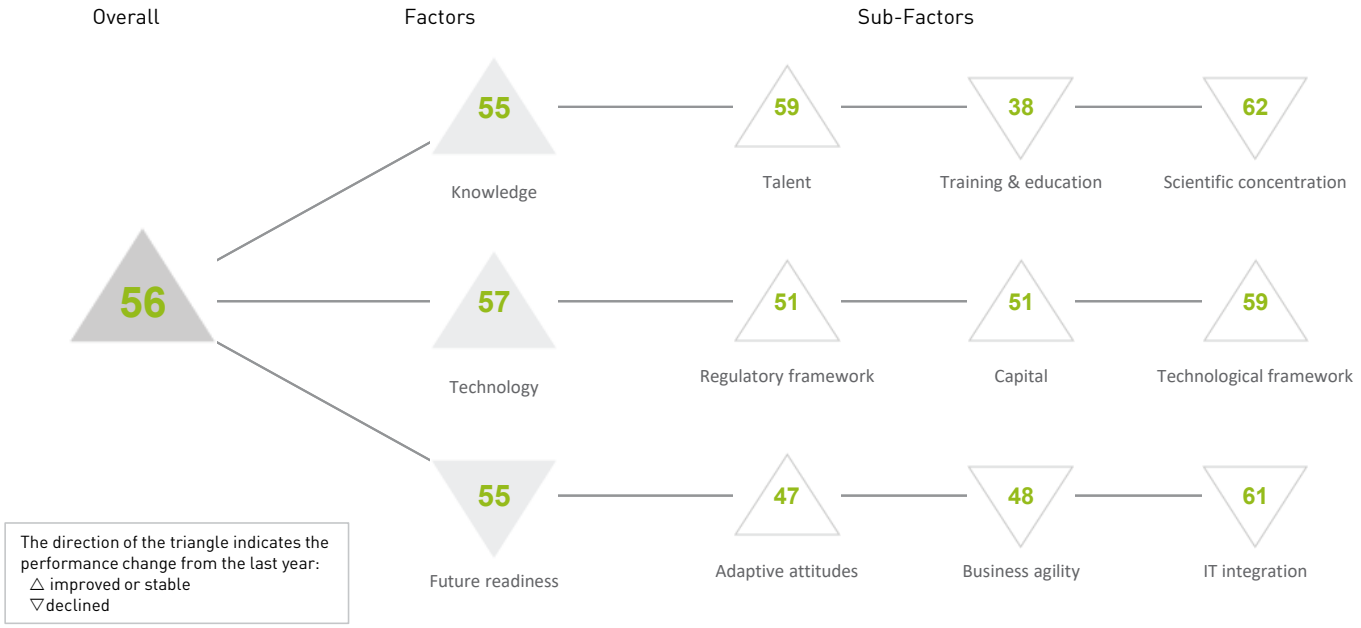
Adaptive attitudes	Rank
E-Participation	39
Internet retailing	11
▶ Tablet possession	02
Smartphone possession	12
Attitudes toward globalization	23

Business agility	Rank
▷ Opportunities and threats	45
World robots distribution	40
Agility of companies	27
Use of big data and analytics	12
Knowledge transfer	18
Entrepreneurial fear of failure	15

IT integration	Rank
E-Government	16
Public-private partnerships	26
Cyber security	39
Software piracy	10
▷ Government cyber security capacity	45
▶ Privacy protection by law content	05

PERU

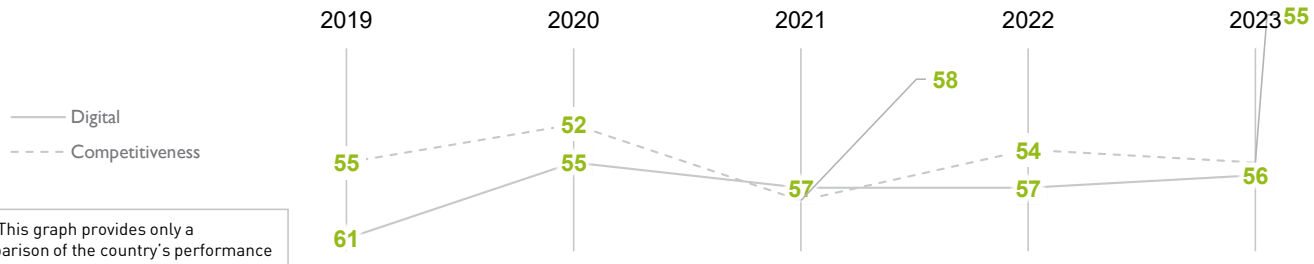
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	61	55	57	57	56
Knowledge	61	55	59	56	55
Technology	58	58	56	57	57
Future readiness	59	55	54	54	55

COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

PERU

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	59	58	59	59	59
Training & education	42	39	41	37	38
Scientific concentration	62	59	60	60	62

Talent	Rank
Educational assessment PISA - Math	50
International experience	35
Foreign highly skilled personnel	42
▷ Management of cities	60
Digital/Technological skills	59
Net flow of international students	-

Training & education	Rank
▷ Employee training	62
Total public expenditure on education	49
▶ Higher education achievement	10
Pupil-teacher ratio (tertiary education)	37
▶ Graduates in Sciences	10
Women with degrees	40

Scientific concentration	Rank
Total expenditure on R&D (%)	58
Total R&D personnel per capita	-
Female researchers	44
R&D productivity by publication	28
Scientific and technical employment	53
High-tech patent grants	59
Robots in Education and R&D	42

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	50	49	49	51	51
Capital	45	37	43	53	51
Technological framework	61	59	58	59	59

Regulatory framework	Rank
Starting a business	55
Enforcing contracts	46
▶ Immigration laws	08
Development & application of tech.	58
Scientific research legislation	56
Intellectual property rights	56

Capital	Rank
IT & media stock market capitalization	56
Funding for technological development	56
Banking and financial services	40
Country credit rating	42
Venture capital	40
▶ Investment in Telecommunications	10

Technological framework	Rank
▷ Communications technology	60
Mobile broadband subscribers	54
▷ Wireless broadband	61
Internet users	58
Internet bandwidth speed	50
High-tech exports (%)	55

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	49	54	54	53	47
Business agility	59	47	39	39	48
IT integration	59	58	56	59	61

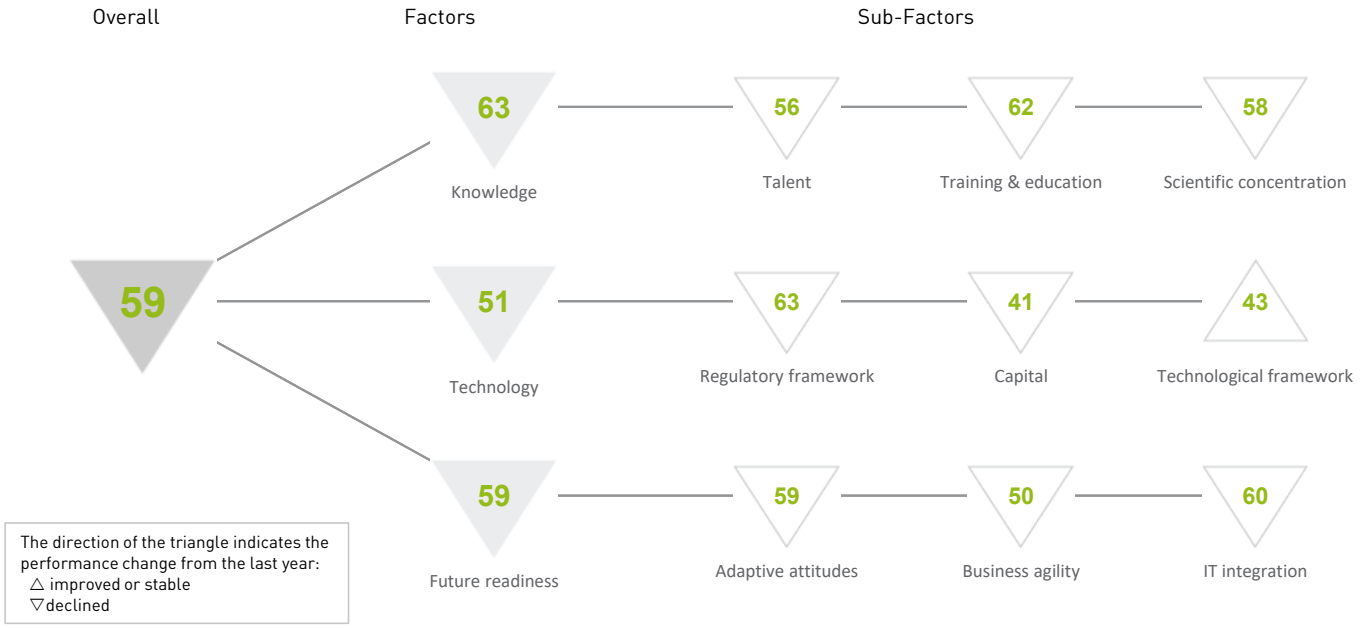
Adaptive attitudes	Rank
E-Participation	21
Internet retailing	54
Tablet possession	53
Smartphone possession	37
Attitudes toward globalization	36

Business agility	Rank
Opportunities and threats	56
World robots distribution	53
Agility of companies	57
Use of big data and analytics	57
Knowledge transfer	57
▶ Entrepreneurial fear of failure	04

IT integration	Rank
E-Government	50
Public-private partnerships	52
Cyber security	58
Software piracy	54
▷ Government cyber security capacity	63
Privacy protection by law content	53

PHILIPPINES

OVERALL PERFORMANCE (64 countries)

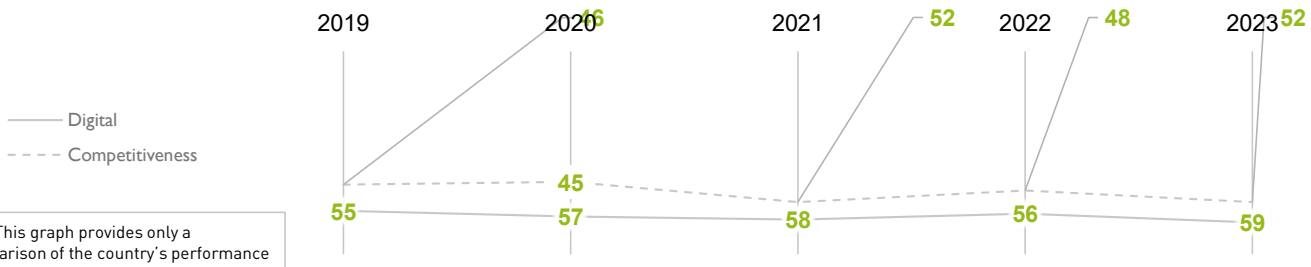


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	55	57	58	56	59
Knowledge	51	62	63	62	63
Technology	55	53	54	49	51
Future readiness	54	54	57	58	59

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 (27 countries)

PHILIPPINES

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	41	55	55	55	56
Training & education	54	59	61	61	62
Scientific concentration	54	56	56	57	58

Talent	Rank
Educational assessment PISA - Math	57
International experience	44
Foreign highly skilled personnel	46
Management of cities	50
Digital/Technological skills	46
Net flow of international students	40

Training & education	Rank
Employee training	37
Total public expenditure on education	58
Higher education achievement	57
Pupil-teacher ratio (tertiary education)	51
Graduates in Sciences	34
▷ Women with degrees	59

Scientific concentration	Rank
Total expenditure on R&D (%)	53
Total R&D personnel per capita	55
▶ Female researchers	02
R&D productivity by publication	37
Scientific and technical employment	58
High-tech patent grants	37
Robots in Education and R&D	52

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	60	62	62	62	63
Capital	40	39	40	40	41
Technological framework	51	49	49	45	43

Regulatory framework	Rank
▷ Starting a business	63
▷ Enforcing contracts	62
Immigration laws	38
Development & application of tech.	53
Scientific research legislation	53
Intellectual property rights	59

Capital	Rank
IT & media stock market capitalization	35
Funding for technological development	55
Banking and financial services	32
Country credit rating	46
Venture capital	52
▶ Investment in Telecommunications	09

Technological framework	Rank
▷ Communications technology	63
Mobile broadband subscribers	52
Wireless broadband	33
▷ Internet users	59
Internet bandwidth speed	44
▶ High-tech exports (%)	02

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	53	57	60	58	59
Business agility	42	32	37	45	50
IT integration	58	56	57	57	60

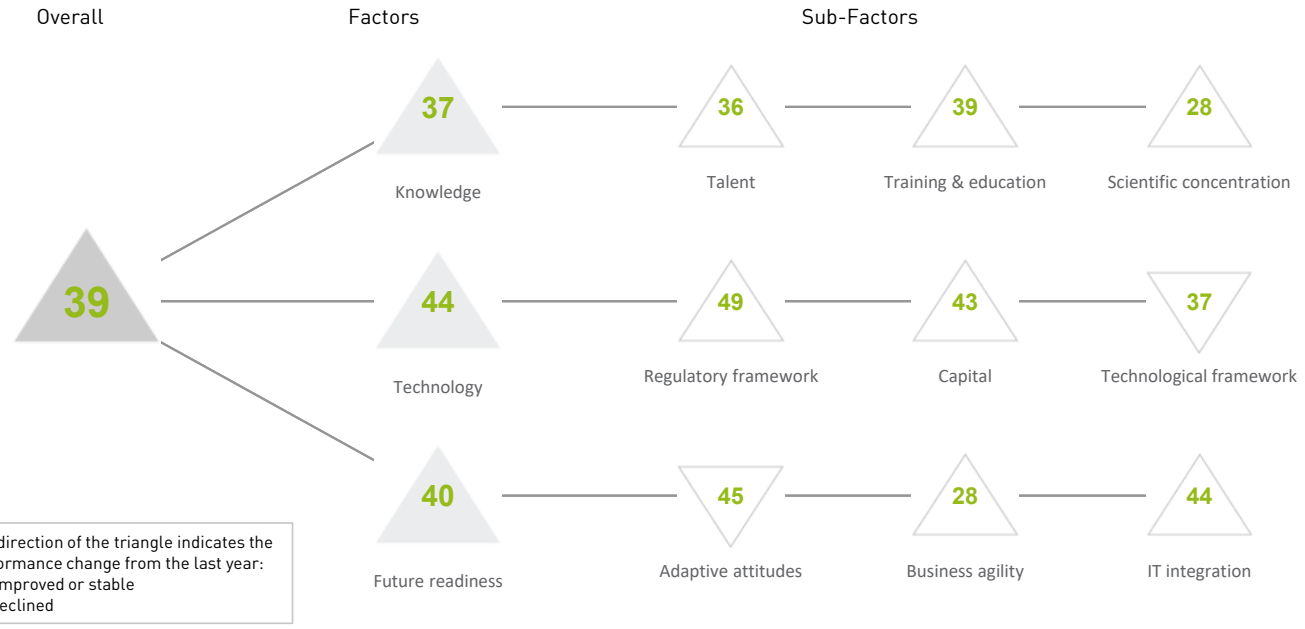
Adaptive attitudes	Rank
E-Participation	56
Internet retailing	56
Tablet possession	54
Smartphone possession	52
▶ Attitudes toward globalization	22

Business agility	Rank
Opportunities and threats	46
World robots distribution	39
Agility of companies	49
Use of big data and analytics	38
Knowledge transfer	51
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	58
▶ Public-private partnerships	31
Cyber security	56
Software piracy	55
Government cyber security capacity	54
Privacy protection by law content	42

POLAND

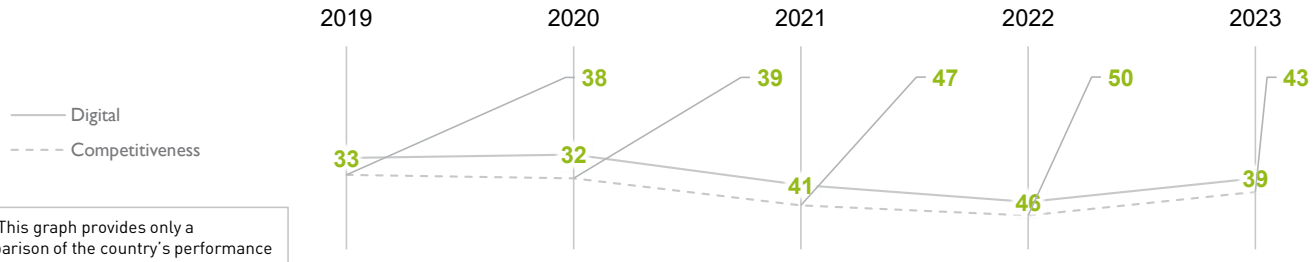
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	33	32	41	46	39
Knowledge	33	30	38	42	37
Technology	37	37	41	46	44
Future readiness	33	35	39	43	40

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS > 20 MILLION (27 countries)

POLAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	28	29	41	48	36
Training & education	35	32	44	42	39
Scientific concentration	31	28	28	30	28

Talent	Rank
▶ Educational assessment PISA - Math	09
International experience	36
Foreign highly skilled personnel	50
Management of cities	35
Digital/Technological skills	41
Net flow of international students	32

Training & education	Rank
Employee training	46
Total public expenditure on education	33
Higher education achievement	38
Pupil-teacher ratio (tertiary education)	29
Graduates in Sciences	48
Women with degrees	32

Scientific concentration	Rank
Total expenditure on R&D (%)	30
Total R&D personnel per capita	34
Female researchers	32
R&D productivity by publication	19
Scientific and technical employment	35
High-tech patent grants	42
▶ Robots in Education and R&D	14

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	45	46	53	57	49
Capital	38	36	47	49	43
Technological framework	30	23	31	33	37

Regulatory framework	Rank
▷ Starting a business	54
Enforcing contracts	38
Immigration laws	47
Development & application of tech.	51
Scientific research legislation	41
▷ Intellectual property rights	54

Capital	Rank
IT & media stock market capitalization	36
Funding for technological development	46
Banking and financial services	48
Country credit rating	37
Venture capital	32
Investment in Telecommunications	32

Technological framework	Rank
▷ Communications technology	51
Mobile broadband subscribers	38
▶ Wireless broadband	04
Internet users	46
Internet bandwidth speed	31
High-tech exports (%)	42

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	37	29	28	37	45
Business agility	28	33	44	47	28
IT integration	36	38	45	51	44

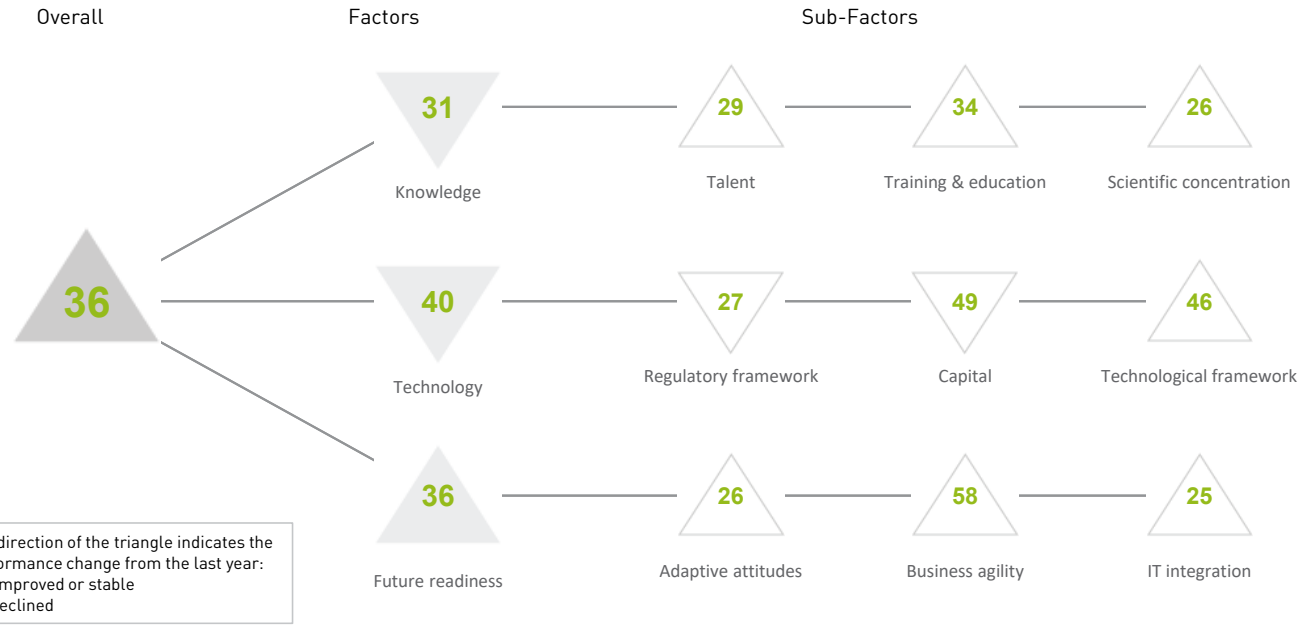
Adaptive attitudes	Rank
E-Participation	44
Internet retailing	29
▶ Tablet possession	10
▷ Smartphone possession	57
▷ Attitudes toward globalization	57

Business agility	Rank
▶ Opportunities and threats	15
World robots distribution	17
Agility of companies	22
Use of big data and analytics	27
Knowledge transfer	38
Entrepreneurial fear of failure	21

IT integration	Rank
E-Government	32
Public-private partnerships	50
Cyber security	46
Software piracy	36
Government cyber security capacity	50
Privacy protection by law content	41

PORTUGAL

OVERALL PERFORMANCE (64 countries)

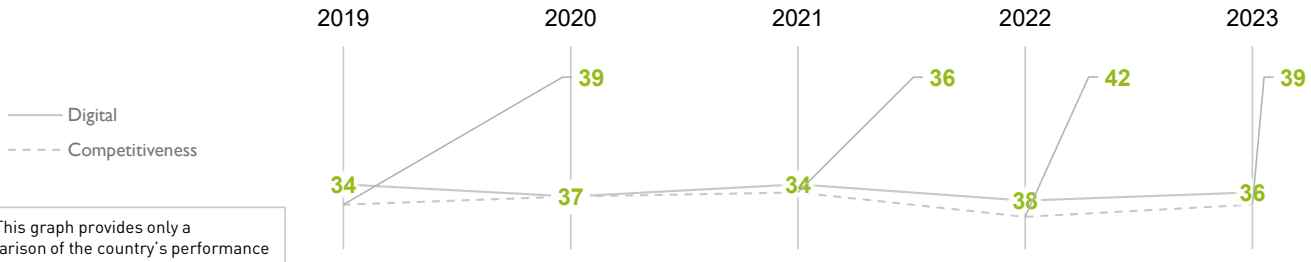


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	34	37	34	38	36
Knowledge	31	33	32	29	31
Technology	38	38	38	39	40
Future readiness	34	41	38	40	36

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

PORTUGAL

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	26	24	22	29	29
Training & education	39	38	38	36	34
Scientific concentration	32	30	27	27	26

Talent	Rank
Educational assessment PISA - Math	27
▷ International experience	56
Foreign highly skilled personnel	36
Management of cities	31
Digital/Technological skills	22
Net flow of international students	21

Training & education	Rank
▷ Employee training	60
Total public expenditure on education	37
Higher education achievement	28
▶ Pupil-teacher ratio (tertiary education)	12
▶ Graduates in Sciences	16
Women with degrees	34

Scientific concentration	Rank
Total expenditure on R&D (%)	24
Total R&D personnel per capita	25
Female researchers	19
R&D productivity by publication	29
Scientific and technical employment	27
High-tech patent grants	34
Robots in Education and R&D	34

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	21	20	21	19	27
Capital	48	44	44	48	49
Technological framework	45	42	46	48	46

Regulatory framework	Rank
Starting a business	31
Enforcing contracts	29
▶ Immigration laws	06
Development & application of tech.	34
Scientific research legislation	39
Intellectual property rights	32

Capital	Rank
IT & media stock market capitalization	46
Funding for technological development	45
Banking and financial services	39
Country credit rating	44
Venture capital	45
Investment in Telecommunications	35

Technological framework	Rank
▶ Communications technology	08
▷ Mobile broadband subscribers	58
Wireless broadband	52
Internet users	48
Internet bandwidth speed	21
High-tech exports (%)	51

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	32	31	30	35	26
Business agility	52	57	58	60	58
IT integration	29	34	30	25	25

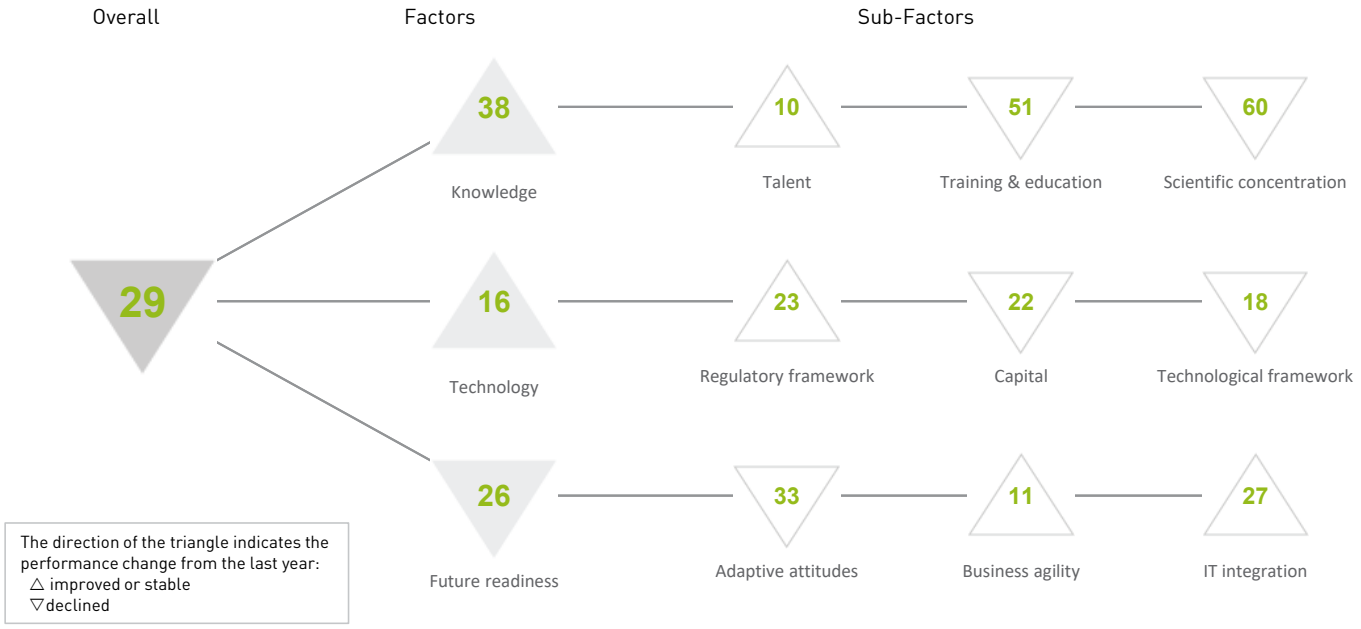
Adaptive attitudes	Rank
E-Participation	29
Internet retailing	36
Tablet possession	28
Smartphone possession	24
Attitudes toward globalization	26

Business agility	Rank
Opportunities and threats	41
World robots distribution	31
▷ Agility of companies	56
▷ Use of big data and analytics	52
Knowledge transfer	42
Entrepreneurial fear of failure	45

IT integration	Rank
E-Government	35
Public-private partnerships	37
Cyber security	47
Software piracy	28
Government cyber security capacity	17
▶ Privacy protection by law content	01

QATAR

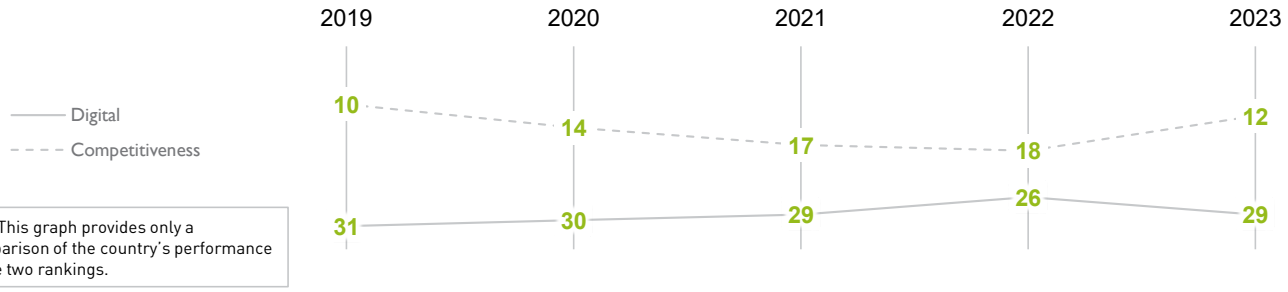
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

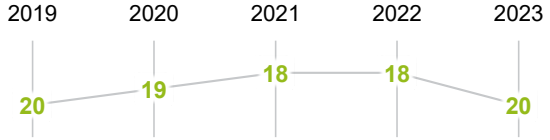
	2019	2020	2021	2022	2023
OVERALL	31	30	29	26	29
Knowledge	45	45	44	38	38
Technology	33	25	19	17	16
Future readiness	22	24	23	23	26

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS < 20 MILLION (37 countries)

QATAR

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	15	15	19	11	10
Training & education	48	53	54	45	51
Scientific concentration	61	60	59	59	60

Talent	Rank
Educational assessment PISA - Math	48
International experience	06
Foreign highly skilled personnel	05
Management of cities	05
Digital/Technological skills	07
Net flow of international students	22

Training & education	Rank
Employee training	22
▷ Total public expenditure on education	61
Higher education achievement	51
Pupil-teacher ratio (tertiary education)	34
Graduates in Sciences	42
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	46
Total R&D personnel per capita	48
Female researchers	37
R&D productivity by publication	51
Scientific and technical employment	51
High-tech patent grants	10
Robots in Education and R&D	52

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	28	29	27	27	23
Capital	23	19	24	21	22
Technological framework	38	31	16	15	18

Regulatory framework	Rank
Starting a business	46
▷ Enforcing contracts	55
Immigration laws	08
Development & application of tech.	05
Scientific research legislation	15
Intellectual property rights	19

Capital	Rank
IT & media stock market capitalization	37
Funding for technological development	06
Banking and financial services	03
Country credit rating	22
Venture capital	13
Investment in Telecommunications	52

Technological framework	Rank
Communications technology	09
▶ Mobile broadband subscribers	03
Wireless broadband	08
▶ Internet users	02
Internet bandwidth speed	39
▷ High-tech exports (%)	59

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	18	27	26	29	33
Business agility	12	17	17	14	11
IT integration	27	28	28	28	27

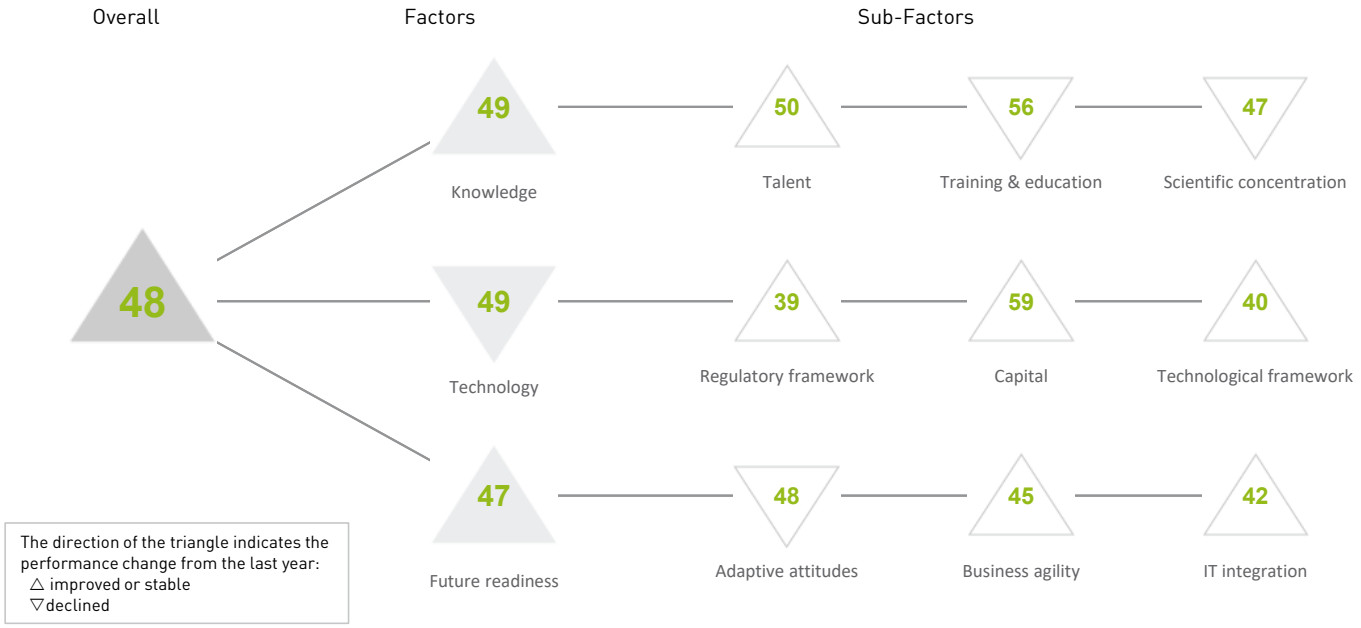
Adaptive attitudes	Rank
▷ E-Participation	60
Internet retailing	53
Tablet possession	05
Smartphone possession	04
Attitudes toward globalization	18

Business agility	Rank
Opportunities and threats	11
World robots distribution	55
Agility of companies	15
▶ Use of big data and analytics	03
Knowledge transfer	06
Entrepreneurial fear of failure	14

IT integration	Rank
▷ E-Government	57
▶ Public-private partnerships	02
▶ Cyber security	01
Software piracy	38
Government cyber security capacity	13
Privacy protection by law content	47

ROMANIA

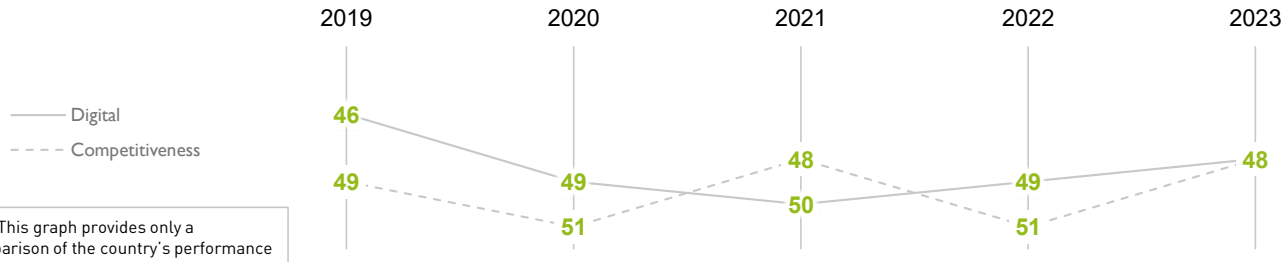
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	46	49	50	49	48
Knowledge	47	53	52	49	49
Technology	45	48	47	48	49
Future readiness	51	49	49	51	47

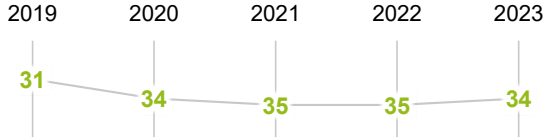
COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS < 20 MILLION (37 countries)

ROMANIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	48	51	50	51	50
Training & education	51	54	59	55	56
Scientific concentration	38	39	43	44	47

Talent	Rank
Educational assessment PISA - Math	44
International experience	41
Foreign highly skilled personnel	48
Management of cities	54
Digital/Technological skills	35
Net flow of international students	39

Training & education	Rank
Employee training	42
▷ Total public expenditure on education	56
▷ Higher education achievement	55
Pupil-teacher ratio (tertiary education)	48
▶ Graduates in Sciences	11
Women with degrees	52

Scientific concentration	Rank
Total expenditure on R&D (%)	50
Total R&D personnel per capita	47
▶ Female researchers	11
R&D productivity by publication	22
Scientific and technical employment	48
High-tech patent grants	36
Robots in Education and R&D	37

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	41	43	40	39	39
Capital	59	61	61	61	59
Technological framework	36	37	40	41	40

Regulatory framework	Rank
Starting a business	39
▶ Enforcing contracts	18
Immigration laws	27
Development & application of tech.	46
Scientific research legislation	51
Intellectual property rights	43

Capital	Rank
IT & media stock market capitalization	53
Funding for technological development	48
▷ Banking and financial services	57
Country credit rating	53
Venture capital	49
Investment in Telecommunications	54

Technological framework	Rank
Communications technology	34
▷ Mobile broadband subscribers	56
Wireless broadband	40
Internet users	49
▶ Internet bandwidth speed	04
High-tech exports (%)	36

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	48	45	42	46	48
Business agility	46	53	57	59	45
IT integration	55	54	50	42	42

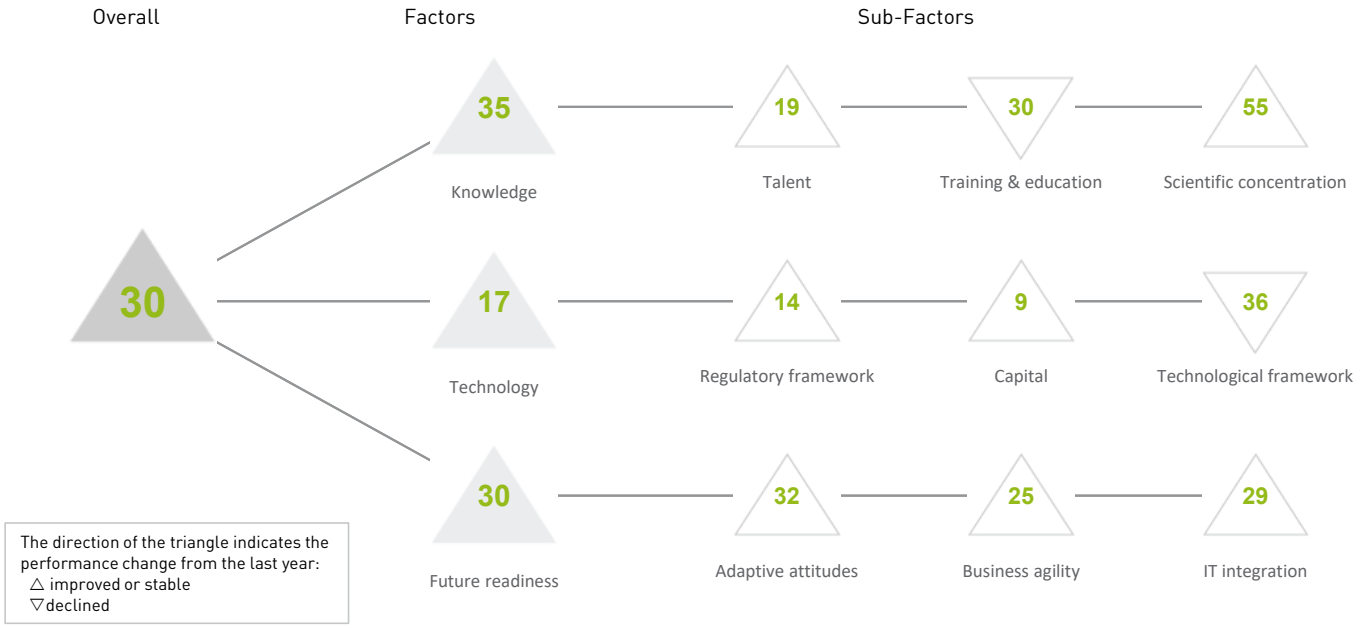
Adaptive attitudes	Rank
E-Participation	46
Internet retailing	43
Tablet possession	33
Smartphone possession	43
Attitudes toward globalization	55

Business agility	Rank
Opportunities and threats	44
World robots distribution	35
Agility of companies	41
Use of big data and analytics	37
Knowledge transfer	40
Entrepreneurial fear of failure	37

IT integration	Rank
E-Government	49
▷ Public-private partnerships	58
Cyber security	28
Software piracy	52
▶ Government cyber security capacity	14
Privacy protection by law content	38

SAUDI ARABIA

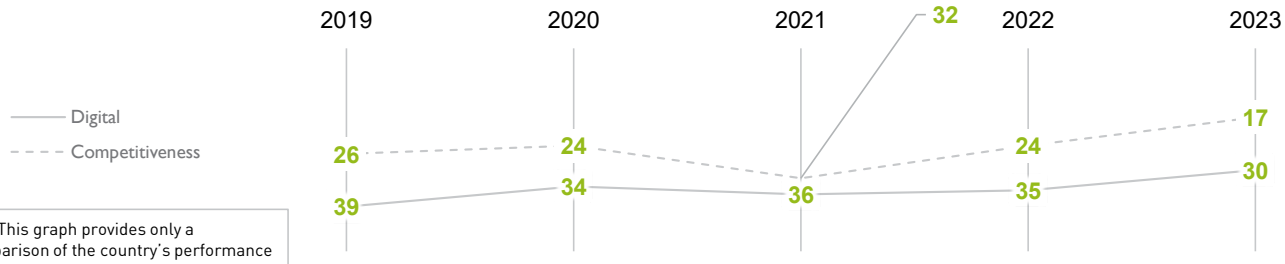
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	39	34	36	35	30
Knowledge	39	46	50	37	35
Technology	40	24	24	26	17
Future readiness	38	28	32	37	30

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS > 20 MILLION (27 countries)

SAUDI ARABIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	20	34	32	28	19
Training & education	38	34	34	24	30
Scientific concentration	59	62	64	58	55

Talent	Rank
▷ Educational assessment PISA - Math	56
International experience	07
Foreign highly skilled personnel	11
Management of cities	14
Digital/Technological skills	06
Net flow of international students	36

Training & education	Rank
Employee training	21
Total public expenditure on education	11
Higher education achievement	32
Pupil-teacher ratio (tertiary education)	41
Graduates in Sciences	31
Women with degrees	33

Scientific concentration	Rank
Total expenditure on R&D (%)	51
Total R&D personnel per capita	50
Female researchers	16
R&D productivity by publication	13
▷ Scientific and technical employment	55
High-tech patent grants	38
▷ Robots in Education and R&D	54

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	39	25	30	25	14
Capital	13	05	15	22	09
Technological framework	54	47	35	34	36

Regulatory framework	Rank
Starting a business	22
Enforcing contracts	36
Immigration laws	26
▶ Development & application of tech.	02
Scientific research legislation	10
Intellectual property rights	22

Capital	Rank
IT & media stock market capitalization	49
▶ Funding for technological development	01
Banking and financial services	11
Country credit rating	28
▶ Venture capital	03
Investment in Telecommunications	19

Technological framework	Rank
Communications technology	12
Mobile broadband subscribers	30
Wireless broadband	23
Internet users	11
Internet bandwidth speed	42
▷ High-tech exports (%)	62

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	50	37	46	33	32
Business agility	36	28	35	32	25
IT integration	30	24	24	33	29

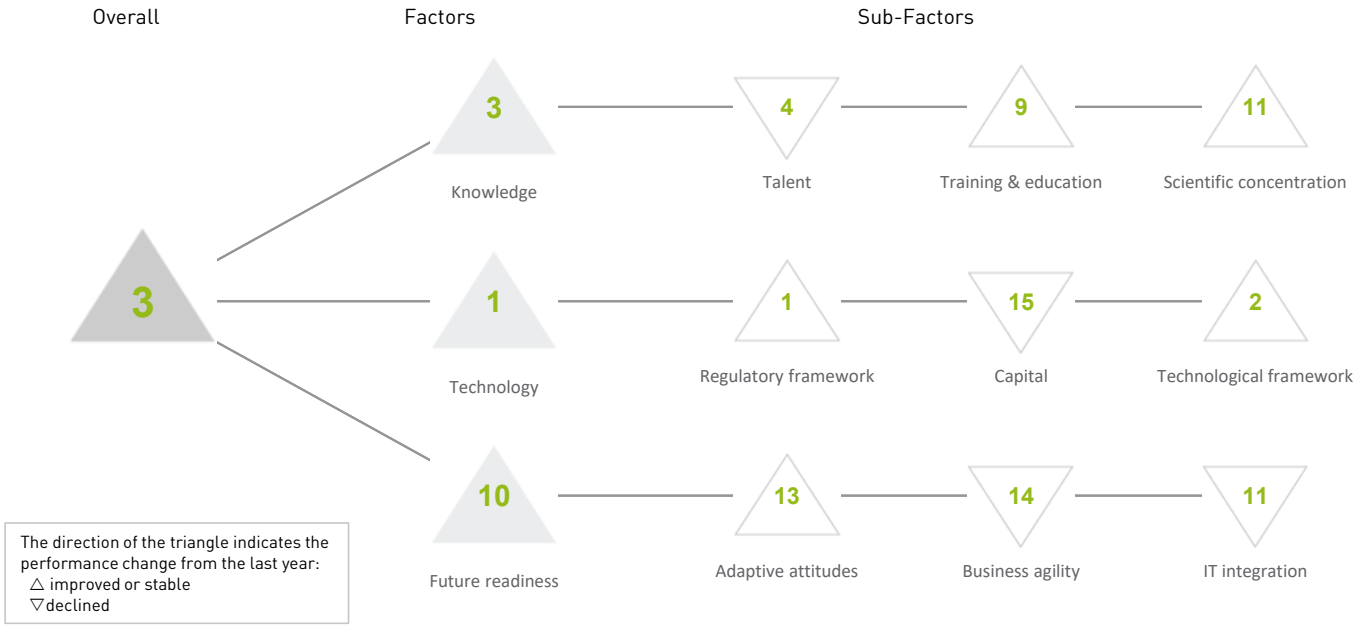
Adaptive attitudes	Rank
E-Participation	39
Internet retailing	51
Tablet possession	47
Smartphone possession	03
Attitudes toward globalization	17

Business agility	Rank
Opportunities and threats	13
World robots distribution	51
Agility of companies	13
Use of big data and analytics	07
Knowledge transfer	17
Entrepreneurial fear of failure	47

IT integration	Rank
E-Government	29
▶ Public-private partnerships	01
▶ Cyber security	02
Software piracy	38
Government cyber security capacity	22
▷ Privacy protection by law content	62

SINGAPORE

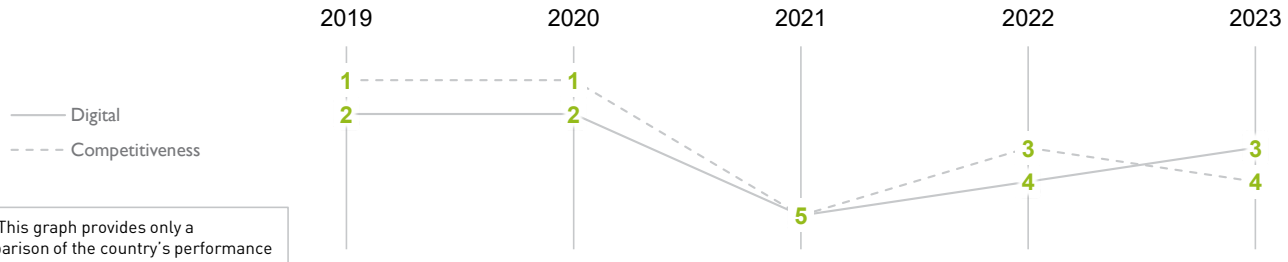
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	02	02	05	04	03
Knowledge	03	02	04	05	03
Technology	01	01	03	01	01
Future readiness	11	12	11	10	10

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 (37 countries)

SINGAPORE

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	01	01	02	03	04
Training & education	04	07	13	09	09
Scientific concentration	22	10	11	11	11

Talent	Rank
Educational assessment PISA - Math	02
International experience	11
Foreign highly skilled personnel	06
Management of cities	06
Digital/Technological skills	12
Net flow of international students	07

Training & education	Rank
Employee training	27
▷ Total public expenditure on education	62
▶ Higher education achievement	02
Pupil-teacher ratio (tertiary education)	26
Graduates in Sciences	03
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	18
Total R&D personnel per capita	15
▷ Female researchers	45
R&D productivity by publication	42
Scientific and technical employment	22
▶ High-tech patent grants	01
Robots in Education and R&D	30

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	02	01	05	01	01
Capital	08	11	14	11	15
Technological framework	01	01	02	02	02

Regulatory framework	Rank
Starting a business	03
▶ Enforcing contracts	01
▷ Immigration laws	49
Development & application of tech.	11
Scientific research legislation	08
Intellectual property rights	09

Capital	Rank
IT & media stock market capitalization	28
Funding for technological development	04
Banking and financial services	06
▶ Country credit rating	01
Venture capital	10
▷ Investment in Telecommunications	58

Technological framework	Rank
Communications technology	23
Mobile broadband subscribers	22
Wireless broadband	06
Internet users	25
▶ Internet bandwidth speed	01
High-tech exports (%)	03

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	19	20	11	17	13
Business agility	06	11	12	09	14
IT integration	04	03	07	08	11

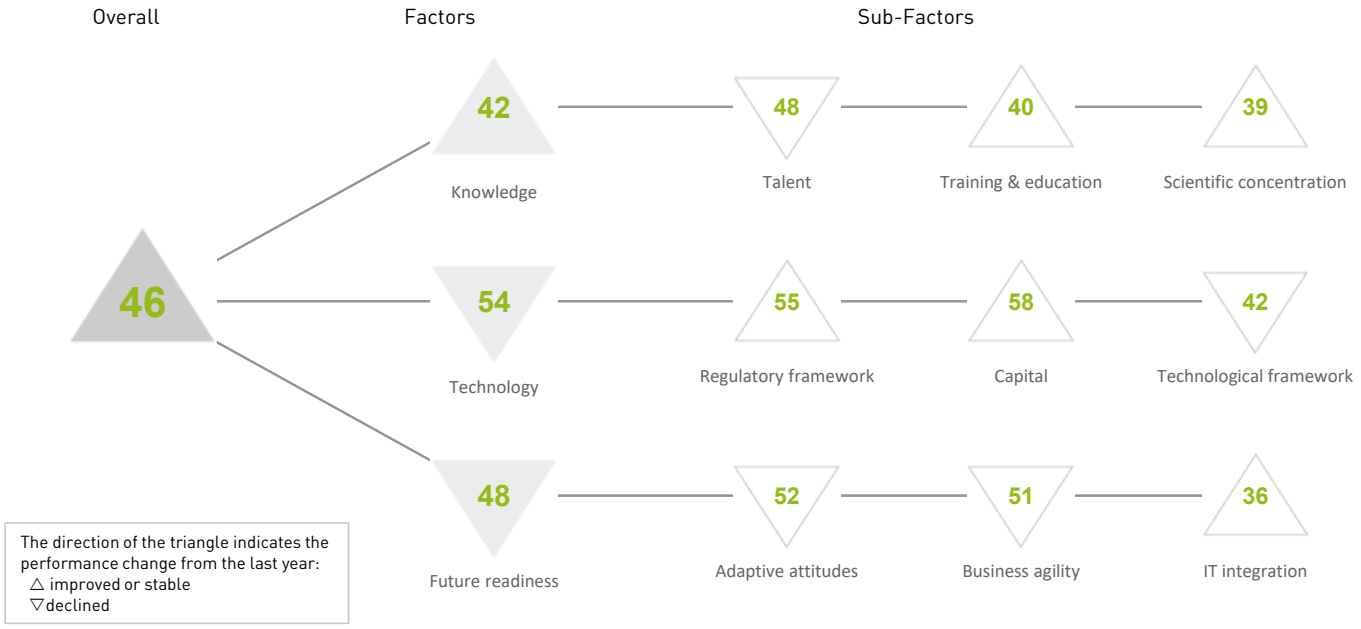
Adaptive attitudes	Rank
E-Participation	03
Internet retailing	24
Tablet possession	15
Smartphone possession	38
Attitudes toward globalization	13

Business agility	Rank
Opportunities and threats	16
World robots distribution	14
Agility of companies	24
Use of big data and analytics	11
Knowledge transfer	05
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	12
Public-private partnerships	08
Cyber security	08
Software piracy	17
Government cyber security capacity	10
▷ Privacy protection by law content	50

SLOVAK REPUBLIC

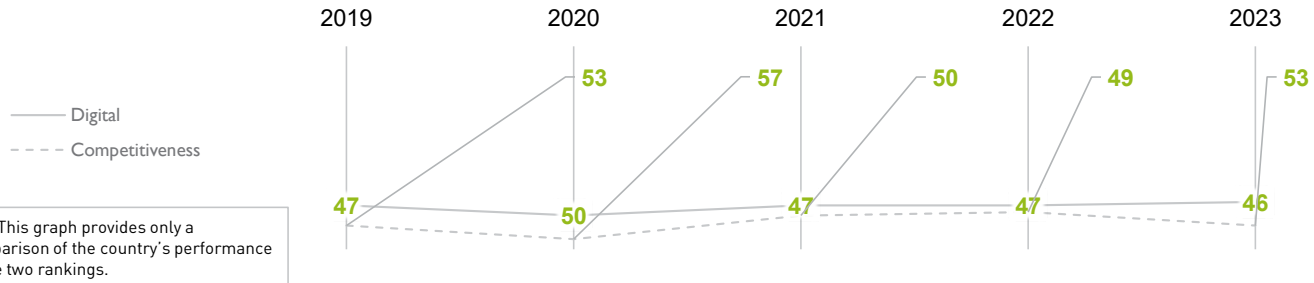
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	47	50	47	47	46
Knowledge	48	51	46	44	42
Technology	44	51	45	53	54
Future readiness	47	51	46	45	48

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

SLOVAK REPUBLIC

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	54	53	52	44	48
Training & education	52	52	49	43	40
Scientific concentration	36	38	40	39	39

Talent	Rank
Educational assessment PISA - Math	30
International experience	53
▷ Foreign highly skilled personnel	58
Management of cities	45
▶ Digital/Technological skills	24
Net flow of international students	57

Training & education	Rank
Employee training	41
Total public expenditure on education	43
Higher education achievement	42
▶ Pupil-teacher ratio (tertiary education)	17
Graduates in Sciences	37
Women with degrees	39

Scientific concentration	Rank
Total expenditure on R&D (%)	42
Total R&D personnel per capita	37
▶ Female researchers	24
R&D productivity by publication	39
Scientific and technical employment	42
High-tech patent grants	26
Robots in Education and R&D	32

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	58	61	60	58	55
Capital	43	47	42	58	58
Technological framework	37	38	39	40	42

Regulatory framework	Rank
Starting a business	49
Enforcing contracts	34
▷ Immigration laws	60
Development & application of tech.	56
Scientific research legislation	57
Intellectual property rights	55

Capital	Rank
▷ IT & media stock market capitalization	57
Funding for technological development	57
Banking and financial services	44
Country credit rating	33
Venture capital	56
Investment in Telecommunications	28

Technological framework	Rank
Communications technology	32
Mobile broadband subscribers	36
Wireless broadband	42
Internet users	32
Internet bandwidth speed	45
High-tech exports (%)	44

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	42	50	49	50	52
Business agility	61	62	60	50	51
IT integration	40	44	40	39	36

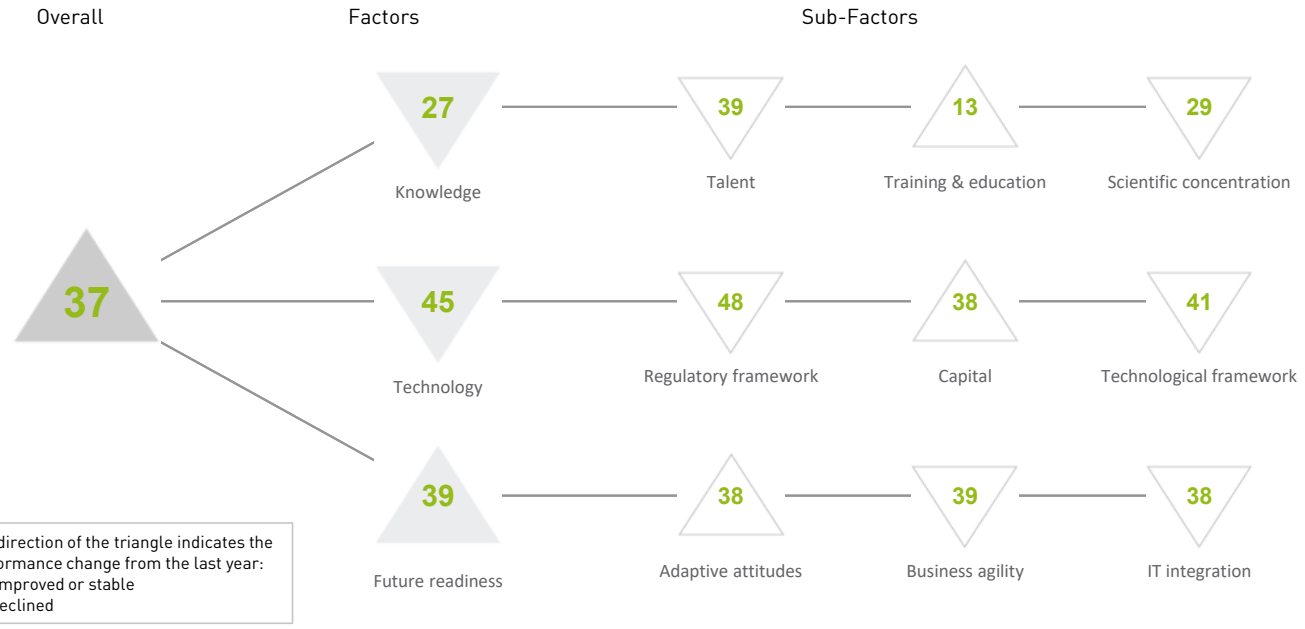
Adaptive attitudes	Rank
E-Participation	57
Internet retailing	34
Tablet possession	26
Smartphone possession	33
▷ Attitudes toward globalization	60

Business agility	Rank
Opportunities and threats	57
World robots distribution	28
Agility of companies	37
Use of big data and analytics	28
▷ Knowledge transfer	59
Entrepreneurial fear of failure	30

IT integration	Rank
E-Government	41
Public-private partnerships	51
▶ Cyber security	25
Software piracy	26
Government cyber security capacity	55
▶ Privacy protection by law content	19

SLOVENIA

OVERALL PERFORMANCE (64 countries)

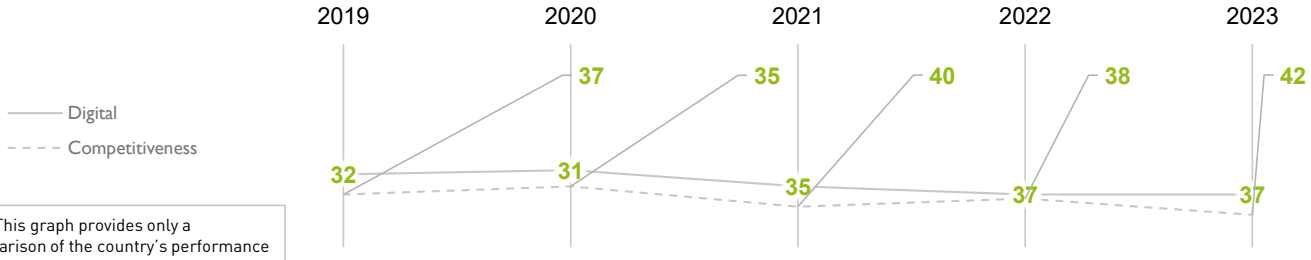


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	32	31	35	37	37
Knowledge	27	29	30	26	27
Technology	35	35	39	38	45
Future readiness	36	37	40	41	39

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 (41 countries)

POPULATIONS < 20 MILLION (37 countries)

SLOVENIA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	33	35	37	38	39
Training & education	22	22	23	18	13
Scientific concentration	25	33	31	28	29

Talent	Rank
▶ Educational assessment PISA - Math	13
International experience	48
▷ Foreign highly skilled personnel	59
Management of cities	33
Digital/Technological skills	28
Net flow of international students	29

Training & education	Rank
Employee training	29
Total public expenditure on education	15
Higher education achievement	27
▶ Pupil-teacher ratio (tertiary education)	10
▶ Graduates in Sciences	12
Women with degrees	25

Scientific concentration	Rank
Total expenditure on R&D (%)	19
Total R&D personnel per capita	16
Female researchers	38
▷ R&D productivity by publication	55
▶ Scientific and technical employment	10
High-tech patent grants	35
Robots in Education and R&D	33

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	37	38	45	43	48
Capital	31	28	39	38	38
Technological framework	33	34	33	35	41

Regulatory framework	Rank
Starting a business	24
▷ Enforcing contracts	54
▷ Immigration laws	58
Development & application of tech.	47
Scientific research legislation	36
Intellectual property rights	37

Capital	Rank
IT & media stock market capitalization	45
Funding for technological development	42
Banking and financial services	43
Country credit rating	31
Venture capital	50
▶ Investment in Telecommunications	08

Technological framework	Rank
Communications technology	37
Mobile broadband subscribers	27
Wireless broadband	39
Internet users	41
Internet bandwidth speed	40
High-tech exports (%)	50

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	44	38	41	45	38
Business agility	34	31	40	33	39
IT integration	31	31	35	37	38

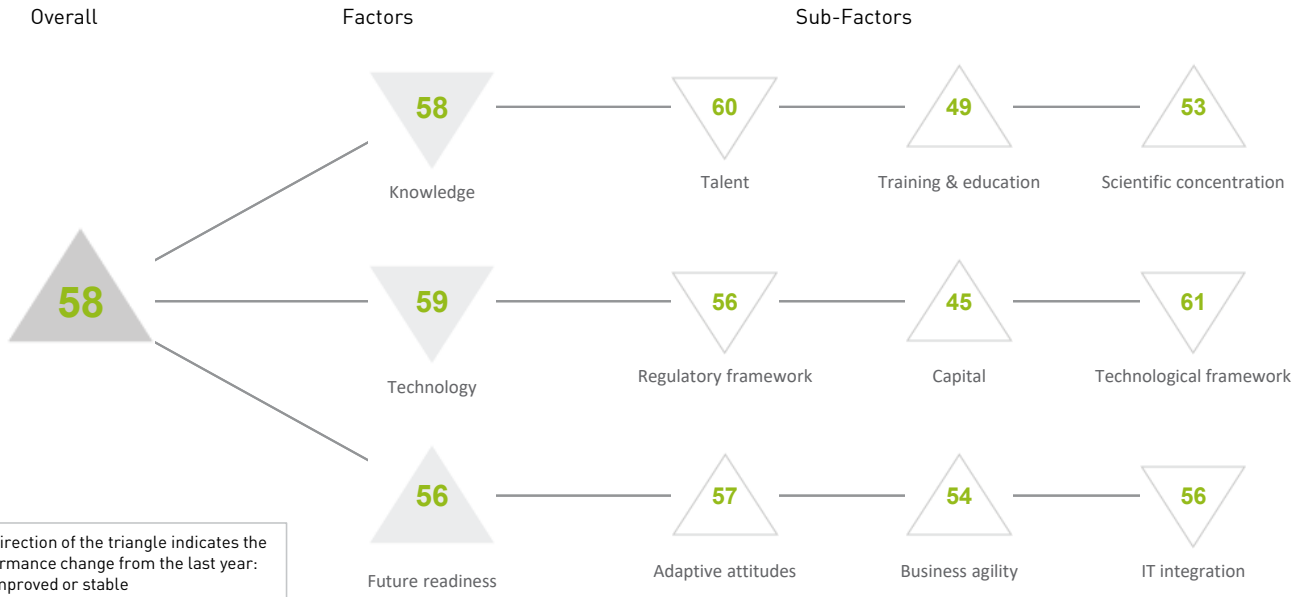
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	35
Tablet possession	22
Smartphone possession	48
Attitudes toward globalization	51

Business agility	Rank
Opportunities and threats	33
World robots distribution	33
Agility of companies	32
Use of big data and analytics	40
Knowledge transfer	50
Entrepreneurial fear of failure	19

IT integration	Rank
E-Government	20
Public-private partnerships	53
Cyber security	29
Software piracy	30
▷ Government cyber security capacity	61
Privacy protection by law content	17

SOUTH AFRICA

OVERALL PERFORMANCE (64 countries)

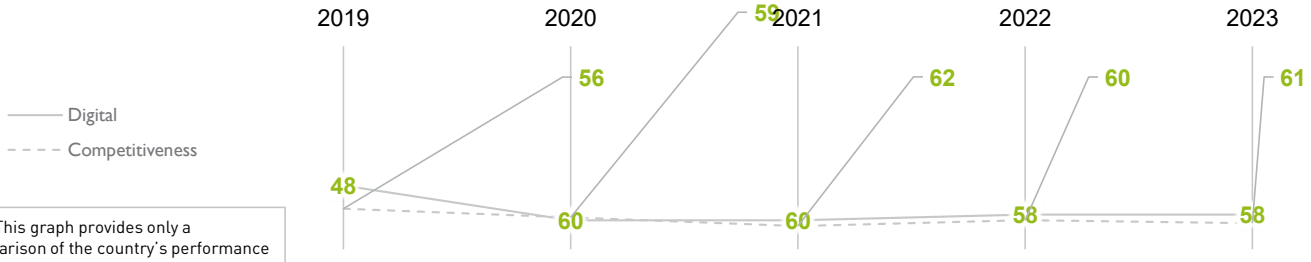


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	48	60	60	58	58
Knowledge	54	60	62	54	58
Technology	51	55	59	58	59
Future readiness	44	57	59	59	56

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 (41 countries)

POPULATIONS > 20 MILLION (27 countries)

SOUTH AFRICA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	49	59	58	57	60
Training & education	58	60	62	50	49
Scientific concentration	48	53	53	53	53

Talent	Rank
Educational assessment PISA - Math	-
International experience	58
Foreign highly skilled personnel	53
▷ Management of cities	62
Digital/Technological skills	57
Net flow of international students	35

Training & education	Rank
Employee training	54
▶ Total public expenditure on education	02
Higher education achievement	60
Pupil-teacher ratio (tertiary education)	40
Graduates in Sciences	56
Women with degrees	55

Scientific concentration	Rank
Total expenditure on R&D (%)	48
Total R&D personnel per capita	53
▶ Female researchers	15
▶ R&D productivity by publication	20
Scientific and technical employment	-
High-tech patent grants	55
Robots in Education and R&D	45

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	53	56	59	53	56
Capital	30	32	36	51	45
Technological framework	59	57	61	60	61

Regulatory framework	Rank
Starting a business	59
Enforcing contracts	51
▷ Immigration laws	61
Development & application of tech.	55
Scientific research legislation	43
Intellectual property rights	47

Capital	Rank
▶ IT & media stock market capitalization	05
Funding for technological development	58
Banking and financial services	53
Country credit rating	57
Venture capital	59
▶ Investment in Telecommunications	12

Technological framework	Rank
Communications technology	57
▷ Mobile broadband subscribers	62
Wireless broadband	37
▷ Internet users	62
Internet bandwidth speed	59
High-tech exports (%)	54

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	55	59	59	57	57
Business agility	40	58	59	57	54
IT integration	42	50	55	55	56

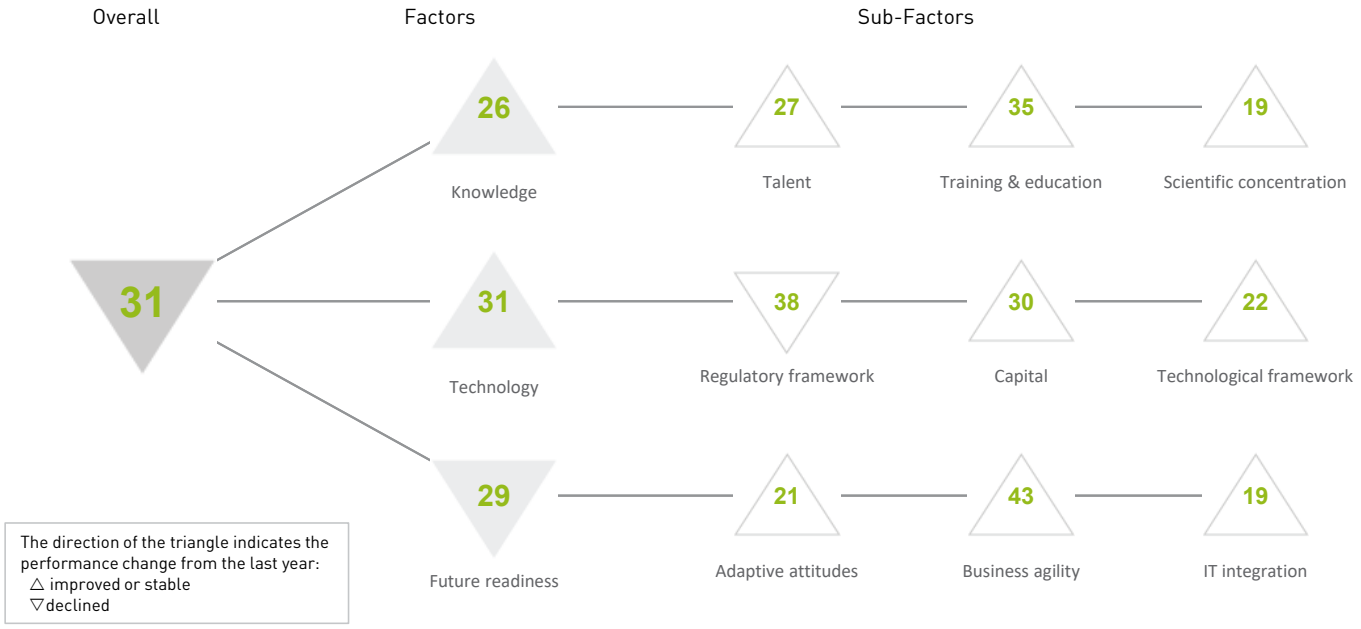
Adaptive attitudes	Rank
E-Participation	50
Internet retailing	57
Tablet possession	55
Smartphone possession	28
Attitudes toward globalization	41

Business agility	Rank
Opportunities and threats	36
World robots distribution	32
Agility of companies	47
Use of big data and analytics	33
Knowledge transfer	56
Entrepreneurial fear of failure	46

IT integration	Rank
E-Government	53
▷ Public-private partnerships	62
Cyber security	55
Software piracy	20
Government cyber security capacity	47
Privacy protection by law content	49

SPAIN

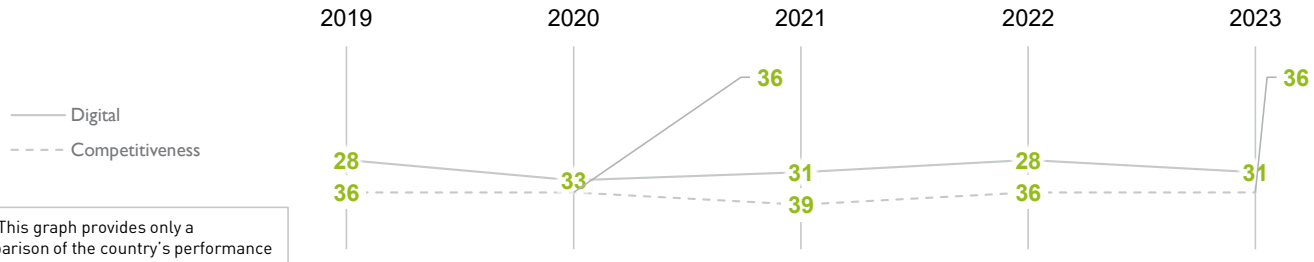
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	28	33	31	28	31
Knowledge	28	32	31	27	26
Technology	29	33	33	33	31
Future readiness	27	40	35	27	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 (41 countries)

POPULATIONS > 20 MILLION (27 countries)

SPAIN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	29	32	31	31	27
Training & education	40	42	40	35	35
Scientific concentration	20	20	23	20	19

Talent	Rank
Educational assessment PISA - Math	32
International experience	31
Foreign highly skilled personnel	18
Management of cities	29
Digital/Technological skills	37
Net flow of international students	33

Training & education	Rank
Employee training	40
Total public expenditure on education	38
Higher education achievement	26
Pupil-teacher ratio (tertiary education)	21
▷ Graduates in Sciences	43
Women with degrees	27

Scientific concentration	Rank
Total expenditure on R&D (%)	31
Total R&D personnel per capita	31
Female researchers	23
▶ R&D productivity by publication	08
Scientific and technical employment	24
High-tech patent grants	40
▶ Robots in Education and R&D	07

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	34	36	37	35	38
Capital	33	34	34	31	30
Technological framework	23	27	24	28	22

Regulatory framework	Rank
Starting a business	41
Enforcing contracts	22
Immigration laws	30
Development & application of tech.	35
▷ Scientific research legislation	54
Intellectual property rights	29

Capital	Rank
IT & media stock market capitalization	21
Funding for technological development	39
Banking and financial services	33
Country credit rating	38
Venture capital	25
Investment in Telecommunications	24

Technological framework	Rank
Communications technology	13
Mobile broadband subscribers	40
Wireless broadband	34
Internet users	18
▶ Internet bandwidth speed	07
▷ High-tech exports (%)	43

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	25	35	33	25	21
Business agility	38	48	49	44	43
IT integration	25	30	29	20	19

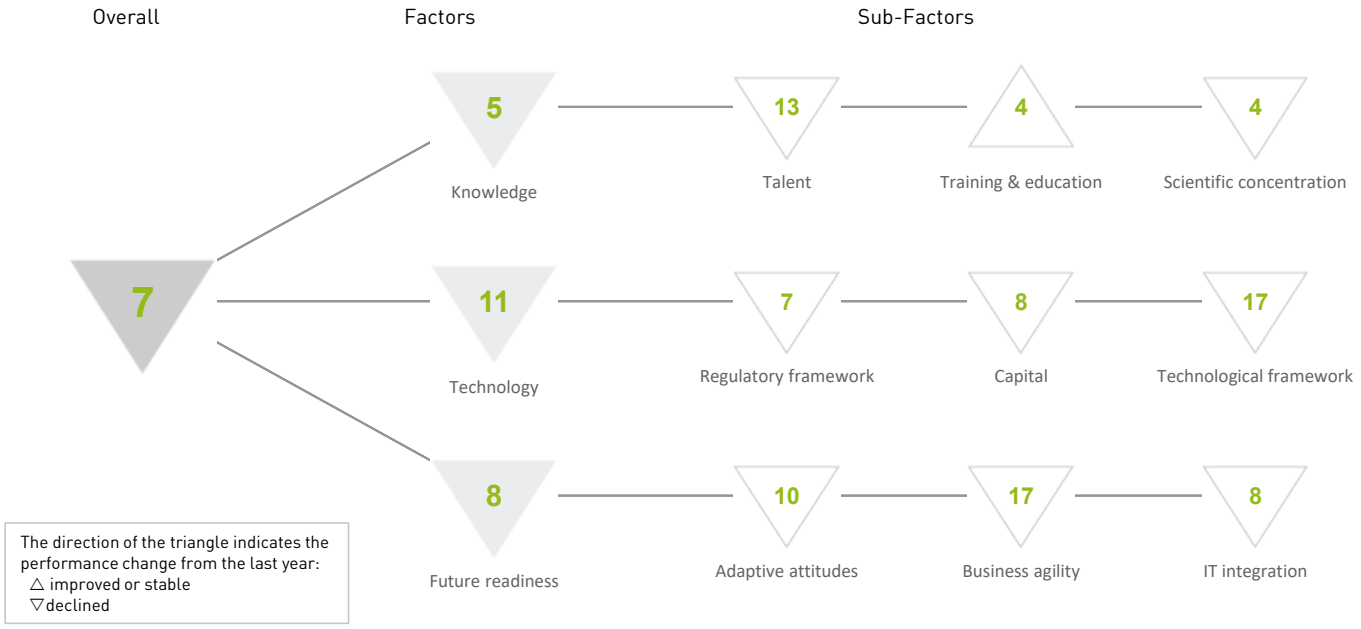
Adaptive attitudes	Rank
E-Participation	22
Internet retailing	30
Tablet possession	18
▶ Smartphone possession	10
Attitudes toward globalization	34

Business agility	Rank
Opportunities and threats	34
▶ World robots distribution	10
Agility of companies	34
▷ Use of big data and analytics	58
▷ Knowledge transfer	44
Entrepreneurial fear of failure	42

IT integration	Rank
E-Government	17
Public-private partnerships	24
Cyber security	41
Software piracy	32
Government cyber security capacity	12
Privacy protection by law content	13

SWEDEN

OVERALL PERFORMANCE (64 countries)

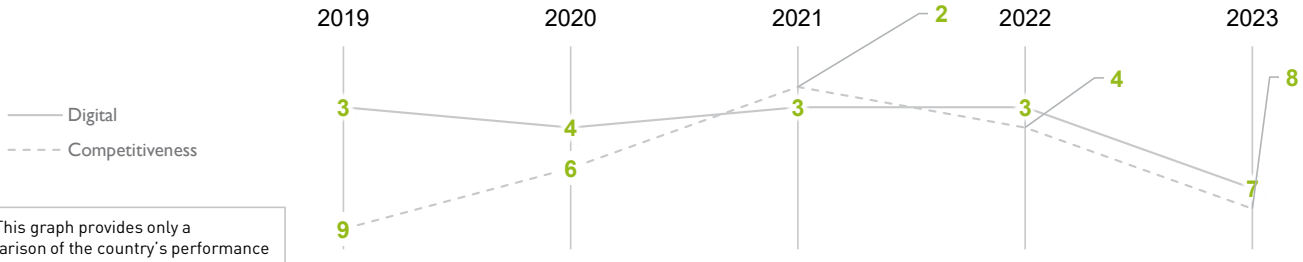


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	03	04	03	03	07
Knowledge	04	04	02	02	05
Technology	07	06	08	05	11
Future readiness	06	07	06	04	08

COMPETITIVENESS & DIGITAL RANKINGS

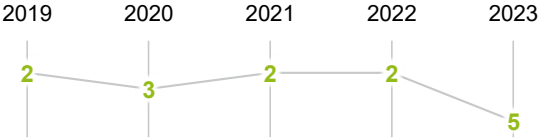


N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)



SWEDEN

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	08	09	07	06	13
Training & education	02	02	02	04	04
Scientific concentration	03	06	04	02	04

Talent	Rank
Educational assessment PISA - Math	16
International experience	14
Foreign highly skilled personnel	29
Management of cities	12
Digital/Technological skills	10
Net flow of international students	24

Training & education	Rank
Employee training	09
Total public expenditure on education	05
Higher education achievement	24
Pupil-teacher ratio (tertiary education)	20
Graduates in Sciences	19
Women with degrees	11

Scientific concentration	Rank
▶ Total expenditure on R&D (%)	05
Total R&D personnel per capita	13
▷ Female researchers	41
▷ R&D productivity by publication	38
▶ Scientific and technical employment	01
High-tech patent grants	08
Robots in Education and R&D	20

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	05	05	03	02	07
Capital	04	04	05	07	08
Technological framework	12	11	13	09	17

Regulatory framework	Rank
Starting a business	23
Enforcing contracts	30
▷ Immigration laws	34
▶ Development & application of tech.	04
Scientific research legislation	07
Intellectual property rights	06

Capital	Rank
IT & media stock market capitalization	24
Funding for technological development	11
Banking and financial services	10
▶ Country credit rating	01
Venture capital	06
▷ Investment in Telecommunications	49

Technological framework	Rank
Communications technology	16
Mobile broadband subscribers	16
Wireless broadband	29
Internet users	10
Internet bandwidth speed	20
High-tech exports (%)	31

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	08	08	05	07	10
Business agility	13	10	13	10	17
IT integration	12	04	05	04	08

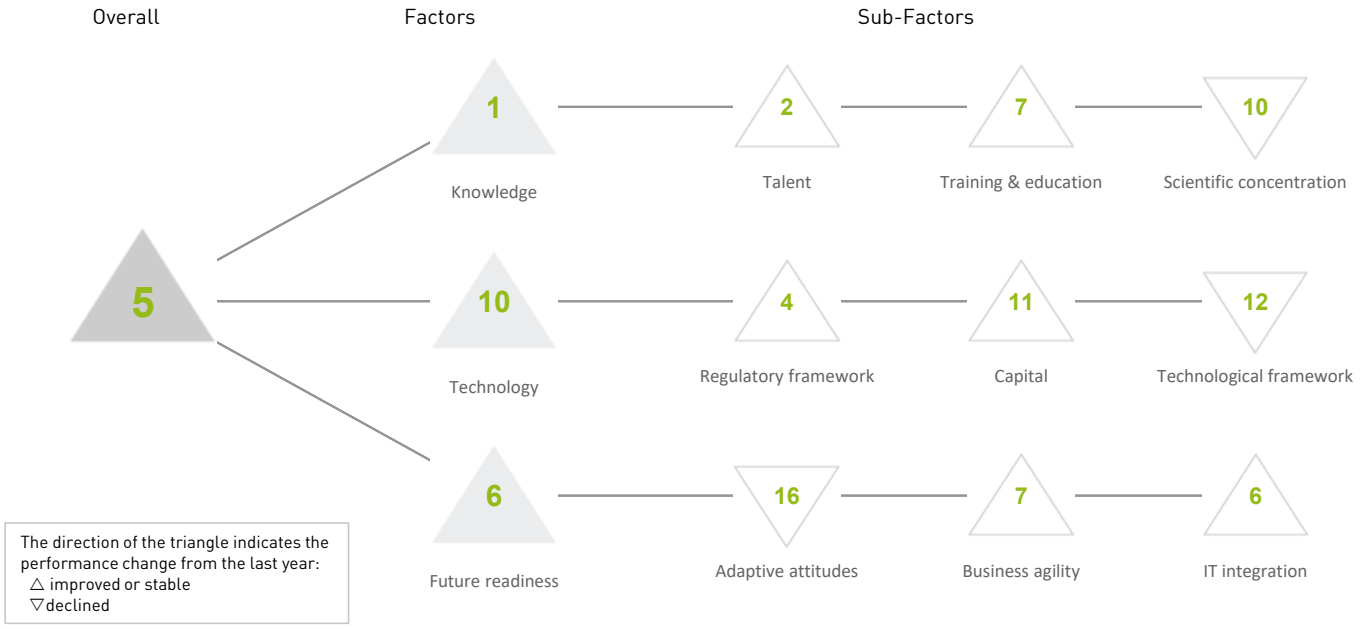
Adaptive attitudes	Rank
E-Participation	29
Internet retailing	15
▶ Tablet possession	01
Smartphone possession	41
Attitudes toward globalization	05

Business agility	Rank
Opportunities and threats	32
World robots distribution	21
Agility of companies	11
Use of big data and analytics	09
Knowledge transfer	09
Entrepreneurial fear of failure	22

IT integration	Rank
E-Government	05
▷ Public-private partnerships	33
Cyber security	26
Software piracy	06
Government cyber security capacity	18
Privacy protection by law content	06

SWITZERLAND

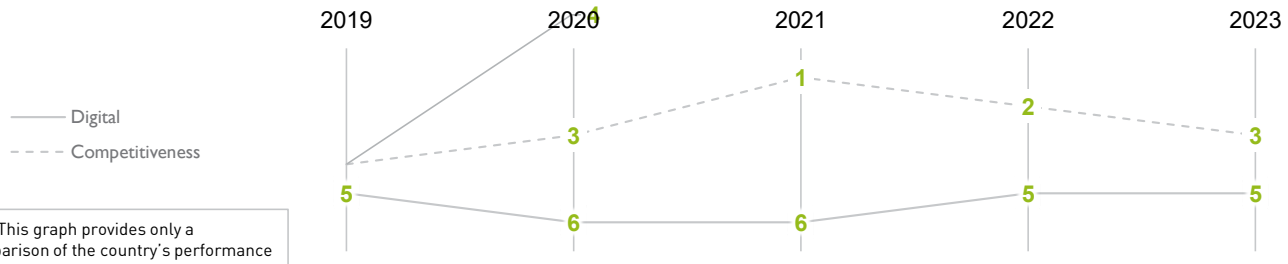
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	05	06	06	05	05
Knowledge	02	03	01	01	01
Technology	10	11	11	12	10
Future readiness	10	05	03	07	06

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

SWITZERLAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	02	02	03	02	02
Training & education	15	14	07	08	07
Scientific concentration	07	09	08	08	10

Talent	Rank
Educational assessment PISA - Math	10
▶ International experience	01
▶ Foreign highly skilled personnel	01
Management of cities	10
Digital/Technological skills	16
Net flow of international students	09

Training & education	Rank
Employee training	04
Total public expenditure on education	14
Higher education achievement	20
Pupil-teacher ratio (tertiary education)	06
Graduates in Sciences	27
Women with degrees	31

Scientific concentration	Rank
Total expenditure on R&D (%)	08
Total R&D personnel per capita	08
Female researchers	33
▷ R&D productivity by publication	35
Scientific and technical employment	06
High-tech patent grants	24
Robots in Education and R&D	16

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	14	10	09	08	04
Capital	16	14	12	12	11
Technological framework	09	14	11	11	12

Regulatory framework	Rank
Starting a business	36
▷ Enforcing contracts	40
Immigration laws	16
Development & application of tech.	07
▶ Scientific research legislation	01
▶ Intellectual property rights	01

Capital	Rank
▷ IT & media stock market capitalization	50
Funding for technological development	09
Banking and financial services	08
Country credit rating	01
Venture capital	18
Investment in Telecommunications	26

Technological framework	Rank
Communications technology	07
Mobile broadband subscribers	01
▷ Wireless broadband	47
Internet users	12
Internet bandwidth speed	10
High-tech exports (%)	30

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	11	09	10	12	16
Business agility	14	06	04	07	07
IT integration	07	07	04	06	06

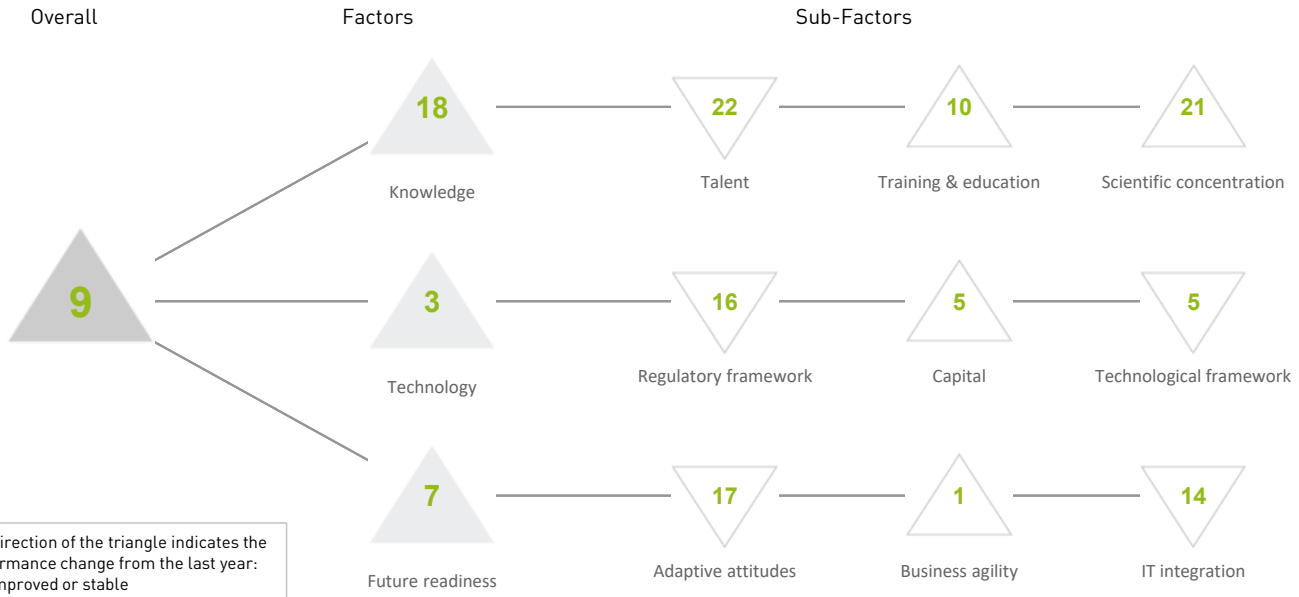
Adaptive attitudes	Rank
▷ E-Participation	38
Internet retailing	07
Tablet possession	07
Smartphone possession	20
Attitudes toward globalization	21

Business agility	Rank
Opportunities and threats	10
World robots distribution	24
Agility of companies	07
Use of big data and analytics	30
▶ Knowledge transfer	01
Entrepreneurial fear of failure	05

IT integration	Rank
E-Government	22
Public-private partnerships	07
Cyber security	20
Software piracy	10
Government cyber security capacity	28
Privacy protection by law content	03

TAIWAN, CHINA

OVERALL PERFORMANCE (64 countries)

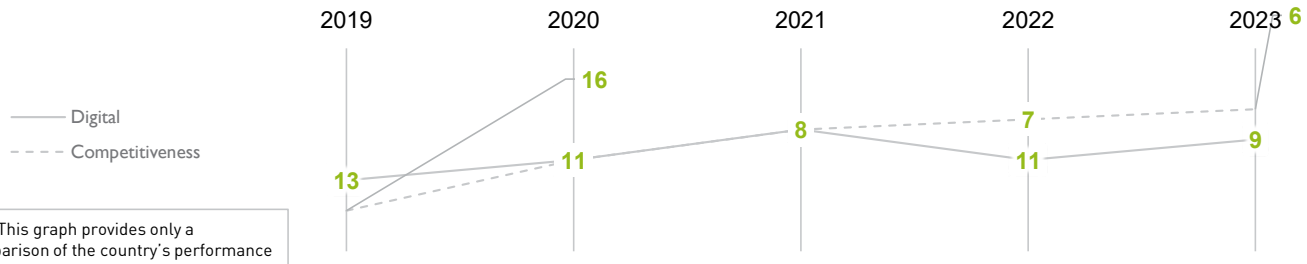


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	13	11	08	11	09
Knowledge	17	18	16	18	18
Technology	09	05	02	06	03
Future readiness	12	08	07	08	07

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 (27 countries)

TAIWAN, CHINA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	21	18	17	21	22
Training & education	20	21	12	11	10
Scientific concentration	15	18	19	21	21

Talent	Rank
Educational assessment PISA - Math	04
International experience	40
Foreign highly skilled personnel	44
Management of cities	17
Digital/Technological skills	32
Net flow of international students	13

Training & education	Rank
Employee training	07
▷ Total public expenditure on education	52
Higher education achievement	03
▷ Pupil-teacher ratio (tertiary education)	50
Graduates in Sciences	07
Women with degrees	08

Scientific concentration	Rank
Total expenditure on R&D (%)	03
▶ Total R&D personnel per capita	01
▷ Female researchers	54
R&D productivity by publication	32
▷ Scientific and technical employment	47
High-tech patent grants	20
Robots in Education and R&D	19

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	23	16	16	14	16
Capital	12	08	02	09	05
Technological framework	04	04	04	04	05

Regulatory framework	Rank
Starting a business	10
Enforcing contracts	11
Immigration laws	31
Development & application of tech.	25
Scientific research legislation	16
Intellectual property rights	20

Capital	Rank
▶ IT & media stock market capitalization	01
Funding for technological development	18
Banking and financial services	14
Country credit rating	15
Venture capital	19
▷ Investment in Telecommunications	46

Technological framework	Rank
Communications technology	19
▶ Mobile broadband subscribers	01
Wireless broadband	10
Internet users	22
Internet bandwidth speed	13
High-tech exports (%)	04

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	14	14	13	13	17
Business agility	03	01	02	05	01
IT integration	24	17	15	13	14

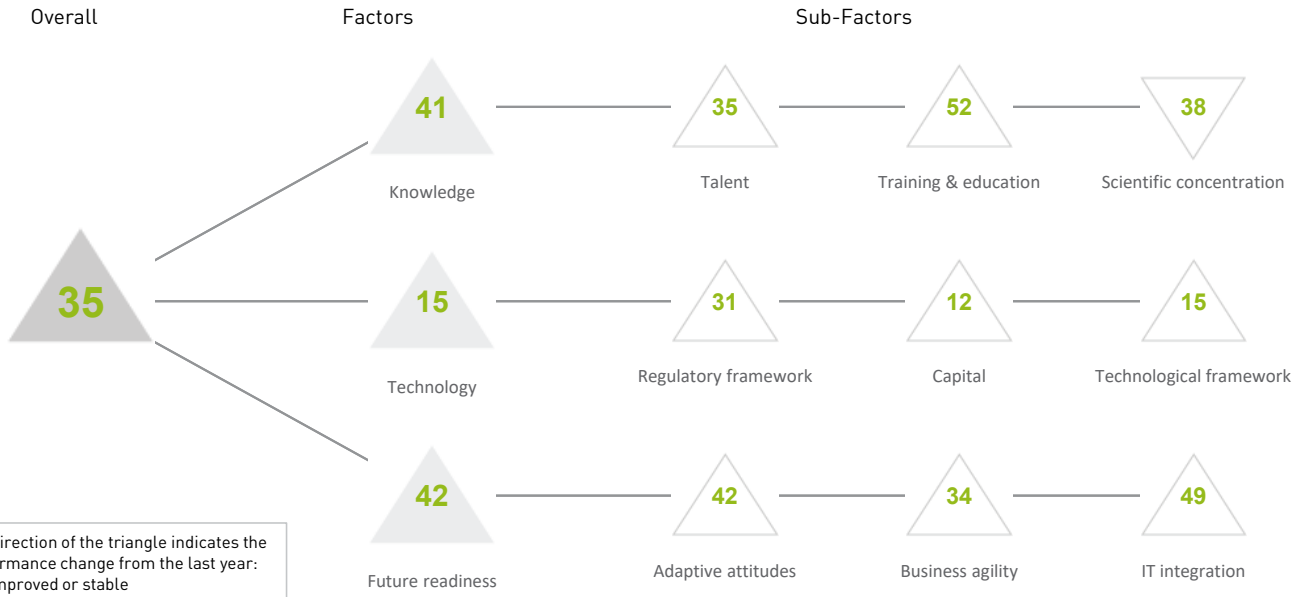
Adaptive attitudes	Rank
E-Participation	-
Internet retailing	26
Tablet possession	20
Smartphone possession	07
Attitudes toward globalization	06

Business agility	Rank
Opportunities and threats	05
World robots distribution	07
▶ Agility of companies	01
▶ Use of big data and analytics	01
Knowledge transfer	12
Entrepreneurial fear of failure	18

IT integration	Rank
E-Government	-
Public-private partnerships	13
Cyber security	19
Software piracy	25
Government cyber security capacity	09
Privacy protection by law content	40

THAILAND

OVERALL PERFORMANCE (64 countries)

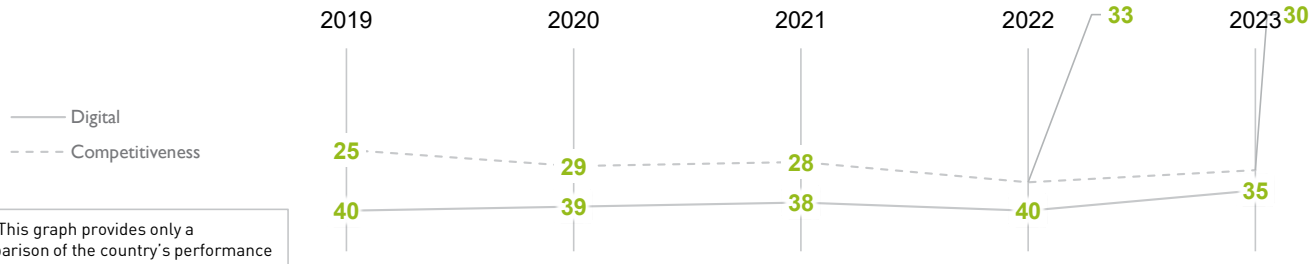


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	40	39	38	40	35
Knowledge	43	43	42	45	41
Technology	27	22	22	20	15
Future readiness	50	45	44	49	42

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 (27 countries)

THAILAND

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	40	36	39	37	35
Training & education	50	55	56	57	52
Scientific concentration	35	37	36	36	38

Talent	Rank
Educational assessment PISA - Math	46
International experience	23
Foreign highly skilled personnel	19
Management of cities	19
Digital/Technological skills	36
Net flow of international students	41

Training & education	Rank
Employee training	20
Total public expenditure on education	51
Higher education achievement	46
▷ Pupil-teacher ratio (tertiary education)	54
Graduates in Sciences	38
Women with degrees	48

Scientific concentration	Rank
Total expenditure on R&D (%)	34
Total R&D personnel per capita	44
Female researchers	14
R&D productivity by publication	30
▷ Scientific and technical employment	57
High-tech patent grants	31
Robots in Education and R&D	13

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	33	31	29	34	31
Capital	21	17	19	20	12
Technological framework	29	25	22	18	15

Regulatory framework	Rank
Starting a business	26
Enforcing contracts	28
Immigration laws	18
Development & application of tech.	30
Scientific research legislation	34
Intellectual property rights	35

Capital	Rank
IT & media stock market capitalization	12
Funding for technological development	26
Banking and financial services	19
Country credit rating	41
Venture capital	23
▶ Investment in Telecommunications	05

Technological framework	Rank
Communications technology	15
Mobile broadband subscribers	28
Wireless broadband	30
Internet users	45
▶ Internet bandwidth speed	05
▶ High-tech exports (%)	11

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	58	53	53	52	42
Business agility	30	44	34	41	34
IT integration	51	43	43	50	49

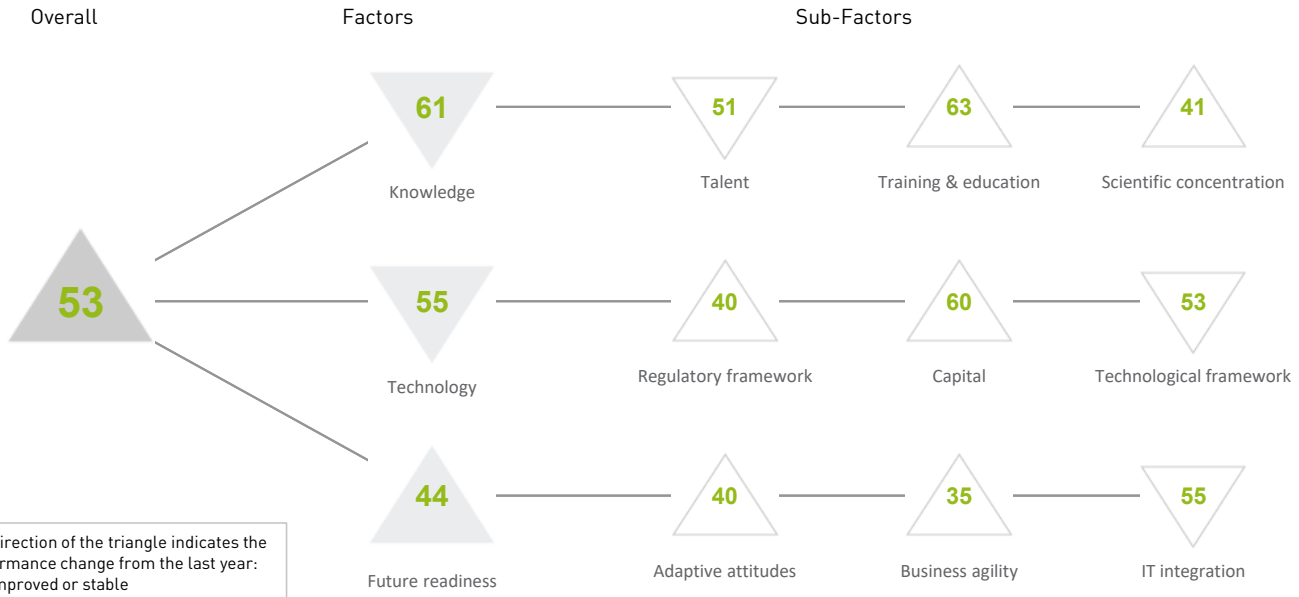
Adaptive attitudes	Rank
E-Participation	17
Internet retailing	40
▷ Tablet possession	57
Smartphone possession	30
▶ Attitudes toward globalization	10

Business agility	Rank
Opportunities and threats	29
▶ World robots distribution	11
Agility of companies	30
Use of big data and analytics	25
Knowledge transfer	24
Entrepreneurial fear of failure	51

IT integration	Rank
E-Government	48
Public-private partnerships	18
Cyber security	38
▷ Software piracy	56
▷ Government cyber security capacity	58
Privacy protection by law content	43

TURKEY

OVERALL PERFORMANCE (64 countries)

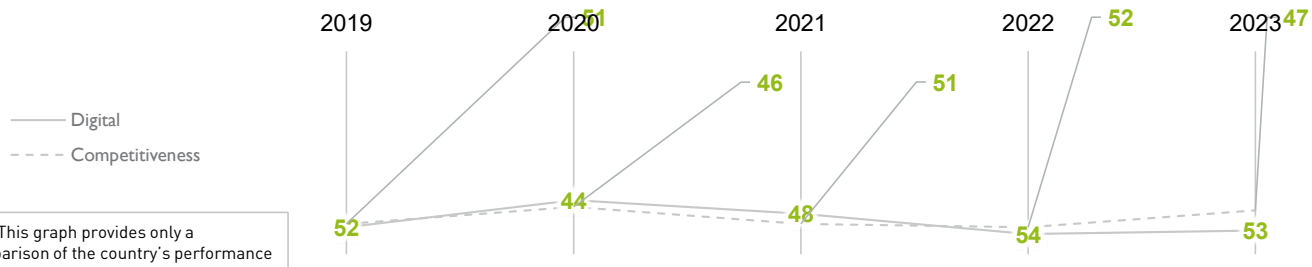


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	52	44	48	54	53
Knowledge	60	56	57	59	61
Technology	48	42	52	54	55
Future readiness	41	34	41	44	44

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 (41 countries)

POPULATIONS > 20 MILLION (27 countries)

TURKEY

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	52	38	49	47	51
Training & education	63	62	63	63	63
Scientific concentration	43	45	41	41	41

Talent	Rank
Educational assessment PISA - Math	38
International experience	52
Foreign highly skilled personnel	51
Management of cities	52
Digital/Technological skills	47
Net flow of international students	25

Training & education	Rank
Employee training	48
Total public expenditure on education	35
Higher education achievement	41
▷ Pupil-teacher ratio (tertiary education)	59
▷ Graduates in Sciences	59
Women with degrees	49

Scientific concentration	Rank
Total expenditure on R&D (%)	36
Total R&D personnel per capita	41
Female researchers	31
▶ R&D productivity by publication	09
Scientific and technical employment	43
High-tech patent grants	50
Robots in Education and R&D	28

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	38	34	41	44	40
Capital	56	51	60	60	60
Technological framework	50	51	48	52	53

Regulatory framework	Rank
Starting a business	35
Enforcing contracts	20
Immigration laws	32
Development & application of tech.	50
Scientific research legislation	47
Intellectual property rights	53

Capital	Rank
IT & media stock market capitalization	42
Funding for technological development	52
Banking and financial services	51
▷ Country credit rating	62
Venture capital	51
Investment in Telecommunications	42

Technological framework	Rank
Communications technology	56
▶ Mobile broadband subscribers	20
Wireless broadband	56
Internet users	47
▷ Internet bandwidth speed	61
▷ High-tech exports (%)	58

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	38	32	34	42	40
Business agility	44	20	29	42	35
IT integration	48	42	47	54	55

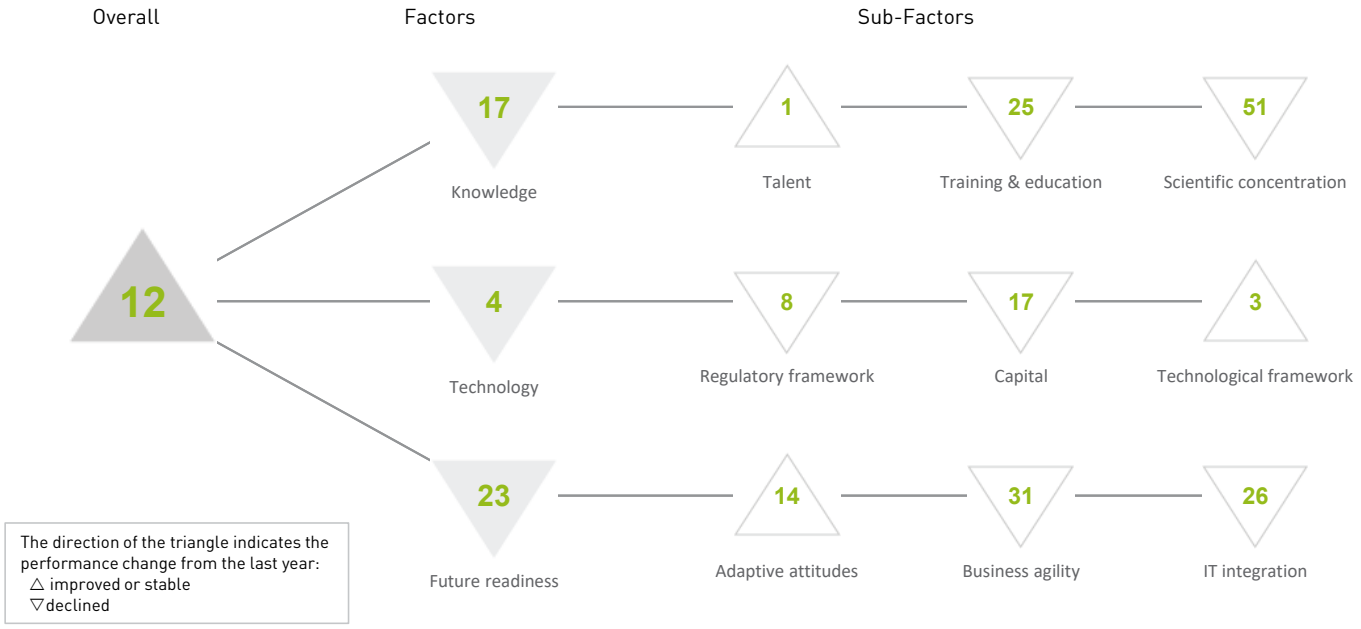
Adaptive attitudes	Rank
▶ E-Participation	17
Internet retailing	42
Tablet possession	51
▶ Smartphone possession	16
Attitudes toward globalization	30

Business agility	Rank
Opportunities and threats	31
World robots distribution	18
Agility of companies	26
Use of big data and analytics	44
Knowledge transfer	48
▶ Entrepreneurial fear of failure	16

IT integration	Rank
E-Government	42
Public-private partnerships	49
Cyber security	54
Software piracy	49
Government cyber security capacity	42
Privacy protection by law content	55

UAE

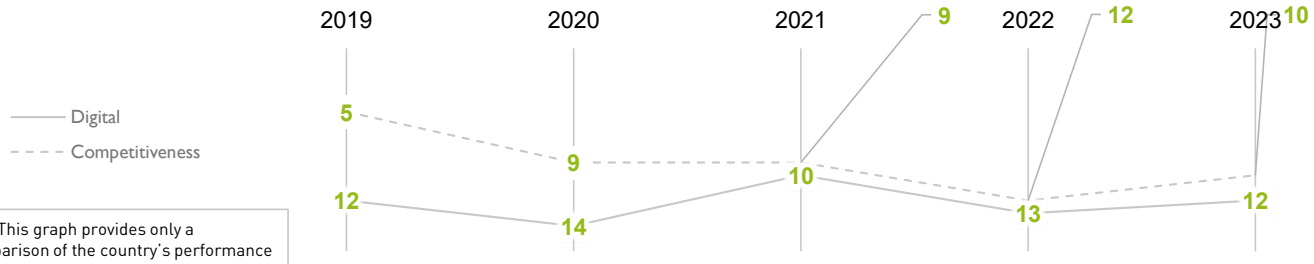
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	12	14	10	13	12
Knowledge	35	31	18	15	17
Technology	02	04	05	03	04
Future readiness	09	11	12	20	23

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)

POPULATIONS < 20 MILLION (37 countries)

UAE

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	05	05	01	01	01
Training & education	41	44	25	22	25
Scientific concentration	56	52	52	46	51

Talent	Rank
Educational assessment PISA - Math	43
International experience	04
Foreign highly skilled personnel	03
▶ Management of cities	01
Digital/Technological skills	19
▶ Net flow of international students	01

Training & education	Rank
Employee training	44
▷ Total public expenditure on education	48
Higher education achievement	19
Pupil-teacher ratio (tertiary education)	43
Graduates in Sciences	06
Women with degrees	12

Scientific concentration	Rank
Total expenditure on R&D (%)	27
Total R&D personnel per capita	36
Female researchers	39
▷ R&D productivity by publication	50
Scientific and technical employment	32
High-tech patent grants	23
Robots in Education and R&D	41

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	01	03	02	03	08
Capital	02	10	11	10	17
Technological framework	05	08	05	03	03

Regulatory framework	Rank
Starting a business	08
Enforcing contracts	09
▶ Immigration laws	02
Development & application of tech.	16
Scientific research legislation	30
Intellectual property rights	38

Capital	Rank
IT & media stock market capitalization	29
Funding for technological development	19
Banking and financial services	26
Country credit rating	16
Venture capital	07
Investment in Telecommunications	33

Technological framework	Rank
Communications technology	33
Mobile broadband subscribers	18
▶ Wireless broadband	01
▶ Internet users	01
Internet bandwidth speed	19
▷ High-tech exports (%)	46

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	20	15	15	16	14
Business agility	04	12	10	26	31
IT integration	08	08	10	24	26

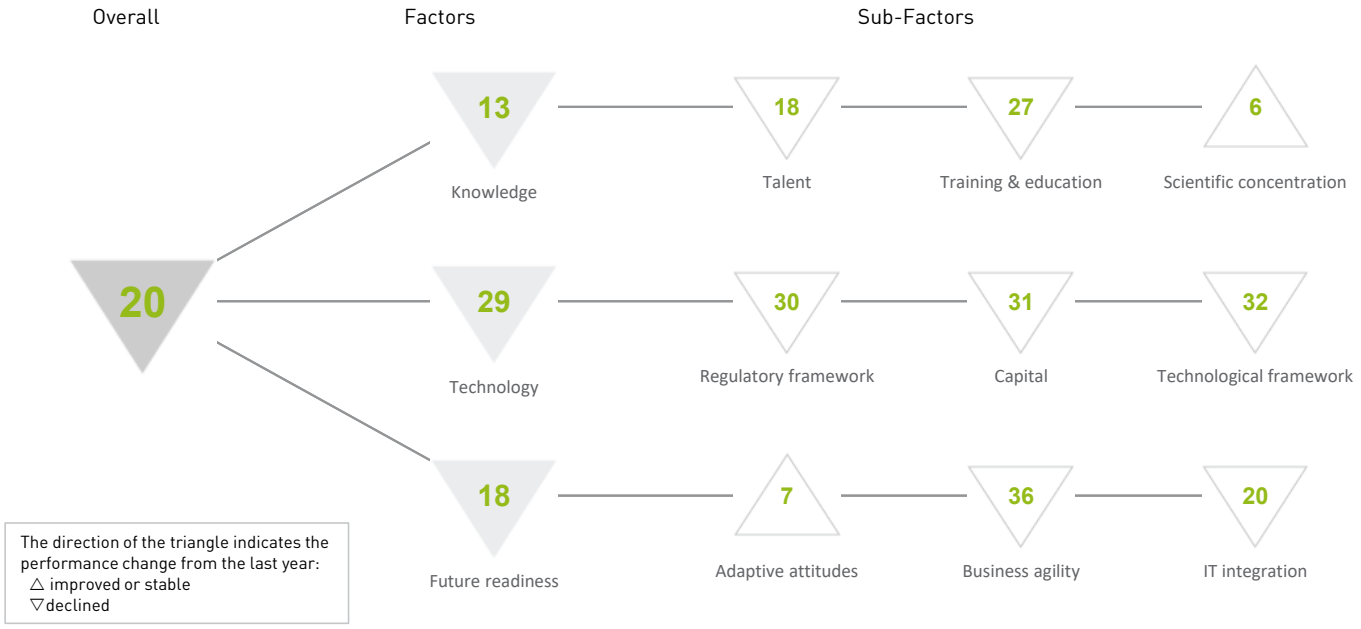
Adaptive attitudes	Rank
E-Participation	17
Internet retailing	28
Tablet possession	08
Smartphone possession	14
Attitudes toward globalization	02

Business agility	Rank
Opportunities and threats	19
▷ World robots distribution	50
Agility of companies	14
Use of big data and analytics	29
Knowledge transfer	32
Entrepreneurial fear of failure	39

IT integration	Rank
E-Government	13
Public-private partnerships	17
Cyber security	10
Software piracy	20
Government cyber security capacity	07
▷ Privacy protection by law content	63

UNITED KINGDOM

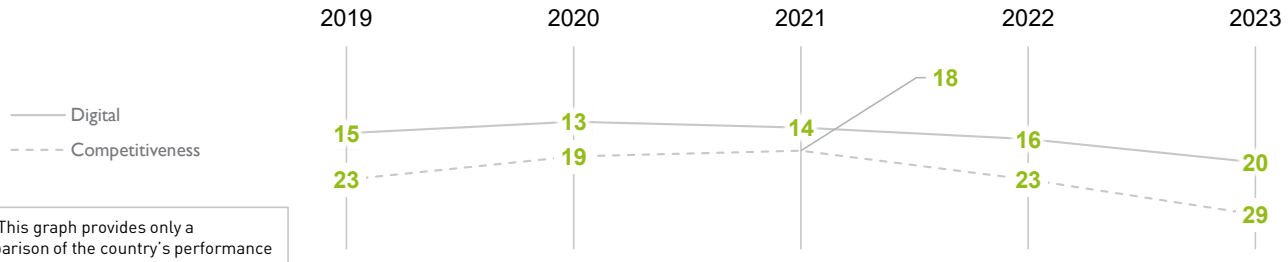
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	15	13	14	16	20
Knowledge	14	13	13	12	13
Technology	18	16	17	25	29
Future readiness	13	13	13	16	18

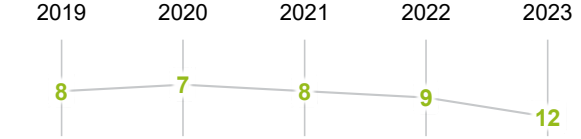
COMPETITIVENESS & DIGITAL RANKINGS



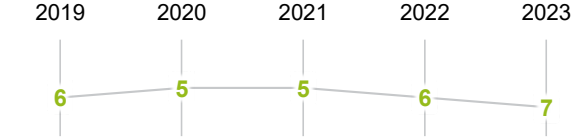
N.B. This graph provides only a comparison of the country's performance in the two rankings.

PEER GROUPS RANKINGS

EUROPE - MIDDLE EAST - AFRICA (41 countries)



POPULATIONS > 20 MILLION (27 countries)



UNITED KINGDOM

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	17	10	11	15	18
Training & education	23	25	26	19	27
Scientific concentration	08	08	07	06	06

Talent	Rank
Educational assessment PISA - Math	17
International experience	37
Foreign highly skilled personnel	28
Management of cities	34
Digital/Technological skills	26
▶ Net flow of international students	03

Training & education	Rank
▷ Employee training	50
Total public expenditure on education	21
Higher education achievement	14
Pupil-teacher ratio (tertiary education)	28
Graduates in Sciences	35
Women with degrees	15

Scientific concentration	Rank
Total expenditure on R&D (%)	12
Total R&D personnel per capita	23
Female researchers	25
R&D productivity by publication	11
▶ Scientific and technical employment	07
High-tech patent grants	16
▶ Robots in Education and R&D	08

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	18	17	20	24	30
Capital	22	22	18	28	31
Technological framework	18	22	19	29	32

Regulatory framework	Rank
Starting a business	09
Enforcing contracts	26
▷ Immigration laws	52
Development & application of tech.	28
Scientific research legislation	23
Intellectual property rights	21

Capital	Rank
IT & media stock market capitalization	33
Funding for technological development	25
Banking and financial services	31
Country credit rating	21
Venture capital	15
▷ Investment in Telecommunications	48

Technological framework	Rank
Communications technology	36
Mobile broadband subscribers	32
Wireless broadband	24
Internet users	37
Internet bandwidth speed	38
High-tech exports (%)	13

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	10	11	09	10	07
Business agility	26	25	23	28	36
IT integration	14	11	09	16	20

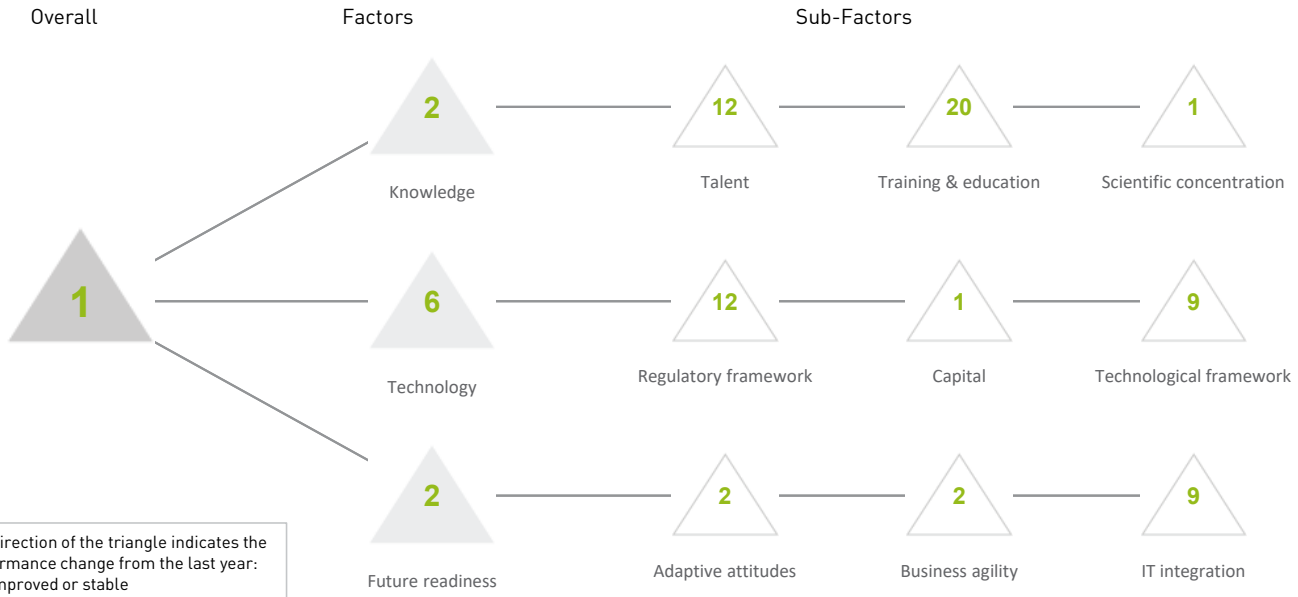
Adaptive attitudes	Rank
▶ E-Participation	06
▶ Internet retailing	03
Tablet possession	14
Smartphone possession	46
Attitudes toward globalization	44

Business agility	Rank
▷ Opportunities and threats	46
World robots distribution	15
Agility of companies	46
Use of big data and analytics	24
Knowledge transfer	13
Entrepreneurial fear of failure	44

IT integration	Rank
E-Government	11
Public-private partnerships	28
Cyber security	30
Software piracy	10
Government cyber security capacity	23
▷ Privacy protection by law content	46

USA

OVERALL PERFORMANCE (64 countries)

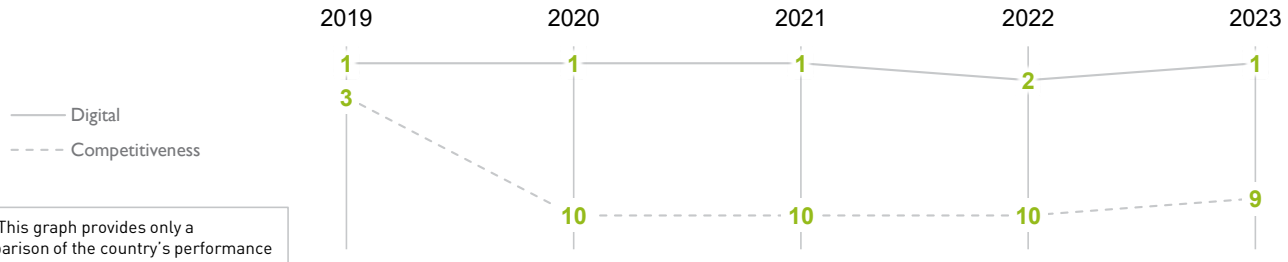


The direction of the triangle indicates the performance change from the last year:
△ improved or stable
▽declined

OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	01	01	01	02	01
Knowledge	01	01	03	04	02
Technology	05	07	04	09	06
Future readiness	01	02	01	03	02

COMPETITIVENESS & DIGITAL RANKINGS



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

PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

USA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	14	14	13	14	12
Training & education	25	24	24	23	20
Scientific concentration	01	01	02	01	01

Talent	Rank
Educational assessment PISA - Math	35
International experience	17
Foreign highly skilled personnel	04
Management of cities	21
Digital/Technological skills	09
Net flow of international students	16

Training & education	Rank
Employee training	28
Total public expenditure on education	09
Higher education achievement	21
Pupil-teacher ratio (tertiary education)	18
▷ Graduates in Sciences	46
Women with degrees	10

Scientific concentration	Rank
Total expenditure on R&D (%)	04
Total R&D personnel per capita	22
Female researchers	-
▶ R&D productivity by publication	03
Scientific and technical employment	18
High-tech patent grants	04
▶ Robots in Education and R&D	03

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	19	22	12	12	12
Capital	01	01	01	02	01
Technological framework	11	07	09	13	09

Regulatory framework	Rank
Starting a business	29
Enforcing contracts	16
▷ Immigration laws	41
Development & application of tech.	10
Scientific research legislation	05
Intellectual property rights	17

Capital	Rank
IT & media stock market capitalization	06
Funding for technological development	05
Banking and financial services	18
Country credit rating	11
▶ Venture capital	02
Investment in Telecommunications	25

Technological framework	Rank
Communications technology	35
Mobile broadband subscribers	11
Wireless broadband	09
Internet users	36
Internet bandwidth speed	03
High-tech exports (%)	20

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	02	03	01	04	02
Business agility	02	02	01	04	02
IT integration	05	10	03	10	09

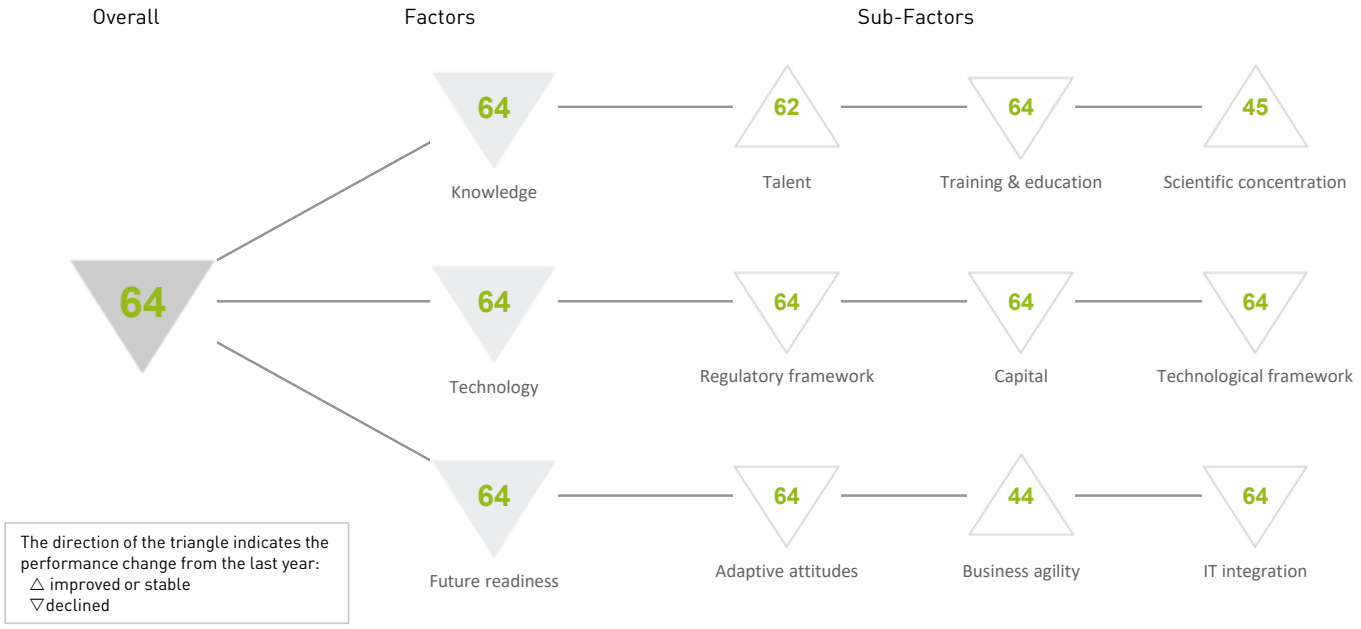
Adaptive attitudes	Rank
E-Participation	10
▶ Internet retailing	01
Tablet possession	16
▷ Smartphone possession	44
▷ Attitudes toward globalization	50

Business agility	Rank
Opportunities and threats	20
World robots distribution	04
Agility of companies	19
Use of big data and analytics	04
Knowledge transfer	08
Entrepreneurial fear of failure	17

IT integration	Rank
E-Government	10
Public-private partnerships	09
Cyber security	23
▶ Software piracy	01
Government cyber security capacity	15
Privacy protection by law content	37

VENEZUELA

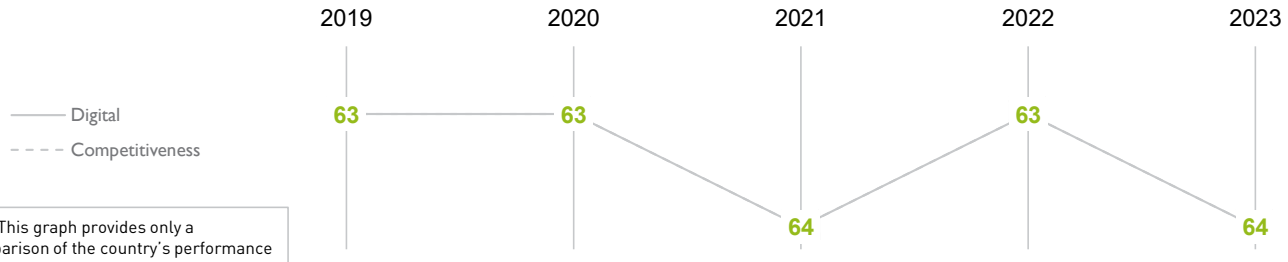
OVERALL PERFORMANCE (64 countries)



OVERALL & FACTORS - 5 years

	2019	2020	2021	2022	2023
OVERALL	63	63	64	63	64
Knowledge	63	61	61	63	64
Technology	63	63	64	63	64
Future readiness	63	63	64	63	64

COMPETITIVENESS & DIGITAL RANKINGS



PEER GROUPS RANKINGS

THE AMERICAS (9 countries)

POPULATIONS > 20 MILLION (27 countries)

VENEZUELA

▶ Overall Top Strengths

▷ Overall Top Weaknesses

KNOWLEDGE

Sub-Factors	2019	2020	2021	2022	2023
Talent	63	63	64	63	62
Training & education	56	47	52	60	64
Scientific concentration	51	48	49	47	45

Talent	Rank
Educational assessment PISA - Math	-
International experience	60
Foreign highly skilled personnel	64
Management of cities	64
Digital/Technological skills	64
Net flow of international students	-

Training & education	Rank
Employee training	58
▷ Total public expenditure on education	64
Higher education achievement	-
Pupil-teacher ratio (tertiary education)	-
Graduates in Sciences	-
Women with degrees	-

Scientific concentration	Rank
Total expenditure on R&D (%)	-
Total R&D personnel per capita	-
▶ Female researchers	03
R&D productivity by publication	-
Scientific and technical employment	-
High-tech patent grants	54
Robots in Education and R&D	54

TECHNOLOGY

Sub-Factors	2019	2020	2021	2022	2023
Regulatory framework	63	63	64	63	64
Capital	63	63	64	63	64
Technological framework	63	63	63	63	64

Regulatory framework	Rank
▷ Starting a business	64
Enforcing contracts	61
Immigration laws	59
Development & application of tech.	63
Scientific research legislation	64
Intellectual property rights	64

Capital	Rank
IT & media stock market capitalization	60
Funding for technological development	64
Banking and financial services	64
▷ Country credit rating	64
Venture capital	64
Investment in Telecommunications	-

Technological framework	Rank
▷ Communications technology	64
Mobile broadband subscribers	59
▷ Wireless broadband	64
Internet users	61
Internet bandwidth speed	63
High-tech exports (%)	-

FUTURE READINESS

Sub-Factors	2019	2020	2021	2022	2023
Adaptive attitudes	63	63	64	63	64
Business agility	49	49	52	55	44
IT integration	63	63	64	63	64

Adaptive attitudes	Rank
E-Participation	62
Internet retailing	-
Tablet possession	48
Smartphone possession	61
Attitudes toward globalization	42

Business agility	Rank
▶ Opportunities and threats	14
World robots distribution	56
Agility of companies	35
Use of big data and analytics	60
Knowledge transfer	63
Entrepreneurial fear of failure	-

IT integration	Rank
E-Government	62
Public-private partnerships	64
Cyber security	64
Software piracy	62
Government cyber security capacity	43
Privacy protection by law content	57

Appendices and Sources

The statistical tables are available for subscribers of the IMD World Competitiveness Online.

Visit our eShop:

WWW.WCCESHOP.ORG

Background Statistics

0.0.1 [B]	**Exchange Rate** National currency per US$ (average)
0.0.2 [B]	**Population - market size** Estimates in millions
0.0.3 [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 2017-2019)
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** 4G & 5G 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
2.3.5	**Internet bandwidth speed** Average speed
2.3.6	**High-tech exports (%)** Percentage of GDP

Appendices and Sources

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
3.3.5	**Government cyber security capacity** The government's capability to mitigate harm from cyber security threats
3.3.6	**Privacy protection by law content** Extent of the legal framework to protect Internet users' privacy

Notes and Sources by Criteria

The source of the survey criteria is always :
IMD World Competitiveness Center's Executive Opinion Survey 2023.
Which was conducted from mid-February to early May 2023, with a total number of 6'031 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 February 2023 (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 2023 and national sources.

Background

0.0.1 [B]	**Exchange Rate** International Financial Statistics Online February-March 2022 (IMF) National sources Period average.
0.0.2 [B]	**Population - market size** World Economic Outlook April 2022 National sources Mid-year estimates. Croatia: new census in 2011 with a new methodology. India: break in series in 2011. Iceland, Romania as of January 1. Jordan: series have been revised according to the the new Population and Housing Census published in 2016. End of year population for 2019 and 2020. Lithuania: break in series 2011-census revised population figure downwards by 10% (emigration to EU over past decade). Philippines: Projected population (medium assumption) excluding for 2015, which is based on the 2015 Census. 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).
0.0.3 [B]	**GDP per capita** OECD (2022), Main Economic Indicators - complete database National sources Provisional data or estimates for most recent year. Malaysia: Data for 2021 is sum of 4 quarters. Taiwan, China: 2019 and 2020 data are revised according to the annual revisions released by DGBAS in November 2021.

Knowledge

Talent

1.1.1 Educational assessment PISA - Math

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

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.

Training & education

1.2.2 Total public expenditure on education

IMF Government Finance Statistics
Eurostat March 2022
UNESCO http://stats.uis.unesco.org
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

OECD Education at a Glance 2021
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 SAR: Figures starting from 2012 exclude post-secondary diploma or certificate and exclude foreign domestic helpers. Kazakhstan: The data were reviewed taking into account the inclusion of graduates in technical and vocational education organizations (□□□□-5). 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).

Notes and Sources by Criteria

1.2.4 **Pupil-teacher ratio (tertiary education)**
UNESCO http://stats.uis.unesco.org
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. Czech Republic, France, Ireland and Poland: 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**
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 (%). Japan: Data on information and communication technologies are included in other fields. Jordan: 2020 data used in 2019. Philippines: includes Medical and Allied Disciplines Graduates.

1.2.6 **Women with degrees**
OECD Education at a Glance 2021
National sources

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. Taiwan, China: Including those attending & suspended.

Scientific concentration

1.3.1 **Total expenditure on R&D (%)**
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**
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, China: break in series. Mongolia: Total number of employees in science sector. United Kingdom: underestimated or based on underestimated data. Jordan, Philippines: based on headcount, not FTE.

1.3.3 **Female researchers**
UNESCO
OECD (2022), "Main Science and Technology Indicators", OECD Science, Technology and R&D Statistics (database)

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**

NSF Science & Engineering Indicators 2021
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**

Eurostat
OECD (2022), "Labour Force Statistics: Employment by activities and status", OECD Employment and Labour Market Statistics ILOSTAT
National sources

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). Philippines: 2020 data are preliminary figures for October 2020.

1.3.6 **High-tech patent grants**

WIPO Statistics Database
http://www.wipo.int/ipstats/en/statistics/patents/
TIPO for Taiwan, China

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, China: 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**

World Robotics 2022
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.

1.3.7 **Robots in Education and R&D (number of robots)**

World Robotics 2020
International Federation of Robotics (IFR)

Industrial robot as defined by ISO 8373:2012: an automatically controlled, reprogrammable, multipur

Notes and Sources by Criteria

Technology

Regulatory framework

2.1.1 Starting a business
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
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.

Capital

2.2.1 IT & media 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
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
Passport
Source: © Euromonitor International
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.

2.3.2 Mobile Broadband subscribers

Business Monitor International

Total active mobile 4G and 5G 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

Passport

Source: © Euromonitor International

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

ITU via World Bank

Internet World Stats www.internetworldstats.com

National sources

Average of available sources

2.3.5 Internet bandwidth speed

M-Labs / cable.co.uk: https://www.cable.co.uk/broadband/speed/worldwide-speed-league/

Ookla

OpenSignal

Average connection speed in Mbps: data transfer rates for Internet access by end-users.

Values presented are an average compiled from three different sources: M-Labs / cable.co.uk; Ookla; and OpenSignal.

2.3.6 High-tech 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.

Notes and Sources by Criteria

Future readiness

Adaptive attitudes

3.1.1 E-Participation
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
Passport
Source: © Euromonitor International
National sources

Retail Value excluding sales tax. Iceland Based on data from Centre for Retail Studies Iceland. Total turnover in online retail with Icelandic cards.

3.1.3 Tablet possession
Passport
Source: © Euromonitor International

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
Passport
Source: © Euromonitor International

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
World Robotics 2022
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

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 Software piracy

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.

3.3.5 Government cyber security capacity

Digital Society Project

Does the government have sufficiently technologically skilled staff and resources to mitigate harm from cyber-security threats? 0: No. The government does not have the capacity to counter even unsophisticated cyber security threats.

1: Not really. The government has the resources to combat only unsophisticated cyber attacks.

2: Somewhat. The government has the resources to combat moderately sophisticated cyber attacks.

3: Mostly. The government has the resources to combat most sophisticated cyber attacks.

4: Yes. The government has the resources to combat sophisticated cyber attacks, even those launched by highly skilled actors.

3.3.6 Privacy protection by law content

Digital Society Project

What does the legal framework to protect Internet users' privacy and their data stipulate? The legal framework explicitly allows the government to access…

0: …any type of personal data on the Internet.

1: …most types of personal data on the Internet.

2: …many types of personal data on the Internet.

3: …only a few types of personal information on the Internet.

4: …personal information on the Internet only in extraordinary circumstances.

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..

P

R

S

T

U-V

W

About the Institute for Management Development (IMD)

IMD has been a pioneering force in developing leaders who transform organizations and contribute to society since it was founded more than 75 years ago.

Led by an expert and diverse faculty, with campuses in Lausanne and Singapore, IMD strives to be the trusted learning partner of choice for ambitious individuals and organizations worldwide.

Our executive education and degree programs are consistently ranked among the world's best by the Financial Times, Bloomberg, Forbes and others.

Our leading position in the field is grounded in our unique approach to creating real learning, real impact. Through our research, programs and advisory work we enable business leaders to find new and better solutions: *challenging what is and inspiring what could be.*

www.imd.org

IMD / World Competitiveness Center