

# SOURCES AND DEFINITIONS

This appendix complements the country/economy profiles and the online data tables by providing, for each of the 80 indicators included in the Global Innovation Index (GII) this year, its title, description, definition, and source.

For all 131 economies in the GI in 2020, the most recent values, within the period 2010 to 2019, were used for each indicator with a few noted exceptions (Appendix IV). The year provided next to the indicator description corresponds to the year when data were most frequently available for economies. When more than one year is considered, the period is indicated at the end of the indicator's source in parentheses.

Of the 80 indicators, 58 variables are hard data, 18 are composite indicators from third-party data providers, marked with (\*), and 4 are survey questions from the World Economic Forum's Executive Opinion Survey (EOS), marked with (†). In some cases, additional markings are provided at the end of the indicator description. Instances marked with superscript "a" signal indicators that were assigned half weights and those marked with superscript "b" are indicators where higher scores indicate poorer outcomes, commonly known as "bads". Details on the computation can be found in Appendix IV.

Some indicators received special treatment by way of scaling during computation to be comparable across economies. Scaling of indicators by other comparable indicators or through division by gross domestic product (GDP) in current U.S. dollars, purchasing power parity GDP in international dollars (PPP\$ GDP), population, total exports, total trade, and so on. Details are provided in this appendix. In all cases, the scaling factor used was the value that corresponded to the same year of the indicator.

## 1. Institutions

### 1.1. Political Environment

#### 1.1.1. Political and operational stability

Political, legal, operational or security risk index<sup>ab</sup> | 2019

Index that measures the likelihood and severity of political, legal, operational or security risks impacting business operations. Scores are annualized and standardized.

Source: IHS Markit, *Country Risk Scores*, aggregated for end Q1, Q2, Q3, and Q4 2019. (<https://ihsmarkit.com/industry/economics-country-risk.html>).

#### 1.1.2. Government effectiveness

Government effectiveness index\* | 2018

Index that reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

### 1.2. Regulatory environment

#### 1.2.1. Regulatory quality

Regulatory quality index<sup>a</sup> | 2018

Index that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

### 1.2.2. Rule of law

Rule of law index<sup>a</sup> | 2018

Index that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

### 1.2.3. Cost of redundancy dismissal

Sum of notice period and severance pay for redundancy dismissal (salary in weeks, averages for workers with 1, 5, and 10 years of tenure, with a minimum threshold of 8 weeks)<sup>b</sup> | 2019

Redundancy costs measure the cost of advance notice requirements and severance payments due when terminating a redundant worker, expressed in weeks of salary. The average value of notice requirements and severance payments applicable to a worker with 1 year of tenure, a worker with 5 years, and a worker with 10 years is also considered. One month is recorded as 4 and 1/3 weeks. If the redundancy cost adds up to 8 or fewer weeks of salary, a value of 8 is assigned but the actual number of weeks is published. If the cost adds up to more than 8 weeks of salary, the score is the number of weeks.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies, 2020* (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>)

## 1.3. Business environment

### 1.3.1. Ease of starting a business

Ease of starting a business (score)\* | 2019

The ranking of economies on the ease of starting a business is determined by sorting their scores. These scores are the simple average of the scores for each of the component indicators. The World Bank's Doing Business records all procedures officially required, or commonly done in practice, for an entrepreneur to start up and formally operate an industrial or commercial business, as well as the time and cost to complete these procedures and the paid-in minimum capital requirement. These procedures include obtaining all necessary licenses and permits and completing any required notifications, verifications, or inscriptions for the company and employees with relevant authorities. Data are collected from limited liability companies based in the largest business cities. For 11 economies, namely Bangladesh, Brazil, China, India, Indonesia, Japan, Mexico, Nigeria,

Pakistan, the Russian Federation, and the United States, the data are also collected for the second-largest business city.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies, 2020* (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

### 1.3.2. Ease of resolving insolvency

Ease of resolving insolvency (score)\* | 2019

The ranking of economies on the ease of resolving insolvency is determined by sorting their scores. These scores are the simple average of the scores for the recovery rate and the strength of insolvency framework index. The recovery rate is recorded as cents on the dollar recovered by secured creditors through reorganization, liquidation, or debt enforcement (foreclosure or receivership) proceedings. The calculation takes into account the outcome: whether the business emerges from the proceedings as a going concern or the assets are sold piecemeal. Then the costs of the proceedings are deducted (1 cent for each percentage point of the value of the debtor's estate). Finally, the value lost as a result of the time that the money remains tied up in insolvency proceedings is taken into account, including the loss of value due to depreciation of a hotel's furniture. The strength of the insolvency framework index is based on four other indices: commencement of proceedings index, management of debtor's assets index, reorganization proceedings index, and creditor participation index.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies, 2020* (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

## 2. Human capital and research

### 2.1. Education

#### 2.1.1. Expenditure on education

Government expenditure on education (% of GDP) | 2018

Total general (local, regional and central) government expenditure on education (current, capital, and transfers), expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government. Botswana, Morocco, and the Philippines use data for 2009.

Data for France sourced from Eurostat and UIS. Data for Greece sourced from Eurostat. Eurostat data sourced from table gov\_10\_exp General government expenditure by function (COFOG), General government sector, Education, Total general government expenditure (Extracted on 05/05/2020).

Source: UNESCO Institute for Statistics, *UIS online database*; and Eurostat (2009–18). (<http://data.uis.unesco.org/>; [https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=gov\\_10a\\_exp&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=gov_10a_exp&lang=en)).

### 2.1.2. Government funding per secondary student

Government funding per secondary student (% of GDP per capita) | 2016

Total general (local, regional and central, current and capital) initial government funding of education per student, which includes transfers paid (such as scholarships to students), but excludes transfers received, in this case international transfers to government for education (when foreign donors provide education sector budget support or other support integrated in the government budget). This is then expressed as a share of GDP per capita, in US\$. Botswana and Qatar use data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database* (2009–18). (<http://data.uis.unesco.org/>).

### 2.1.3. School life expectancy

School life expectancy, primary to tertiary education, both sexes (years) | 2017

Total number of years of schooling that a child of a certain age can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular age is equal to the current enrolment ratio for that age. For a child of a certain age, the school life expectancy is calculated as the sum of the age-specific enrolment rates for primary to tertiary levels of education. The part of the enrollment that is not distributed by age is divided by the school-age population for the primary to tertiary level of education in which they are enrolled, and multiplied by the duration of that level of education. The result is then added to the sum of the age-specific enrolment rates. A relatively high value indicates a greater probability that children will spend more years in education and a higher overall retention within the education system. It must be noted that the expected number of years spent in school does not necessarily coincide with the expected number of grades of education completed, because of grade repetition. Kenya uses data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database* (2009–19). (<http://data.uis.unesco.org/>).

### 2.1.4. Assessment in reading, mathematics, and science

PISA average scales in reading, mathematics, and science<sup>a</sup> | 2018

PISA is the OECD's (Organisation for Economic Co-operation and Development) Programme for International Student Assessment. PISA measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills. Results from PISA indicate the quality and equity of learning outcomes attained around the world. The 2018 PISA survey is the seventh round of the triennial assessment.

The indicator is built using the average of the reading, mathematics and science scores for each country. PISA scores are set in relation to the variation in results observed across all test participants in a country. There is theoretically no minimum or maximum score in PISA; rather, the results are scaled to fit approximately normal distributions, with means around 500 score points and standard deviations around 100 score points.

The 2018 scores for China correspond to the provinces/municipalities of Beijing, Shanghai, Jiangsu and Zhejiang only. The 2018 scores for Azerbaijan correspond only to the capital Baku. The 2018 average scores for Spain are based only on the scores for mathematics and science, given that the reading scores were not published by the OECD due to implausible response behavior amongst students. PISA 2018 results for Malaysia fully met the technical standards. However, Malaysia's PISA 2015 results cannot be compared to results from previous years or to those from 2018 due to the potential of bias introduced by low response rates in the original PISA sample. PISA 2015 results for Argentina cannot be compared to results from previous years or to results from 2018 due to the use of an incomplete sampling frame.

Source: OECD Programme for International Student Assessment (PISA) (2015–18). ([www.pisa.oecd.org/](http://www.pisa.oecd.org/)).

### 2.1.5. Pupil-teacher ratio, secondary

Pupil-teacher ratio, secondary<sup>ab</sup> | 2018

The number of pupils enrolled in secondary school divided by the number of secondary school teachers (regardless of their teaching assignment). Where the data are missing for some countries, the ratios for upper-secondary are reported; if these are also missing, the ratios for lower-secondary are reported instead. A high pupil-teacher ratio suggests that each teacher has to be responsible for a large number of pupils. In other words, the higher the pupil/teacher ratio, the lower the relative access of pupils to teachers. Israel, Kenya, and Trinidad and Tobago use data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database* (2009–19). (<http://data.uis.unesco.org/>).

## 2.2. Tertiary education

### 2.2.1. Tertiary enrolment

School enrolment, tertiary (% gross) | 2017

The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education. Tertiary education, whether or not at an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. The school enrolment ratio can exceed 100% as a result of grade repetition and the inclusion of over-aged and under-aged students because of early or late entrants.

Source: UNESCO Institute for Statistics, *UIS online database* (2010–19). (<http://data.uis.unesco.org>).

### 2.2.2. Graduates in science and engineering

Tertiary graduates in science, technology, engineering, and mathematics (% of total tertiary graduates) | 2017

The share of all tertiary-level graduates in natural sciences, mathematics, statistics, information and technology, manufacturing, engineering, and construction as a percentage of all tertiary-level graduates.

Source: UNESCO Institute for Statistics, *UIS online database* (2010–19). (<http://data.uis.unesco.org>).

### 2.2.3. Tertiary inbound mobility

Tertiary inbound mobility rate (%)<sup>a</sup> | 2017

The number of students from abroad studying in a given country as a percentage of the total tertiary-level enrolment in that country. Bangladesh uses data from 2009.

Source: UNESCO Institute for Statistics, *UIS online database* (2009–19). (<http://data.uis.unesco.org>).

## 2.3. Research and development (R&D)

### 2.3.1. Researchers FTE

Researchers, full-time equivalent (FTE) (per million population) | 2018

Researchers per million population, FTE. Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&D are included. Data collected from UNESCO Institute for Statistics, Eurostat, and OECD Main Science and Technology Indicators.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, Eurostat data base, 2020; OECD, *Main Science and Technology Indicators MSTI database, 2020* (2010–18). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)).

### 2.3.2. Gross expenditure on R&D (GERD)

Gross expenditure on R&D (% of GDP) | 2018

Total domestic intramural expenditure on R&D during a given period as a percentage of GDP. “Intramural R&D expenditure” is all expenditure for R&D performed within a statistical unit or sector of the economy during a specific period, whatever the source of funds. Data collected from UNESCO Institute for Statistics, Eurostat, and OECD Main Science and Technology Indicators. Plurinational State of Bolivia uses data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, Eurostat data base, 2020; OECD, *Main Science and Technology Indicators MSTI database, 2020* (2009–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSet-Code=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSet-Code=MSTI_PUB)).

### 2.3.3. Global R&D companies, average expenditure, top 3

Average expenditure of the top 3 global companies by R&D, mn US\$\* | 2019

Average expenditure on R&D of the top three global companies. If a country has fewer than three global companies listed, the figure is either the average of the sum of the two companies listed or the total for a single listed company. A score of 0 is given to countries with no listed companies.

Source: European Commission, *The 2019 EU Industrial R&D Investment Scoreboard*. (<https://iri.jrc.ec.europa.eu/scoreboard/2019-eu-industrial-rd-investment-scoreboard>).

### 2.3.4. QS university ranking score of top 3 universities

Average score of the top 3 universities at the QS world university ranking\* | 2019

Average score of the top three universities per country. If fewer than three universities are listed in the QS ranking of the global top 1000 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities.

Source: QS Quacquarelli Symonds Ltd, *QS World University Ranking 2019/2020, Top Universities*. (<https://www.topuniversities.com/qs-world-university-rankings>).

## 3. Infrastructure

### 3.1. Information and communication technologies (ICTs)

#### 3.1.1. ICT access

ICT access index<sup>\*a</sup> | 2018

The ICT access index, previously part of the ITU ICT Development Index, is a composite index that weights five ICT indicators (20% each): (1) Fixed telephone subscriptions per 100 inhabitants; (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3) International Internet bandwidth (bit/s) per Internet user; (4) Percentage of households with a computer; and (5) Percentage of households with Internet access.

Source: GII calculations based on the *World Telecommunication/ICT Indicators Database* (Released January 18, 2019) following the methodology of the International Telecommunication Union, *ICT Development Index 2017* (<http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx>).

#### 3.1.2. ICT use

ICT use index<sup>\*a</sup> | 2018

The ICT use index, previously part of the ITU ICT Development Index, is a composite index that weights three ICT indicators (33% each): (1) Percentage of individuals using the Internet; (2) Fixed (wired)-broadband Internet subscriptions per 100 inhabitants; (3) Active mobile-broadband subscriptions per 100 inhabitants.

Source: GII calculations based on the *World Telecommunication/ICT Indicators Database* (Released January 18, 2019) following the methodology of the International Telecommunication Union, *ICT Development Index 2017* (<http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx>).

#### 3.1.3. Government online service

Government's online service index<sup>\*a</sup> | 2018

The Online Services Index component of the E-Government Development Index is a composite indicator measuring the use of ICTs by governments in delivering public services at the national level. The 2018 Online Service Questionnaire (OSQ) consists of a list of 140 questions. To arrive at a set of Online Service Index values for 2018, a total of 206 online United Nations Volunteer (UNV) researchers from 89 countries covering 66 languages, assessed each country's national website in the native language, including the national portal, e-services portal and e-participation portal, as well as the websites of the related ministries of education, labor, social services, health, finance, and environment, as applicable. The total

number of points scored by each country is normalized to a range of 0 to 1. The online index value for a given country is equal to the actual total score less the lowest total score divided by the range of total score values for all countries.

Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e-government changes and the underlying technology evolves. See link below for more details.

Source: United Nations Public Administration Network, *e-Government Survey 2018*. (<https://publicadministration.un.org/en/research/un-e-government-surveys>).

#### 3.1.4. Online e-participation

E-Participation Index<sup>\*a</sup> | 2018

The E-Participation Index (EPI) is derived as a supplementary index to the United Nations E-Government Survey. It extends the dimension of the Survey by focusing on the government use of online services in providing information to its citizens or "e-information sharing", interacting with stakeholders or "e-consultation" and engaging in decision-making processes or "e-decision-making." A country's EPI reflects the e-participation mechanisms that are deployed by the government as compared to all other countries. The purpose of this measure is not to prescribe any specific practice, but rather to offer insight into how different countries are using online tools in promoting interaction between the government and its citizens, as well as among the citizens, for the benefit of all. As the EPI is a qualitative assessment based on the availability and relevance of participatory services available on government websites, the comparative ranking of countries is for illustrative purposes and only serves as an indicator of the broad trends in promoting citizen engagement. As with the EGDI, the EPI is not intended as an absolute measurement of e-participation, but rather, as an attempt to capture the e-participation performance of counties relative to one another at a point in time. The index ranges from 0 to 1, with 1 showing greater e-participation. Mathematically, the EPI is normalized by taking the total score value for a given country, subtracting the lowest total score for any country in the Survey and dividing by the range of total score values for all countries.

Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e-government changes and the underlying technology evolves. See link in source for more details.

Source: United Nations Public Administration Network, *e-Government Survey 2018*. (<https://publicadministration.un.org/en/research/un-e-government-surveys>).

## 3.2. General infrastructure

### 3.2.1. Electricity output

Electricity output (GWh per mn population)<sup>a</sup> | 2017

Electricity production, measured at the terminals of all alternator sets in a station. In addition to hydropower, coal, oil, gas, and nuclear power generation, this indicator covers generation by geothermal, solar, wind, and tide and wave energy, as well as that from combustible renewables and waste. Production includes the output of electric plants that are designed to produce electricity only as well as that of combined heat and power plants. Electricity output in GWh is scaled by population.

Source: International Energy Agency (IEA) *World Energy Balances on-line data service, 2019 edition* (2017–18). (<https://www.iea.org/reports/world-energy-balances-2019>).

### 3.2.2. Logistics performance

Logistics Performance Index<sup>\*a</sup> | 2018

A multidimensional assessment of logistics performance, the Logistics Performance Index (LPI) ranks 160 countries combining data on six core performance components into a single aggregate measure—including customs performance, infrastructure quality, and timeliness of shipments. The data used in the ranking comes from a survey of logistics professionals who are asked questions about the foreign countries in which they operate. The LPI's six components are: (1) the efficiency of customs and border management clearance ("Customs"); (2) the quality of trade and transport infrastructure ("Infrastructure"); (3) the ease of arranging competitively priced shipments ("International shipments"); (4) the competence and quality of logistics services ("Services Quality"); (5) the ability to track and trace consignments ("Tracking and tracing"); and (6) the frequency with which shipments reach consignees within scheduled or expected delivery times ("Timeliness"). The LPI consists therefore of both qualitative and quantitative measures and helps build profiles of logistics friendliness for these countries.

Source: World Bank and Turku School of Economics, *Logistics Performance Index 2018*; Arvis et al., 2018, *Connecting to Compete 2018: Trade Logistics in the Global Economy—The Logistics Performance Index and its Indicators*. (<https://openknowledge.worldbank.org/bitstream/handle/10986/29971/LPI2018.pdf>).

### 3.2.3. Gross capital formation

Gross capital formation (% of GDP) | 2019

Gross capital formation is expressed as a ratio of total investment in current local currency to GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector, on the basis of the System of National Accounts (SNA) of 1993.

Source: International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP). (<https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

## 3.3. Ecological sustainability

### 3.3.1. GDP per unit of energy use

GDP per unit of energy use (2010 PPP\$ per kg of oil equivalent) | 2017

Purchasing power parity gross domestic product (PPP\$ GDP) per kilogram of oil equivalent of energy use. Total primary energy supply (TPES) is made up of production + imports – exports – international marine bunkers – international aviation bunkers +/- stock changes.

Source: International Energy Agency (IEA) *World Energy Balances on-line data service, 2019 edition* (2017–18). (<https://www.iea.org/reports/world-energy-balances-2019>).

### 3.3.2. Environmental performance

Environmental Performance Index<sup>\*</sup> | 2019

The 2020 Environmental Performance Index (EPI) ranks 180 countries on 32 performance indicators across 11 issue categories covering environmental health and ecosystem vitality. These indicators provide a gauge at a national scale of how close countries are to established environmental policy targets. The EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. The index ranges from 0 to 100, with 100 indicating best performance.

Source: Yale University and Columbia University *2020 Environmental Performance Index*. (<http://epi.yale.edu/>).

### 3.3.3. ISO 14001 environment certificates

ISO 14001 Environmental management systems—Requirements with guidance for use: Number of certificates issued (per billion PPP\$ GDP) | 2018

ISO 14001:2015 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. ISO 14001 is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. ISO 14001 helps an organization achieve the intended outcomes of its environmental management system, which provide value for the environment, the organization itself, and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include enhancement of environmental performance, fulfillment of compliance obligations, and achievement of environmental objectives. ISO 14001 is applicable to any organization, regardless of size, type, or nature, and applies to the environmental aspects of its activities, products, and services that the organization determines it can either control or influence from a life cycle perspective. ISO 14001

does not state specific environmental performance criteria. ISO 14001 can be used in whole or in part to systematically improve environmental management. Claims of conformity to ISO 14001, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion. The data are reported per billion PPP\$ GDP.

Source: International Organization for Standardization, *The ISO Survey of certifications to management system standards, 2018*; International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP). (<https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

## 4. Market Sophistication

### 4.1. Credit

#### 4.1.1. Ease of getting credit

Ease of getting credit\* | 2019

The ranking of economies on the ease of getting credit is determined by sorting their scores for getting credit.

These scores are the score for the sum of the strength of the legal rights index (range 0–12) and the depth of credit information index (range 0–8). Doing Business measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the reporting of credit information through another. The first set of indicators measures whether certain features that facilitate lending exist within the applicable collateral and bankruptcy laws. The second set measures the coverage, scope, and accessibility of credit information available through credit reporting service providers such as credit bureaus or credit registries. Although Doing Business compiles data on getting credit for public registry coverage (% of adults) and for private bureau coverage (% of adults), these indicators are not included in the ranking.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies, 2020* (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>)

#### 4.1.2. Domestic credit to private sector

Domestic credit to private sector (% of GDP) | 2018

“Domestic credit to private sector” refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. For some countries, these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits).

Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

Source: International Monetary Fund, International Financial Statistics and data files; and World Bank and OECD GDP estimates; extracted from the World Bank's *World Development Indicators* database (2010–2018). (<http://data.worldbank.org/>).

#### 4.1.3. Microfinance institutions gross loan portfolio

Microfinance institutions: Gross loan portfolio (% of GDP)\* | 2018

Combined gross loan balances of microfinance institutions (current US\$) in a country as a percentage of its GDP (current US\$).

Source: Microfinance Information Exchange, *Mix Market database*; International Monetary Fund, *World Economic Outlook Database, October 2019* (current US\$ GDP) (2011–2019). (<https://datacatalog.worldbank.org/dataset/mix-market>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 4.2. Investment

#### 4.2.1. Ease of protecting minority investors

Ease of protecting minority investors\* | 2019

This ranking is the sum of the scores for the extent of conflict of interest regulation index and the extent of shareholder governance index. The extent of conflict of interest regulation index measures the protection of shareholders against directors' misuse of corporate assets for personal gain by distinguishing three dimensions of regulation that address conflicts of interest: transparency of related-party transactions (extent of disclosure index), shareholders' ability to sue and hold directors liable for self-dealing (extent of director liability index), and access to evidence and allocation of legal expenses in shareholder litigation (ease of shareholder suits index). The extent of shareholder governance index measures shareholders' rights in corporate governance by distinguishing three dimensions of good governance: shareholders' rights and role in major corporate decisions (extent of shareholder rights index); governance safeguards protecting shareholders from undue board control and entrenchment (extent of ownership and control index); and corporate transparency on ownership stakes, compensation, audits, and financial prospects (extent of corporate transparency index). The index also measures whether a subset of relevant rights and safeguards are available in limited companies. The data come from a questionnaire administered to corporate and securities lawyers and are based on securities regulations, company laws, civil procedure codes, and court rules of evidence.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies, 2020* (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

#### 4.2.2. Market capitalization

Market capitalization of listed domestic companies (% of GDP, three-year average) | 2018

Market capitalization (also known as “market value”) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. Data are the average of the end-of-year values for the last three years with the exception of Bulgaria, Ghana, Jamaica, Kenya, Romania, and Serbia (averages for two years: 2010 and 2011); and Zambia (2011).

Source: World Federation of Exchanges database; extracted from the World Bank’s *World Development Indicators* database (2011–18). (<http://data.worldbank.org/>).

#### 4.2.3. Venture capital deals

Venture capital per investment location: Number of deals (per billion PPP\$ GDP) | 2019

Thomson Reuters Eikon data on private equity deals, per deal, with information on the location of investment, investment company, investor firms, funds, and crowdfunding, among other details. The series corresponds to a query on venture capital deals from January 1, 2019 to December 31, 2019, with the data collected by investment location, for a total of 17,960 deals in 81 countries in 2019. The data are reported per billion PPP\$ GDP.

Source: Thomson Reuters Eikon, *Private Equity* screener; International Monetary Fund, *World Economic Outlook Database October 2019* (PPP\$ GDP). (<https://eikon.thomsonreuters.com/index.html>); <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 4.3. Trade, competition, and market scale

#### 4.3.1. Applied tariff rate, weighted average

Tariff rate, applied, weighted average, all products (%)<sup>ab</sup> | 2018

“Weighted mean applied tariff” is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) revision 3 codes to define commodity groups and import weights. To the extent possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of weighted mean tariffs. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most favored nation rate is used instead.

Source: World Bank, based on data from United Nations Conference on Trade and Development’s Trade Analysis and Information System (TRAINS) database and the World Trade Organization’s (WTO) Integrated Data Base (IDB) and Consolidated Tariff Schedules (CTS) database; extracted from World Bank’s *World Development Indicators* database (2015–18). (<http://data.worldbank.org/>).

#### 4.3.2. Intensity of local competition

Average answer to the survey question: In your country, how intense is competition in the local markets? [1 = not intense at all; 7 = extremely intense]<sup>†</sup> | 2019

Source: World Economic Forum, *Executive Opinion Survey 2019*. ([http://www3.weforum.org/docs/WEF\\_GCR\\_2019\\_Appendix\\_B.pdf](http://www3.weforum.org/docs/WEF_GCR_2019_Appendix_B.pdf)).

#### 4.3.3. Domestic market scale

Domestic market scale as measured by GDP, bn PPP\$ | 2019

The domestic market size is measured by gross domestic product (GDP) based on the purchasing-power-parity (PPP) valuation of country GDP, in current international dollars (billions).

Source: International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP). (<https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

## 5. Business sophistication

### 5.1. Knowledge workers

#### 5.1.1. Knowledge-intensive employment

Employment in knowledge-intensive occupations (% of workforce) | 2018

Sum of people in categories 1 to 3 as a percentage of total people employed, according to the International Standard Classification of Occupations (ISCO). Categories included in ISCO-08 are: 1 Managers, 2 Professionals, and 3 Technicians and associate professionals (years 2009–18). Where ISCO-08 data were not available, ISCO-88 data were used. Categories included in ISCO-88 are: 1 Legislators, senior officials and managers; 2 Professionals; 3 Technicians and associate professionals (2010–19).

Source: International Labour Organization *ILOSTAT Database of Labour Statistics* (2010–19). (<http://www.ilo.org/ilostat/>).



### 5.1.2. Firms offering formal training

Firms offering formal training (% of firms) | 2018

The percentage of firms offering formal training programs for their permanent, full-time employees in the sample of firms in the World Bank's Enterprise Survey in each country. Botswana, Chile, Costa Rica, Jamaica, Mexico, Paraguay, and Trinidad and Tobago use data for 2009.

Source: World Bank, *Enterprise Surveys* (2009–19). (<http://www.enterprisesurveys.org/>).

### 5.1.3. GERD performed by business enterprise

GERD performed by business enterprise (% of GDP) | 2018

Gross expenditure on R&D performed by business enterprise as a percentage of GDP. For the definition of GERD see indicator 2.3.2.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, *Eurostat database, 2019*; OECD, *Main Science and Technology Indicators MSTI database, 2019* (2010–19). (<http://data.uis.unesco.org/>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)).

### 5.1.4. GERD financed by business enterprise

GERD: Financed by business enterprise (% of total GERD) | 2017

Gross expenditure on R&D financed by business enterprise as a percentage of total gross expenditure on R&D. For the definition of GERD see indicator 2.3.2. The Plurinational State of Bolivia and Burkina Faso use data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, *Eurostat database, 2019*; OECD, *Main Science and Technology Indicators MSTI database, 2019* (2009-18). (<http://data.uis.unesco.org/>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)).

### 5.1.5. Females employed with advanced degrees

Females employed with advanced degrees, % total employed (25+ years old)\* | 2018

The percentage of females employed with advanced degrees out of total employed. The employed comprise all persons of working age who, during a specified brief period, were in one of the following categories: (1) paid employment (whether at work or with a job but not at work); or (2) self-employment (whether at work or with an enterprise but not at work). Data are disaggregated by level of education, which refers to the highest level of education completed, classified according to the International Standard Classification of Education (ISCED). Data for Canada are based on Table 14-10-0020-01 of the country's Labour Force Survey estimates. Tajikistan uses data for 2009.

Source: International Labour Organization, *ILOSTAT Annual Indicators*; Statistics Canada, *Table 14-10-0020-01 Unemployment rate, participation rate and employment rate by educational attainment, annual (x 1,000)*, accessed February 10, 2020 (2009-19).

## 5.2. Innovation linkages

### 5.2.1. University/industry research collaboration

Average answer to the survey question: In your country, to what extent do businesses and universities collaborate on research and development (R&D)? [1 = do not collaborate at all; 7 = collaborate extensively]\* | 2019

Source: World Economic Forum, *Executive Opinion Survey 2019*. ([http://www3.weforum.org/docs/WEF\\_GCR\\_2019\\_Appendix\\_B.pdf](http://www3.weforum.org/docs/WEF_GCR_2019_Appendix_B.pdf)).

### 5.2.2. State of cluster development

Average answer to the survey question on the role of clusters in the economy: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = non-existent; 7 = widespread in many fields]\* | 2019

Source: World Economic Forum, *Executive Opinion Survey 2019*. ([http://www3.weforum.org/docs/WEF\\_GCR\\_2019\\_Appendix\\_B.pdf](http://www3.weforum.org/docs/WEF_GCR_2019_Appendix_B.pdf)).

### 5.2.3. GERD financed by abroad

GERD: Financed by abroad (% of GDP) | 2017

Percentage of gross expenditure on R&D financed by abroad (billions, national currency)—that is, with foreign financing as a percentage of GDP (billions, national currency). For the definition of GERD see indicator 2.3.2.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, *Eurostat database, 2019*; OECD, *Main Science and Technology Indicators MSTI database, 2019* (2010-18). (<http://data.uis.unesco.org/>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)).

## 5.2.4. Joint venture/strategic alliance deals

Joint ventures/strategic alliances: Number of deals, fractional counting (per billion PPP\$ GDP) | 2019

Thomson Reuters data on joint ventures/strategic alliances deals, per deal, with details on the country of origin of partner firms, among others. The series corresponds to a query on joint venture/strategic alliance deals from January 1, 2019 to December 31, 2019, for a total of 10,535 deals announced in 2019, with firms headquartered in 122 GII participating economies. Each participating nation of each company in a deal (n countries per deal) gets, per deal, a score equivalent to  $1/n$  (with the effect that all country scores add up to 10,535). The data are reported per billion PPP\$ GDP.

Source: Thomson Reuters, *Thomson One Banker Private Equity, SDC Platinum* database; International Monetary Fund *World Economic Outlook Database*, October 2019 (PPP\$ GDP). (<http://banker.thomsonib.com>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

## 5.2.5. Patent families filed in two offices

Number of patent families in at least two offices (per billion PPP\$ GDP) | 2016

A “patent family” is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. Patent families containing applications filed in at least two different offices is a subset of patent families where protection of the same invention is sought in at least two different countries. In this report, “patent families data” refers to patent families containing applications filed in at least two IP offices; the data are scaled by PPP\$ GDP (billions). A “patent” is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious, and industrially applicable. A patent is valid for a limited period of time (generally 20 years) and within a limited territory. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to appropriate the returns from their innovative activity.

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database*, October 2019 (PPP\$ GDP). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

## 5.3. Knowledge absorption

### 5.3.1. Intellectual property payments

Charges for use of intellectual property, i.e., payments (% of total trade, three-year average) | 2018

Charges for the use of intellectual property not included elsewhere payments (% of total trade), average of three most recent years or available data. Value according to the Extended Balance of Payments Services Classification

EBOPS 2010—that is, code SH charges for the use of intellectual property not included elsewhere as a percentage of total trade. “Total trade” is defined as the sum of total imports code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund’s Balance of Payments Manual, the item “Goods” covers general merchandise, net exports of goods under merchanting, and non-monetary gold. The “commercial services” category is defined as being equal to “services” minus “government goods and services not included elsewhere”. Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs including trade secrets, franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast). Data for Azerbaijan is for (2010-12), Guinea (2010-12), Islamic Republic of Iran (2014-16), Mali (2009, 2019), Niger (2009), Rwanda (2009), Tajikistan (2009, 2017, 2018), and Yemen (2014-16).

Source: World Trade Organization, *Trade in Commercial Services* database, based on the sixth (2009) edition of the International Monetary Fund’s *Balance of Payments and International Investment Position Manual and Balance of Payments* database (<https://data.wto.org/>; <http://www.oecd.org/std/its/EBOPS-2010.pdf>).

### 5.3.2. High-tech imports

High-tech imports (% of total trade) | 2018

High-technology imports as a percentage of total trade. High-technology exports and imports contain technical products with a high intensity of R&D, defined by the Eurostat classification, which is based on Standard International Trade Classification (SITC) Revision 4 and the Organisation for Economic Co-operation and Development (OECD) definition. Commodities belong to the following sectors: aerospace; computers & office machines; electronics; telecommunications; pharmacy; scientific instruments; electrical machinery; chemistry; non-electrical machinery; and armament.

Source: World Trade Organization, United Nations, *Comtrade* database; Eurostat, *Annex 5: High-tech aggregation by SITC Rev. 4*, April 2009 (2015-2018). (<http://comtrade.un.org/>; [http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec\\_esms\\_an5.pdf](http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf)).

### 5.3.3. ICT services imports

Telecommunications, computers, and information services imports (% of total trade)<sup>a</sup> | 2018

Telecommunications, computer and information services as a percentage of total trade according to the Organisation for Economic Co-operation and Development (OECD)'s Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer and information services. For the definition of total trade see indicator 5.3.1.

Source: World Trade Organization, *Trade in Commercial Services* database, based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and *Balance of Payments* database (2015-18) (<https://data.wto.org/>; <http://www.oecd.org/std/its/EBOPS-2010.pdf>).

### 5.3.4. Foreign direct investment net inflows

Foreign direct investment (FDI), net inflows (% of GDP, three-year average)<sup>a</sup> | 2018

Foreign direct investment is the average of the most recent three years of net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

Source: International Monetary Fund, *International Financial Statistics* and *Balance of Payments* databases, World Bank, *International Debt Statistics*, and World Bank and OECD GDP estimates; extracted from the World Bank's *World Development Indicators* database, 2019. (<http://data.worldbank.org/>).

### 5.3.5. Research talent in business enterprise

Researchers in business enterprise per thousand population (%) | 2018

"Full-time equivalent (FTE) researchers in the business enterprise sector" refers to researchers as professionals engaged in the conception or creation of new knowledge, products, processes, methods, and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education, and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations, and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, and the private non-profit institutions mainly serving them; the core of this sector is made up of private enterprises. This also includes public enterprises.

Source: UNESCO Institute for Statistics, *UIS online database*; Eurostat, *Eurostat database, 2019*; OECD, *Main Science and Technology Indicators MSTI database, 2019* (2010–18). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)).

## 6. Knowledge and technology outputs

### 6.1. Knowledge creation

#### 6.1.1. Patent applications by origin

Number of resident patent applications filed at a given national or regional patent office (per billion PPP\$ GDP) | 2018

A "patent" is defined in the description of indicator 5.2.5. A resident patent application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the European Patent Office (EPO) by an applicant who resides in any of the EPO member states, for example Germany, is considered a resident application for that member state (Germany). Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database*, October 2019 (PPP\$ GDP) (2010–18). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

#### 6.1.2. PCT applications by origin

Number of Patent Cooperation Treaty applications (per billion PPP\$ GDP)<sup>a</sup> | 2019

A PCT application refers to an international patent applications filed through the WIPO-administered Patent Cooperation Treaty (PCT). The PCT system makes it possible to seek patent protection for an invention simultaneously in a number of countries by filing a single international patent application. The origin of PCT applications is defined by the residence of the first-named applicant. Data is available only for those economies which are PCT Contracting States. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database*, October 2019 (PPP\$ GDP). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 6.1.3. Utility models by origin

Number of resident utility model applications filed at the national patent office (per billion PPP\$ GDP) | 2018

A “utility model” (UM) is a special form of patent right. The terms and conditions for granting a utility model are slightly different from those for normal patents and include a shorter term of protection and less stringent patentability requirements. A utility model is sometimes referred to in certain countries as “petty patents”, “short-term patents”, or “innovation patents”. A resident UM application refers to an application filed with an IP office for or on behalf of the first-named applicant’s country of residence. For example, an application filed with the IP office of Germany by a resident of Germany is considered a resident application for Germany. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database*, October 2019 (PPP\$ GDP) (2010–18). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 6.1.4. Scientific and technical publications

Number of scientific and technical journal articles (per billion PPP\$ GDP) | 2019

The number of scientific and engineering articles published in those fields, including: agriculture, astronomy, astrophysics, automation control systems, biochemistry molecular biology, biodiversity conservation, biotechnology applied microbiology, cell biology, chemistry, computer science, construction building technology, dentistry oral surgery medicine, engineering, environmental sciences, ecology, evolutionary biology, food science technology, general internal medicine, life sciences biomedicine and other topics, marine freshwater biology, materials science, mathematical computational biology, mathematics, metallurgy and metallurgical engineering, meteorology atmospheric science, microbiology, nuclear science and technology, physics, plant sciences, radiology nuclear medicine medical imaging, reproductive biology, research experimental medicine, science technology and other topics, telecommunications, transportation, and veterinary sciences. Article counts are from a set of journals covered by the Science Citation Index (SCI) and the Social Sciences Citation Index (SSCI). Articles are classified by year of publication and assigned to each country/economy on the basis of the institutional address(es) listed in the article.

Articles are counted on a count basis (rather than a fractional basis)—that is, for articles with collaborating institutions from multiple countries/economies, each country/economy receives credit on the basis of its participating institutions. The data are reported per billion PPP\$ GDP.

Source: Clarivate Analytics, special tabulations from Clarivate Analytics, Web of Science, Science Citation Index (SCI), and Social Sciences Citation Index (SSCI);

International Monetary Fund, *World Economic Outlook Database*, October 2019 (PPP\$ GDP). (<https://www.webofknowledge.com>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 6.1.5. Citable documents H-index

The H-index is the economy’s number of published articles (H) that have received at least H citations | 2019

The H-index expresses the journal’s number of articles (H) that have received at least H citations. It quantifies both journal scientific productivity and scientific impact. The H-index is tabulated from the number of citations received in subsequent years by articles published in a given year, divided by the number of articles published that year.

Source: SCImago (2020) *SJR—SCImago Journal & Country Rank*. Retrieved March 2020. (<http://www.scimagojr.com>).

## 6.2. Knowledge impact

### 6.2.1. Growth rate of GDP per person engaged

Growth rate of GDP per person engaged (% , three-year average) | 2019

Growth rate of real GDP per person employed (constant 1990 PPP\$), average of three last available years. Growth of gross domestic product (GDP) per person engaged provides a measure of labor productivity (defined as output per unit of labor input). GDP per person employed is GDP divided by total employment in the economy. PPP\$ GDP is Constant 1990 in U.S. dollars, expressed in 1990 GK PPP, Millions. While this is a relatively robust measure, it does not correct for part-time jobs as it merely counts people who are employed. Hence, GDP per person employed is somewhat underestimated in countries with a higher share of part-time workers, which are mostly OECD countries.

Source: The Conference Board Total Economy Database™ Output, Labor and Labor Productivity, 1950–2019, April 2020 preliminary release. (<https://www.conference-board.org/data/economydatabase/>).

### 6.2.2. New business density

New business density (new registrations per thousand population 15–64 years old)<sup>a</sup> | 2018

Number of newly registered corporations per 1,000 working-age (15–64 years old). The units of measurement are private, formal sector companies with limited liability. The scope of data was expanded in 2018 for Brazil. Data corrections relative to the 2016 survey were implemented for Panama. Malawi uses data for 2009.

Source: World Bank, *Doing Business 2020, Entrepreneurship Project* (2009–2018). (<https://www.doingbusiness.org/en/data/exploretopics/entrepreneurship>).

### 6.2.3. Total computer software spending

Total computer software spending (% of GDP) | 2019

Computer software spending includes the total value of purchased or leased packaged software such as operating systems, database systems, programming tools, utilities, and applications. It excludes expenditures for internal software development and outsourced custom software development. The data are a combination of actual figures and estimates. Data are reported as a percentage of GDP.

Source: IHS Markit, *Information and Communication Technology Database*. (<https://www.ihs.com/index.html>).

### 6.2.4. ISO 9001 quality certificates

ISO 9001 Quality management systems—Requirements: Number of certificates issued (per billion PPP\$ GDP) | 2018

ISO 9001:2015 specifies requirements for a quality management system when an organization needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for improving the system and assuring conformity to customer and applicable statutory and regulatory requirements. All the requirements of ISO 9001:2015 are generic and are intended to be applicable to any organization, regardless of its type or size, or the products and services it provides. The data are reported per billion PPP\$ GDP. Refer to indicator 3.3.3 for more details.

Source: International Organization for Standardization (ISO), *The ISO Survey of certifications to management system standards, 2018*; International Monetary Fund, *World Economic Outlook database, October 2019* (PPP\$ GDP). (<http://www.iso.org>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 6.2.5. High-tech and medium-high-tech manufacturing

High-tech and medium-high-tech manufacturing (% of total manufacturing output) | 2017

High-tech and medium-high-tech output as a percentage of total manufactures output, on the basis of the Organisation for Economic Co-operation and Development (OECD) classification of Technology Intensity Definition, itself based on International Standard Industrial Classification ISIC Revision 4 and ISIC Revision 3. ISIC Revision 4 data were preferred; when not available or not reported for a given country, ISIC Revision 3 data were used. For all ISIC three-digit classification codes included in the definition of high-tech and medium-high-tech output reported as missing for a given country, but for which four-digit level data were available, the three-digit values were calculated as the sum of all four-digit codes that were available.

Source: United Nations Industrial Development Organization (UNIDO), *Industrial Statistics Database*, 3- and 4-digit level of International Standard Industrial

Classification ISIC Revision 4 and Revision 3 (INDSTAT4 2020); OECD, Directorate for Science, Technology and Industry, Economic Analysis and Statistics Division, *ISIC Rev. 3 and Rev. 4 Technology Intensity Definition: Classification of Manufacturing Industries into Categories Based on R&D Intensities (2010-17)* (<http://www.unido.org/statistics.html>; <https://stat.unido.org/content/focus/classification-of-manufacturing-sectors-by-technological-intensity-%2528isic-revision-4%2529;jsessionid=4DB1A3A5812144CACC956F4B8137C1CF>; <http://www.oecd.org/sti/ind/48350231.pdf>).

## 6.3. Knowledge diffusion

### 6.3.1. Intellectual property receipts

Charges for use of intellectual property, i.e., receipts (% total trade, three-year average)<sup>a</sup> | 2018

Charges for the use of intellectual property not included elsewhere receipts (% of total trade), average of three most recent years or available data. Value according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, code SH charges for the use of intellectual property not included elsewhere as a percentage of total trade. Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes, and designs including trade secrets, franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast). For definition of total trade see indicator 5.3.1. Data for Azerbaijan (2010-12), Benin (2014-16), Côte d'Ivoire (2014-16), Islamic Republic of Iran (2013-15), Mali (2011-12, 2017), Mozambique (2009, 2011-12), Niger (2015-16), Rwanda (2009), Tajikistan (2009), Yemen (2009, 2016), and Zimbabwe (2014-16).

Source: World Trade Organization, *Trade in Commercial Services* database, based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and *Balance of Payments* database (2010-2018) (<https://data.wto.org/>; <http://www.oecd.org/std/its/EBOPS-2010.pdf>).

### 6.3.2. High-tech exports

High-tech net exports (% of total trade) | 2018

High-technology exports minus re-exports (% of total trade). See indicator 5.3.2 for details.

Source: World Trade Organization, United Nations, *Comtrade* database; Eurostat, *Annex 5: High-tech aggregation by SITC Rev. 4*, April 2009 (2012-2018). (<http://comtrade.un.org/>; [https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec\\_esms\\_an5.pdf](https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf)).

### 6.3.3. ICT services exports

Telecommunications, computers, and information services exports (% of total trade) | 2018

Telecommunications, computer and information services (% of total trade) according to the Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer and information services.

Source: World Trade Organization, *Trade in Commercial Services* database, based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and *Balance of Payments* database (2015-18) (<https://data.wto.org/> ; <http://www.oecd.org/std/its/EBOPS-2010.pdf>).

### 6.3.4. Foreign direct investments net outflows

Foreign direct investment (FDI), net outflows (% of GDP, three-year average)<sup>a</sup> | 2018

"Foreign direct investment" refers to the average of the most recent three years of direct investment equity flows in an economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy.

Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. This series shows net outflows of investment from the reporting economy to the rest of the world, and is divided by GDP.

Source: International Monetary Fund, *International Financial Statistics* and *Balance of Payments* databases, World Bank, *International Debt Statistics*, and World Bank and OECD GDP estimates; extracted from the World Bank's *World Development Indicators* database (2015–18). (<http://data.worldbank.org/>).



## 7. Creative outputs

### 7.1. Intangible assets

#### 7.1.1. Trademark application class count by origin

Number of classes in resident trademark applications issued at a given national or regional office (per billion PPP\$ GDP) | 2018

A "trademark" is a sign used by the owner of certain products or provider of certain services to distinguish them from the products or services of other companies. A trademark can consist of words and/or combinations of words, such as slogans, names, logos, figures and images, letters, numbers, sounds, and moving images,

or a combination thereof. The procedures for registering trademarks are governed by the legislation and procedures of national and regional IP offices. Trademark rights are limited to the jurisdiction of the IP office that registers the trademark. Trademarks can be registered by filing an application at the relevant national or regional office(s) or by filing an international application through the Madrid System. A resident trademark application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the EU member states, such as France, is considered a resident application for that member state (France). This indicator is based on class count—the total number of goods and services classes specified in resident trademark applications. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP) (2012–18). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

#### 7.1.2. Global brand value

Global brand value of the top 5,000 brands (% of GDP) | 2019

Sum of Global Brand Values, top 5,000 as a percentage of GDP. 2020 rankings based on 2019 data. Brand Finance calculates brand value using the Royalty Relief methodology, which determines the value a company would be willing to pay to license its brand as if it did not own it. The methodology is compliant with industry standards set in ISO 10668. ISO This approach involves estimating the future revenue attributable to a brand and calculating a royalty rate that would be charged for the use of the brand. Brand Finance's study is based on publicly available information on the largest brands in the world. This indicator assesses the economy's brands in the top 5,000 global brand database and produces the sum of the brand values corresponding to that economy. This sum is then scaled by GDP. A score of 0 is assigned where there are no brands in the country that make the Top 5000 ranking. A score of n/a is assigned where Brand Finance has been unable to determine if there are brands from the country that would rank within the Top 5000 due to data availability limitations.

Source: Brand Finance database; International Monetary Fund, *World Economic Outlook Database, October 2019* (2019). (<https://brandirectory.com/>; <https://brandfinance.com/knowledge-centre/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 7.1.3. Industrial designs by origin

Number of designs contained in resident industrial design applications filed at a given national or regional office (per billion PPP\$ GDP)<sup>a</sup> | 2018

An “industrial design” is a set of exclusive rights granted by law to applicants for protecting the ornamental or aesthetic aspect of their products. An industrial design is valid for a limited period of time and within a limited territory. A resident industrial design application refers to an application filed with the IP office for or on behalf of the applicant’s country of residence. For example, an application filed with the Japan Patent Office (JPO) by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the OHIM member states, such as Italy, is considered as a resident application for that member state (Italy). This indicator is based on design count – the total number of designs contained in the resident industrial design applications. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, *Intellectual Property Statistics*; International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP) (2014–18). (<http://www.wipo.int/ipstats/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

### 7.1.4. ICTs and organizational model creation

Average answer to the question: In your country, to what extent do ICTs enable new organizational models (e.g., virtual teams, remote working, telecommuting) within companies? [1 = not at all; 7 = to a great extent]<sup>†</sup> | 2018

Source: World Economic Forum, *Executive Opinion Survey 2019*. ([http://www3.weforum.org/docs/WEF\\_GCR\\_2019\\_Appendix\\_B.pdf](http://www3.weforum.org/docs/WEF_GCR_2019_Appendix_B.pdf)).

## 7.2. Creative goods and services

### 7.2.1. Cultural and creative services exports

Cultural and creative services exports (% of total trade)<sup>a</sup> | 2018

Creative services exports (% of total exports) according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, EBOPS code SI3 Information services; code SJ22 Advertising, market research, and public opinion polling services; code SK1 Audiovisual and related services; and code SK23 Heritage and recreational services as a percentage of total trade. See 5.3.1 for a full definition of total trade.

Data for the United States of America (U.S.) was obtained from the Bureau of Economic Analysis (BEA), *Table 2.1 U.S. Trade in Services, by Type of Service*. The following BEA categories are used: Audio-visual and related products (including Movies and television programming, Books and sound recordings, and Broadcasting and recording of live events); Information Services; Advertising; and Sports and performing arts.

Source: World Trade Organization, *Trade in Commercial Services* database, based on the sixth (2009) edition of the International Monetary Fund’s *Balance of Payments and International Investment Position Manual* and *Balance of Payments* database; Bureau of Economic Analysis (BEA) released October 2019. (2011-18). (<https://timeseries.wto.org/>; <http://www.oecd.org/std/its/EBOPS-2010.pdf>; <https://apps.bea.gov/itable/index.cfm>).

### 7.2.2. National feature films produced

Number of national feature films produced (per million population 15–69 years old)<sup>a</sup> | 2017

A film with a running time of 60 minutes or longer. It includes works of fiction, animation, and documentaries. It is intended for commercial exhibition in cinemas. Feature films produced exclusively for television broadcasting, as well as newsreels and advertising films, are excluded. Data are reported per million population 15–69 years old. Paraguay and Cameroon use data for 2009.

Source: UNESCO Institute for Statistics, *UIS online database*; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population) (2009-2017). (<http://data.uis.unesco.org/>; <https://population.un.org/wpp/>).

### 7.2.3. Entertainment and media market

Global entertainment and media market (per thousand population 15–69 years old)<sup>a\*</sup> | 2018

The Global Entertainment & Media Outlook (the Outlook) is a comprehensive source of global analyses and five-year forecasts of consumer and advertising spending across 53 territories for 14 entertainment and media segments.

A total of 53 territories are represented within the Outlook spread across North America, Western Europe, Central Europe, the Middle East and North Africa, Latin America, and Asia Pacific. The score and rankings for the Global Media Expenditures for the 53 territories considered in the Outlook report are based on advertising and consumer digital and non-digital data in US\$ millions at average 2019 exchange rates for the year 2019. These results are reported normalized per thousand population, 15–69 years old. The figures for Algeria, Bahrain, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, the Islamic Republic of Iran, Malta, Tunisia, and Yemen were estimated from a total corresponding to Middle East and North Africa (MENA)

countries using a breakdown of total GDP (current US\$) for the above-mentioned countries to define referential percentages.

Source: Calculations were derived from PwC's *Global Entertainment and Media Outlook, 2019–2023*; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population); *World Economic Outlook Database*, October 2019 (current US\$ GDP); Middle East & North Africa in the World Bank's *DataBank*. (<http://www.pwc.com/outlook>; <https://population.un.org/wpp/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>; <http://data.worldbank.org/region/middle-east-and-north-africa>).

#### 7.2.4. Printing publications and other media output

Printing publications and other media (% of manufactures total output)<sup>a</sup> | 2017

Printing, and reproduction of recorded media output (ISIC Revision 4 Division 18, group 181 with class 1811 and 1812 and group 182 with class 1820) as a percentage of total manufacturing output (ISIC Revision 4, section C). Where data for ISIC Revision 4 were not available, data from ISIC Revision 3 were used (ISIC Revision 3 group 222, classes 2221, 2222, and 2230).

Source: United Nations Industrial Development Organization, *Industrial Statistics Database*; 4-digit level of International Standard Industrial Classification ISIC Revision 4 (INDSTAT4 2020) and ISIC Revision 3 (INDSTAT2 2020). (2010-17). (<http://www.unido.org/statistics.html>; <http://data.un.org/>).

#### 7.2.5. Creative goods exports

Creative goods exports (% of total trade) | 2018

Total value of creative goods exports (current US\$) over total trade. Creative goods as defined in 2009 UNESCO Framework for Cultural Statistics, *Table 3, International trade of cultural goods and services based on the 2007 Harmonised System (HS 2007)*. For the definition of total trade, see indicator 5.3.1.

Source: United Nations, *Comtrade* database; 2009 UNESCO Framework for Cultural Statistics, *Table 3, International trade of cultural goods and services based on the 2007 Harmonised System (HS 2007)*; World Trade Organization, *Trade in Commercial Services* database, itself based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual and Balance of Payments* database (2012-18). (<http://comtrade.un.org/>; <http://uis.unesco.org/sites/default/files/documents/measuring-cultural-participation-2009-unesco-framework-for-cultural-statistics-handbook-2-2012-en.pdf>; [https://www.wto.org/english/res\\_e/statis\\_e/tradeserv\\_stat\\_e.htm](https://www.wto.org/english/res_e/statis_e/tradeserv_stat_e.htm); <https://www.oecd.org/sdd/its/EBOPS-2010.pdf>).

### 7.3. Online creativity

#### 7.3.1. Generic top-level domains (gTLDs)

Generic top-level domains (gTLDs) (per thousand population 15–69 years old) | 2019

A generic top-level domain (gTLD) is one of the categories of top-level domains (TLDs) maintained by the Internet Assigned Numbers Authority (IANA) for use on the Internet. Generic TLDs can be unrestricted (.com, .info, .net, and .org) or restricted—that is, used on the basis of fulfilling eligibility criteria (.biz, .name, and .pro). Of these, the statistic covers the five generic domains .biz, .info, .org, .net, and .com. Generic domains .name and .pro, and sponsored domains (.arpa, .aero, .asia, .cat, .coop, .edu, .gov, .int, .jobs, .mil, .museum, .tel, .travel, and .xxx) are not included. Neither are country-code top-level domains (refer to indicator 7.3.2). The statistic represents the total number of registered domains (i.e., net totals by December 2019, existing domains + new registrations – expired domains). Data are collected on the basis of a 4% random sample of the total population of domains drawn from the root zone files (a complete listing of active domains) for each TLD. The geographic location of a domain is determined by the registration address for the domain name registrant that is returned from a *whois* query. These registration data are parsed by country and postal code and then aggregated to any number of geographic levels such as county, city, or country/economy. The original hard data were scaled by thousand population 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population). (<http://www.zooknic.com>; <https://population.un.org/wpp/>).

#### 7.3.2. Country-code top-level domains (ccTLDs)

Country-code top-level domains (ccTLDs) (per thousand population 15–69 years old) | 2019

A country-code top-level domain (ccTLD) is one of the categories of top-level domains (TLDs) maintained by the Internet Assigned Numbers Authority (IANA) for use on the Internet. Country-code TLDs are two-letter domains especially designated for a particular economy, country, or autonomous territory (there are 3916 ccTLDs, in various alphabets/characters as of June 2020). The statistic represents the total number of registered domains (i.e., net totals by December 2019, existing domains + new registrations – expired domains). Data are collected from the registry responsible for each ccTLD and represent the total number of domain registrations in the ccTLD. Each ccTLD is assigned to the country with which it is associated rather than based on the registration address of the registrant. ZookNIC reports that, for the ccTLDs it



covers, 85–100% of domains that are registered in the same country; the only exceptions are the ccTLDs that have been licensed for worldwide commercial use. Data are reported per thousand population 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population). (<http://www.zooknic.com>; <https://population.un.org/wpp/>).

### 7.3.3. Wikipedia yearly edits

Wikipedia yearly edits by country (per million population 15–69 years old) | 2019

Data extracted from Wikimedia Foundation's internal data sources. Data reflects economies with more than 100,000 edit counts in 2019; The data exclude both contributions to the extent that is identifiable in the data sources. Data are reported per million population 15–69 years old. Data from China are treated as missing and considered "n/a".

Source: Wikimedia Foundation; United Nations, Department of Economic and Social Affairs, Population Division (2019). *World Population Prospects: The 2019 Revision* (population). (<https://wikimediafoundation.org>; <https://esa.un.org/unpd/wpp/>).

### 7.3.4. Mobile app creation

Global downloads of mobile apps (scaled by per billion PPP \$ GDP) | 2019

Global downloads of mobile apps, by origin of the headquarters of the developer/firm, scaled by PPP\$ GDP (billions). Global downloads are compiled by App Annie Intelligence, public data sources, and the company's proprietary forecast model based on data from Google play store and iOS App store in each country between January 1, 2019 and December 31, 2019. Since data for China are not available for Google play store and only for iOS App store, data from China are treated as missing and considered "n/a".

Source: App Annie Intelligence; International Monetary Fund, *World Economic Outlook Database, October 2019* (PPP\$ GDP) (2016-19). (<https://www.appannie.com/en/>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).