

# GLOBAL INNOVATION INDEX 2018

## Australia

**20<sup>th</sup>** Australia is ranked 20th in the GII 2018, moving up 3 positions from the previous year.

The GII indicators are grouped into innovation inputs and outputs. The following table reflects Australia's ranking over time<sup>1</sup>.

| Australia's ranking over time |     |       |        |            |
|-------------------------------|-----|-------|--------|------------|
|                               | GII | Input | Output | Efficiency |
| 2018                          | 20  | 11    | 31     | 76         |
| 2017                          | 23  | 12    | 30     | 76         |
| 2016                          | 19  | 11    | 27     | 73         |

- Australia's position in innovation outputs deteriorates this year, moving down from the 27th position in 2016 to the 31st this year.
- In innovation inputs, Australia exhibits a more stable performance over the last three years, ranking 11th-12th globally.
- Australia's efficiency in translating innovation inputs into outputs is comparatively lower than other countries. Indeed, its Innovation Efficiency Ratio ranks only 76th. This is negatively influenced by much lower ranking in innovation outputs (31st) than in innovation inputs (11th).

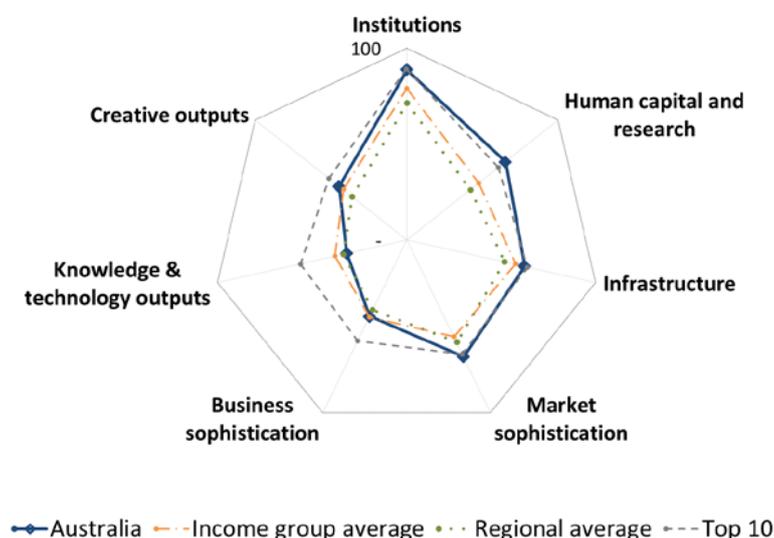
**19<sup>th</sup>** Australia is ranked 19th among the 47 high-income countries in the GII 2018.

**6<sup>th</sup>** Australia is ranked 6th among the 15 countries in South East Asia and Oceania.

<sup>1</sup> Note that year-on-year comparisons of the GII ranks are imperfect and influenced by changes in the GII model and data availability.

## Benchmarking Australia to other high-income countries and the South East Asia and Oceania region

### Australia's scores by area



### High-income countries

Australia has high scores in 5 GII areas – **Institutions, Human Capital and Research, Infrastructure, Market Sophistication, and Creative Outputs**, in which it scores above the average of the high-income group.

Top scores in areas *Regulatory environment, Education, Information & Communication Technologies (ICTs), Trade, competition & market scale, and Intangible assets* are behind these high rankings.

### South East Asia and Oceania region

Compared to other countries in the South East Asia and Oceania region, Australia performs better in 6 GII area: **Institutions, Human Capital and Research, Infrastructure, Market Sophistication, Business Sophistication, and Creative Outputs**.

## Australia's innovation profile

### Strengths

- Australia's major strength lies in **Human Capital and Research** in which it ranks the 3rd globally. It also exhibits strengths in two of its elements: *Education* (3rd) and *Tertiary education* (7th). At the variable level, *Quality of universities* (6th) as well as *School life expectancy* and *Tertiary enrolment* – both ranking 1st in the world – are signaled as comparative strengths.
- Another major strength for Australia is in the area **Market Sophistication**, where it ranks 7<sup>th</sup>. Here, two of its elements, namely *Credit* (5th) and *Trade, competition & market scale* (10th), are also highlighted as comparative strengths. At the variable level, *Ease of getting credit* (6th) and *Intensity of local competition* (7th) show strong rankings.
- In **Institutions** (12th), Australia has strengths in the area *Business environment* (10th) and in indicators *Regulatory quality* (6th) and *Ease of starting a business* (7th).
- In **Infrastructure** (16th), the area *Information and communication technologies (ICTs)* (4th) and indicators *Government's online service* and *E-participation*, both ranking 2nd, are strengths for Australia.
- In **Business Sophistication** (28th), Australia has strength in the area *Knowledge workers* (10th).

- Moving to the innovation output side, in **Knowledge & Technology Outputs** (38th), Australia has strengths in indicators *Quality of scientific publications* (10th) and *New businesses* (7th).
- In **Creative Outputs** (22nd), it exhibits strength in indicator *Generic top-level domains (TLDs)* (10th).

## Weaknesses

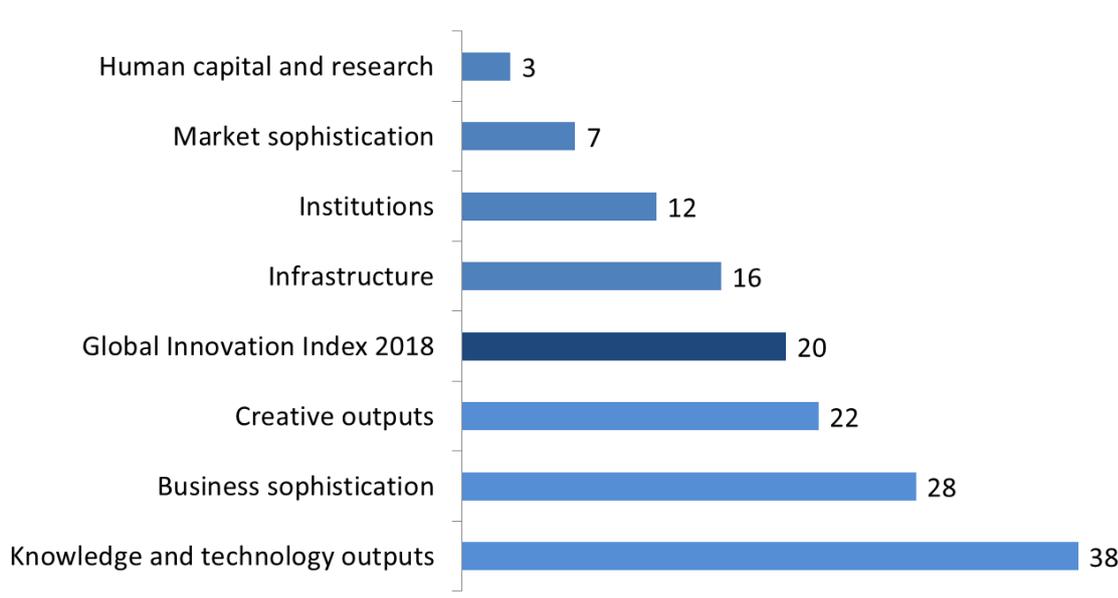
- Australia's main weakness is the **Innovation Efficiency Ratio** which ranks 76th globally.
- Relative GII weaknesses on the **innovation input** side are concentrated in **Business Sophistication** (28th), where the indicators *GERD financed by abroad* (84th), *ICT services imports* (65th) and *Research talent in business enterprise* (43rd).
- Other relative GII weaknesses on the **Innovation Input** side are found at the variable level in *Graduates in science and engineering* (69th), *GDP per unit of energy use* (67th), and *Ease of protecting minority investors* (56th).
- On the **innovation output**, most of the relative weaknesses are exhibited in the **Knowledge & Technology Outputs** (38th), in the sub-pillar *Knowledge diffusion* (92nd) and in indicators *Productivity growth* (61st), *ICT services exports* (83rd), and *FDI outflows* (99th).
- In **Creative outputs** (22nd), Australia exhibits relative weakness only in indicator *National feature films produced* (61st).

The following figure presents a summary of Australia's ranks in the 7 GII pillars, as well as the overall rank in the GII 2018.

### AUSTRALIA's rank in the GII 2018 and the 7 GII pillars

Rank 1 is the highest possible in each pillar

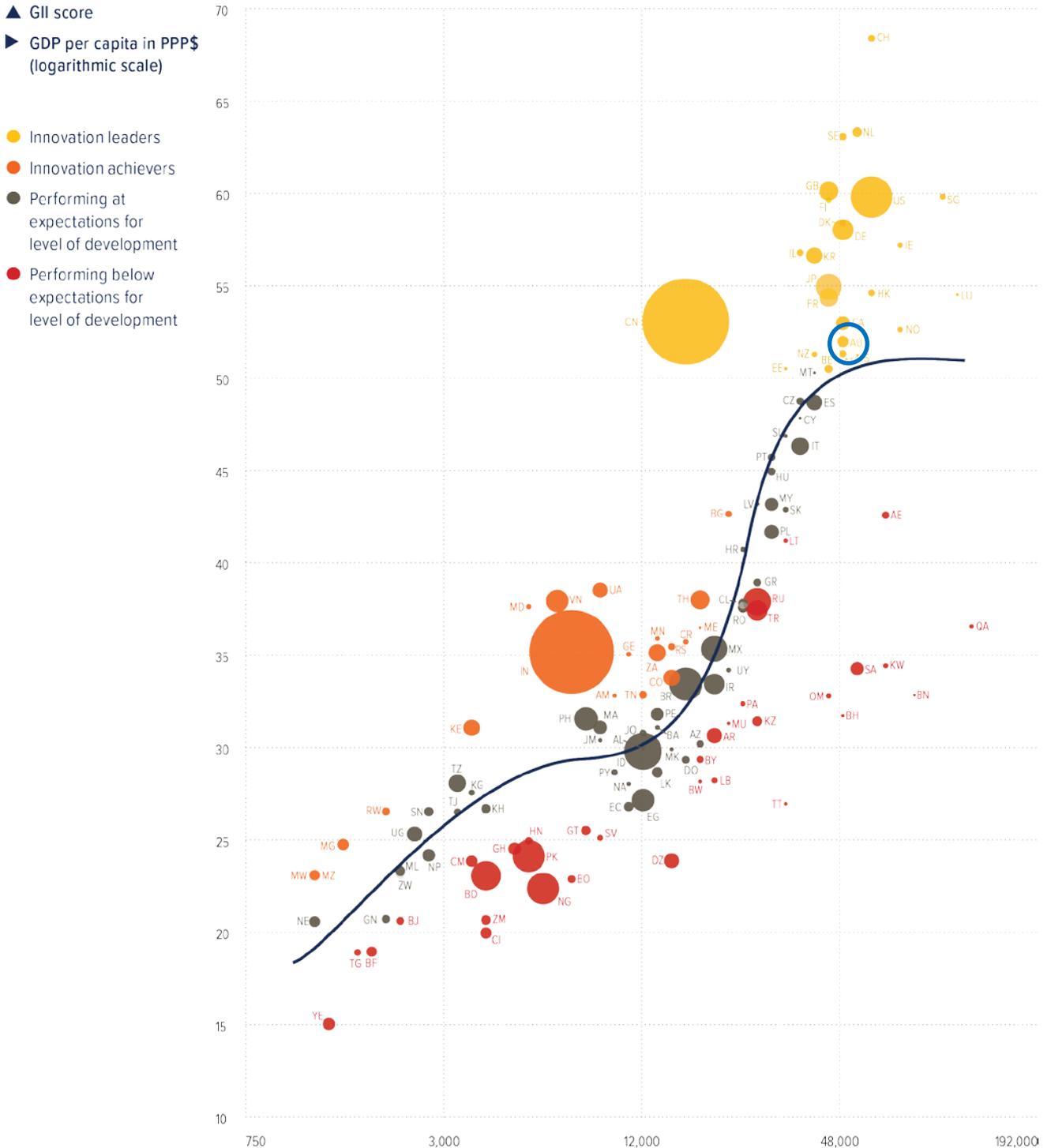
Total number of countries: 126



## Expected vs. Observed Innovation Performance

The GII bubble chart shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The depicted trendline gives an indication of the expected innovation performance at different levels of income. Countries located above the trendline are performing better than what would be expected based on their income level. Countries below the line are Innovation Under-performers relative to GDP.

Relative to GDP, Australia performs at the expected level of its development.



## Missing and Outdated Data

More and better data improve the ability of a country to understand its strengths and weaknesses and give policymakers greater capacity to plan and adapt public policies accordingly. The GII 2018 covers 126 countries that complied with the minimum indicator coverage of 35 indicators in the Innovation Input Sub-Index (66%) and 18 indicators in the Innovation Output Sub-Index (66%).

The following tables show data for Australia that is not available or that is outdated.

### Missing Data

| Code  | Indicator                                      | Country Year | Model Year | Source  |
|-------|--|--------------|------------|---|
| 2.1.2 | Government funding/pupil, secondary, % GDP/cap | n/a          | 2014       | UNESCO Institute for Statistics               |
| 2.1.5 | Pupil-teacher ratio, secondary                 | n/a          | 2016       | UNESCO Institute for Statistics               |
| 4.1.3 | Microfinance gross loans, % GDP                | n/a          | 2016       | Microfinance Information Exchange, Mix Market |
| 5.1.2 | Firms offering formal training, % firms        | n/a          | 2013       | World Bank, Enterprise Surveys                |

### Outdated Data

| Code  | Indicator   | Country Year | Model Year | Source                            |
|-------|---|--------------|------------|-----------------------------------|
| 2.2.2 | Graduates in science & engineering, %               | 2015         | 2016       | UNESCO Institute for Statistics   |
| 2.3.1 | Researchers, FTE/mn pop.                            | 2010         | 2016       | UNESCO Institute for Statistics   |
| 2.3.2 | Gross expenditure on R&D, % GDP                     | 2015         | 2016       | UNESCO Institute for Statistics   |
| 5.1.3 | GERD performed by business, % GDP                   | 2015         | 2016       | UNESCO Institute for Statistics   |
| 5.1.4 | GERD financed by business, %                        | 2008         | 2015       | UNESCO Institute for Statistics   |
| 5.1.5 | Females employed w/advanced degrees, %              | 2013         | 2016       | ILO, ILOSTAT                      |
| 5.2.3 | GERD financed by abroad, %                          | 2008         | 2015       | UNESCO Institute for Statistics   |
| 5.3.5 | Research talent, % in business enterprise           | 2010         | 2016       | UNESCO Institute for Statistics   |
| 7.2.1 | Cultural & creative services exports, % total trade | 2015         | 2016       | WTO, Trade in Commercial Services |



| Output rank   | Input rank   | Income      | Region      | Efficiency ratio | Population (mn) | GDP, PPP\$ | GDP per capita, PPP\$ | GII 2017 rank |
|---|--|-------------|-------------|------------------|-----------------|------------|-----------------------|---------------|
| 31  | 11   | High        | SEAO        | 76 ○             | 24.5            | 1,235.3    | 50,333.7              | 23            |
|   |  |             |             | Score/Value      | Rank            |            |                       |               |
|    | <b>Institutions</b> .....  | <b>88.7</b> | <b>12</b>   |                  |                 |            |                       |               |
| 1.1   | Political environment.....   | 85.3        | 14          |                  |                 |            |                       |               |
| 1.1.1   | Political stability & safety*.....                                     | 86.9        | 18          |                  |                 |            |                       |               |
| 1.1.2   | Government effectiveness*.....   | 84.5        | 15          |                  |                 |            |                       |               |
| 1.2   | Regulatory environment.....  | 93.1        | 11          |                  |                 |            |                       |               |
| 1.2.1   | Regulatory quality*.....   | 92.7        | 6 ●         |                  |                 |            |                       |               |
| 1.2.2   | Rule of law*.....  | 92.0        | 11          |                  |                 |            |                       |               |
| 1.2.3   | Cost of redundancy dismissal, salary weeks.....                        | 12.0        | 40          |                  |                 |            |                       |               |
| 1.3   | Business environment.....  | 87.6        | 10 ●        |                  |                 |            |                       |               |
| 1.3.1   | Ease of starting a business*.....                                      | 96.5        | 7 ●         |                  |                 |            |                       |               |
| 1.3.2   | Ease of resolving insolvency*.....                                     | 78.8        | 17          |                  |                 |            |                       |               |
|    | <b>Human capital &amp; research</b> .....                              | <b>65.2</b> | <b>3 ●◆</b> |                  |                 |            |                       |               |
| 2.1   | Education.....   | 74.6        | 3 ●◆        |                  |                 |            |                       |               |
| 2.1.1   | Expenditure on education, % GDP.....                                   | 5.2         | 43          |                  |                 |            |                       |               |
| 2.1.2   | Government funding/pupil, secondary, % GDP/cap.....                    | n/a         | n/a         |                  |                 |            |                       |               |
| 2.1.3   | School life expectancy, years.....                                     | 22.9        | 1 ●◆        |                  |                 |            |                       |               |
| 2.1.4   | PISA scales in reading, maths & science.....                           | 502.3       | 19          |                  |                 |            |                       |               |
| 2.1.5   | Pupil-teacher ratio, secondary.....                                    | n/a         | n/a         |                  |                 |            |                       |               |
| 2.2   | Tertiary education.....  | 58.3        | 7 ●         |                  |                 |            |                       |               |
| 2.2.1   | Tertiary enrolment, % gross.....                                       | 121.9       | 1 ●◆        |                  |                 |            |                       |               |
| 2.2.2   | Graduates in science & engineering, % <sup>②</sup> .....               | 17.6        | 69 ○        |                  |                 |            |                       |               |
| 2.2.3   | Tertiary inbound mobility, %.....                                      | 17.5        | 9 ◆         |                  |                 |            |                       |               |
| 2.3   | Research & development (R&D).....                                      | 62.6        | 14          |                  |                 |            |                       |               |
| 2.3.1   | Researchers, FTE/mn pop. <sup>②</sup> .....                            | 4,539.5     | 17          |                  |                 |            |                       |               |
| 2.3.2   | Gross expenditure on R&D, % GDP <sup>②</sup> .....                     | 1.9         | 19          |                  |                 |            |                       |               |
| 2.3.3   | Global R&D companies, top 3, mn US\$.....                              | 68.2        | 20          |                  |                 |            |                       |               |
| 2.3.4   | QS university ranking, average score top 3*.....                       | 82.1        | 6 ●         |                  |                 |            |                       |               |
|  | <b>Infrastructure</b> .....  | <b>62.2</b> | <b>16</b>   |                  |                 |            |                       |               |
| 3.1   | Information & communication technologies (ICTs).....                   | 89.0        | 4 ●         |                  |                 |            |                       |               |
| 3.1.1   | ICT access*.....   | 80.0        | 24          |                  |                 |            |                       |               |
| 3.1.2   | ICT use*.....  | 79.7        | 14          |                  |                 |            |                       |               |
| 3.1.3   | Government's online service*.....                                      | 97.8        | 2 ●◆        |                  |                 |            |                       |               |
| 3.1.4   | E-participation*.....  | 98.3        | 2 ●◆        |                  |                 |            |                       |               |
| 3.2   | General infrastructure.....  | 53.2        | 20          |                  |                 |            |                       |               |
| 3.2.1   | Electricity output, kWh/cap.....                                       | 10,565.9    | 13          |                  |                 |            |                       |               |
| 3.2.2   | Logistics performance*.....  | 80.0        | 19          |                  |                 |            |                       |               |
| 3.2.3   | Gross capital formation, % GDP.....                                    | 24.1        | 48          |                  |                 |            |                       |               |
| 3.3   | Ecological sustainability.....   | 44.6        | 44          |                  |                 |            |                       |               |
| 3.3.1   | GDP/unit of energy use.....  | 8.3         | 67 ○        |                  |                 |            |                       |               |
| 3.3.2   | Environmental performance*.....  | 74.1        | 21          |                  |                 |            |                       |               |
| 3.3.3   | ISO 14001 environmental certificates/bn PPP\$ GDP.....                 | 3.6         | 27          |                  |                 |            |                       |               |
|  | <b>Market sophistication</b> .....                                     | <b>67.7</b> | <b>7 ●</b>  |                  |                 |            |                       |               |
| 4.1   | Credit.....  | 76.0        | 5 ●◆        |                  |                 |            |                       |               |
| 4.1.1   | Ease of getting credit*.....   | 90.0        | 6 ●◆        |                  |                 |            |                       |               |
| 4.1.2   | Domestic credit to private sector, % GDP.....                          | 142.9       | 12          |                  |                 |            |                       |               |
| 4.1.3   | Microfinance gross loans, % GDP.....                                   | n/a         | n/a         |                  |                 |            |                       |               |
| 4.2   | Investment.....  | 48.3        | 39          |                  |                 |            |                       |               |
| 4.2.1   | Ease of protecting minority investors*.....                            | 60.0        | 56 ○        |                  |                 |            |                       |               |
| 4.2.2   | Market capitalization, % GDP.....                                      | 93.9        | 12          |                  |                 |            |                       |               |
| 4.2.3   | Venture capital deals/bn PPP\$ GDP.....                                | 0.1         | 16          |                  |                 |            |                       |               |
| 4.3   | Trade, competition, & market scale.....                                | 78.9        | 10 ●        |                  |                 |            |                       |               |
| 4.3.1   | Applied tariff rate, weighted mean, %.....                             | 1.2         | 14          |                  |                 |            |                       |               |
| 4.3.2   | Intensity of local competition <sup>†</sup> .....                      | 81.6        | 7 ●         |                  |                 |            |                       |               |
| 4.3.3   | Domestic market scale, bn PPP\$.....                                   | 1,235.3     | 19          |                  |                 |            |                       |               |
|    | <b>Business sophistication</b> .....                                   | <b>44.5</b> | <b>28</b> ◆ |                  |                 |            |                       |               |
| 5.1   | Knowledge workers.....   | 66.9        | 10 ●        |                  |                 |            |                       |               |
| 5.1.1   | Knowledge-intensive employment, %.....                                 | 46.0        | 11          |                  |                 |            |                       |               |
| 5.1.2   | Firms offering formal training, % firms.....                           | n/a         | n/a         |                  |                 |            |                       |               |
| 5.1.3   | GERD performed by business, % GDP <sup>②</sup> .....                   | 1.0         | 20          |                  |                 |            |                       |               |
| 5.1.4   | GERD financed by business, % <sup>②</sup> .....                        | 61.9        | 10          |                  |                 |            |                       |               |
| 5.1.5   | Females employed w/advanced degrees, % <sup>②</sup> .....              | 22.6        | 16          |                  |                 |            |                       |               |
| 5.2   | Innovation linkages.....   | 32.8        | 52 ◆        |                  |                 |            |                       |               |
| 5.2.1   | University/industry research collaboration <sup>†</sup> .....          | 54.9        | 32 ◆        |                  |                 |            |                       |               |
| 5.2.2   | State of cluster development <sup>†</sup> .....                        | 49.7        | 49 ◆        |                  |                 |            |                       |               |
| 5.2.3   | GERD financed by abroad, % <sup>②</sup> .....                          | 1.6         | 84 ○        |                  |                 |            |                       |               |
| 5.2.4   | JV-strategic alliance deals/bn PPP\$ GDP.....                          | 0.1         | 10          |                  |                 |            |                       |               |
| 5.2.5   | Patent families 2+ offices/bn PPP\$ GDP.....                           | 1.0         | 28 ◆        |                  |                 |            |                       |               |
| 5.3   | Knowledge absorption.....  | 33.8        | 46 ◆        |                  |                 |            |                       |               |
| 5.3.1   | Intellectual property payments, % total trade.....                     | 1.3         | 23          |                  |                 |            |                       |               |
| 5.3.2   | High-tech net imports, % total trade.....                              | 11.7        | 24          |                  |                 |            |                       |               |
| 5.3.3   | ICT services imports, % total trade.....                               | 1.1         | 65 ○        |                  |                 |            |                       |               |
| 5.3.4   | FDI net inflows, % GDP.....  | 3.1         | 51          |                  |                 |            |                       |               |
| 5.3.5   | Research talent, % in business enterprise <sup>②</sup> .....           | 27.9        | 43 ○◆       |                  |                 |            |                       |               |
|    | <b>Knowledge &amp; technology outputs</b> .....                        | <b>31.9</b> | <b>38</b> ◆ |                  |                 |            |                       |               |
| 6.1   | Knowledge creation.....  | 34.5        | 26          |                  |                 |            |                       |               |
| 6.1.1   | Patents by origin/bn PPP\$ GDP.....                                    | 2.2         | 44 ◆        |                  |                 |            |                       |               |
| 6.1.2   | PCT patents by origin/bn PPP\$ GDP.....                                | 1.5         | 22 ◆        |                  |                 |            |                       |               |
| 6.1.3   | Utility models by origin/bn PPP\$ GDP.....                             | 0.9         | 26          |                  |                 |            |                       |               |
| 6.1.4   | Scientific & technical articles/bn PPP\$ GDP.....                      | 28.4        | 11          |                  |                 |            |                       |               |
| 6.1.5   | Citable documents H index.....   | 64.5        | 10 ●        |                  |                 |            |                       |               |
| 6.2   | Knowledge impact.....  | 46.0        | 27          |                  |                 |            |                       |               |
| 6.2.1   | Growth rate of PPP\$ GDP/worker, %.....                                | 0.8         | 61 ○        |                  |                 |            |                       |               |
| 6.2.2   | New businesses/th pop. 15-64.....                                      | 15.5        | 7 ●◆        |                  |                 |            |                       |               |
| 6.2.3   | Computer software spending, % GDP.....                                 | 0.3         | 46          |                  |                 |            |                       |               |
| 6.2.4   | ISO 9001 quality certificates/bn PPP\$ GDP.....                        | 10.7        | 30          |                  |                 |            |                       |               |
| 6.2.5   | High- & medium-high-tech manufactures, %.....                          | 0.3         | 39          |                  |                 |            |                       |               |
| 6.3   | Knowledge diffusion.....   | 15.1        | 92 ○◆       |                  |                 |            |                       |               |
| 6.3.1   | Intellectual property receipts, % total trade.....                     | 0.3         | 31 ◆        |                  |                 |            |                       |               |
| 6.3.2   | High-tech net exports, % total trade.....                              | 2.2         | 51 ◆        |                  |                 |            |                       |               |
| 6.3.3   | ICT services exports, % total trade.....                               | 1.0         | 83 ○        |                  |                 |            |                       |               |
| 6.3.4   | FDI net outflows, % GDP.....   | 0.1         | 99 ○◆       |                  |                 |            |                       |               |
|  | <b>Creative outputs</b> .....  | <b>44.7</b> | <b>22</b>   |                  |                 |            |                       |               |
| 7.1   | Intangible assets.....   | 49.7        | 38 ◆        |                  |                 |            |                       |               |
| 7.1.1   | Trademarks by origin/bn PPP\$ GDP.....                                 | 68.5        | 27          |                  |                 |            |                       |               |
| 7.1.2   | Industrial designs by origin/bn PPP\$ GDP.....                         | 2.3         | 47          |                  |                 |            |                       |               |
| 7.1.3   | ICTs & business model creation <sup>†</sup> .....                      | 69.6        | 32 ◆        |                  |                 |            |                       |               |
| 7.1.4   | ICTs & organizational model creation <sup>†</sup> .....                | 66.1        | 24 ◆        |                  |                 |            |                       |               |
| 7.2   | Creative goods & services.....   | 35.5        | 27          |                  |                 |            |                       |               |
| 7.2.1   | Cultural & creative services exports, % total trade <sup>②</sup> ..... | 0.4         | 33          |                  |                 |            |                       |               |
| 7.2.2   | National feature films/mn pop. 15-69.....                              | 1.9         | 61 ○◆       |                  |                 |            |                       |               |
| 7.2.3   | Entertainment & Media market/th pop. 15-69.....                        | 66.1        | 7           |                  |                 |            |                       |               |
| 7.2.4   | Printing & other media, % manufacturing.....                           | 2.5         | 10 ◆        |                  |                 |            |                       |               |
| 7.2.5   | Creative goods exports, % total trade.....                             | 0.8         | 51          |                  |                 |            |                       |               |
| 7.3   | Online creativity.....   | 44.2        | 15          |                  |                 |            |                       |               |
| 7.3.1   | Generic top-level domains (TLDs)/th pop. 15-69.....                    | 62.5        | 10 ●        |                  |                 |            |                       |               |
| 7.3.2   | Country-code TLDs/th pop. 15-69.....                                   | 51.4        | 14          |                  |                 |            |                       |               |
| 7.3.3   | Wikipedia edits/mn pop. 15-69.....                                     | 47.2        | 28          |                  |                 |            |                       |               |
| 7.3.4   | Mobile app creation/bn PPP\$ GDP.....                                  | 31.0        | 30          |                  |                 |            |                       |               |

NOTES: ● indicates a strength; ○ a weakness; ◆ a strength relative to the other top 25-ranked GII economies; ◇ a weakness relative to the other top 25;

\* an index; † a survey question. ② indicates that the country's data are older than the base year; see Appendix II for details, including the year of the data, at <http://globalinnovationindex.org>. Square brackets indicate that the data minimum coverage (DMC) requirements were not met at the sub-pillar or pillar level; see page 75 of this appendix for details.