The GII indicators are grouped into innovation inputs and outputs. The following table reflects Turkey's ranking over time¹.

<table>
<thead>
<tr>
<th>Year</th>
<th>GII</th>
<th>Input</th>
<th>Output</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>50</td>
<td>62</td>
<td>43</td>
<td>25</td>
</tr>
<tr>
<td>2017</td>
<td>43</td>
<td>68</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td>2016</td>
<td>42</td>
<td>59</td>
<td>37</td>
<td>13</td>
</tr>
</tbody>
</table>

• This year Turkey gains 6 positions in innovation inputs, reaching the 62nd position.
• In innovation outputs Turkey exhibits a downward trend, ranking 43rd and dropping from the 36th and 37th position in the past two years.
• Turkey’s rank in the Innovation Efficiency Ratio deteriorates this year, ranking 25th, down from the 9th position in 2017. Relative to its GII ranking (50th), Turkey presents a high rank in the Efficiency Ratio, which is partly influenced by the higher ranking in innovation outputs (43rd) compared to inputs (62th).

¹ Note that year-on-year comparisons of the GII ranks are imperfect and influenced by changes in the GII model and data availability.
Benchmarking Turkey to other upper-middle-income countries and the Northern Africa and Western Asia region

Turkey's scores by GII area

Upper-middle-income countries

Turkey has high scores in 5 of the 7 GII areas – Human Capital & Research, Infrastructure, Market Sophistication, Knowledge & Technology Outputs, and Creative Outputs, in which it scores above the average of the upper-middle-income group.

Top scores in areas such as Education, Information & Communication Technologies (ICTs), Trade, competition & market scale, Knowledge impact, and Intangible assets are behind these high rankings.

Northern Africa and Western Asia region

Compared to other countries in the Northern Africa and Western Asia region, Turkey performs above-average in 6 of the 7 GII areas: Human Capital & Research, Infrastructure, Market Sophistication, Business Sophistication, Knowledge & Technology Outputs, and Creative Outputs.

Turkey’s innovation profile

Strengths

- Turkey’s strengths are scattered across various GII areas.

- In Market Sophistication (55th), the area Trade, competition & market scale (9th) and two of its three indicators – Intensity of local competition (8th) and Domestic market scale (13th) – are highlighted as strengths.

- In Human Capital & Research (49th), Turkey demonstrates strengths in indicators School life expectancy (14th) and Tertiary enrolment, in which it is number 3 in the world.

- Other GII strengths on the innovation input side are found in the indicator GDP per unit of energy use (16th) within Infrastructure (52nd). Indicator High-tech imports (21st) is a strength within Business Sophistication (72nd).

- Among innovation outputs, most of the GII strengths for Turkey lie in Creative Outputs (39th), the top-ranked GII area for Turkey. In particular, Turkey presents a strong
performance in the area *Intangible assets* (11th) as well as indicators *Trademarks by origin* (14th), *Creative goods exports* (18th), and *Industrial designs by origin* – which positions 1st in the world.

- In **Knowledge & Technology Outputs** (52nd), Turkey performs strongly in the indicator *Computer software spending* (20th).

**Weaknesses**

- On the **innovation input** side, three GII weaknesses are exhibited in **Institutions** (96th), where Turkey performs relatively weakly in indicators *Political stability & safety* (124th), *Cost of redundancy dismissal* (111th), and *Ease of resolving insolvency* (112th).

- In **Human Capital & Research** (49th), only one GII weakness is found in the indicator *Government funding per pupil* (82nd).

- Relative weaknesses also appear in other two **innovation input** areas: *Market Sophistication* (55th) and *Business Sophistication* (72nd). In the former, Turkey shows relative weaknesses in indicators *Microfinance gross loans* (77th) and *Venture capital deals* (78th). In the latter, weak indicators are *R&D financed by abroad* (90th) and *ICT services imports* (121st).

- Among **innovation outputs**, Turkey demonstrates relative weaknesses only in two indicators: *ICT services exports* (122nd) within **Knowledge & Technology Outputs** (52nd) and *Cultural & creative services exports* (75th) within **Creative Outputs** (39th).

The following figure presents a summary of Turkey’s ranks in the 7 GII areas, as well as the overall rank in the GII 2018.

**Turkey’s rank in the GII 2018 and the 7 GII areas**

<table>
<thead>
<tr>
<th>Area</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative outputs</td>
<td>39</td>
</tr>
<tr>
<td>Human capital and research</td>
<td>49</td>
</tr>
<tr>
<td>Global Innovation Index 2018</td>
<td>50</td>
</tr>
<tr>
<td>Knowledge and technology outputs</td>
<td>52</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>52</td>
</tr>
<tr>
<td>Market sophistication</td>
<td>55</td>
</tr>
<tr>
<td>Business sophistication</td>
<td>72</td>
</tr>
<tr>
<td>Institutions</td>
<td>96</td>
</tr>
</tbody>
</table>
**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, Turkey performs below its expected level of development.
Missing and Outdated Data

More and better data improves 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 Turkey that is not available or that is outdated.

### Missing Data

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicator</th>
<th>Country Year</th>
<th>Model Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.1</td>
<td>Intellectual property receipts, % total trade</td>
<td>n/a</td>
<td>2016</td>
<td>WTO, Trade in Commercial Services</td>
</tr>
</tbody>
</table>

### Outdated Data

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicator</th>
<th>Country Year</th>
<th>Model Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.3</td>
<td>School life expectancy, years</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.1.5</td>
<td>Pupil-teacher ratio, secondary</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.2.1</td>
<td>Tertiary enrolment, % gross</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Graduates in science &amp; engineering, %</td>
<td>2014</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Tertiary inbound mobility, %</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Researchers, FTE/mn pop.</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Gross expenditure on R&amp;D, % GDP</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>4.1.3</td>
<td>Microfinance gross loans, % GDP</td>
<td>2015</td>
<td>2016</td>
<td>Microfinance Information Exchange, Mix Market</td>
</tr>
<tr>
<td>5.1.3</td>
<td>GERD performed by business, % GDP</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
<tr>
<td>5.3.5</td>
<td>Research talent, % in business enterprise</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics (UIS)</td>
</tr>
</tbody>
</table>
Turkey

<table>
<thead>
<tr>
<th>Output rank</th>
<th>Input rank</th>
<th>Income</th>
<th>Region</th>
<th>Efficiency ratio</th>
<th>Population (mn)</th>
<th>GDP, PPP$</th>
<th>GDP per capita, PPP$</th>
<th>GII 2017 rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>62</td>
<td>Upper-middle</td>
<td>NAWA</td>
<td>25</td>
<td>80.7</td>
<td>2,132.7</td>
<td>26,892.9</td>
<td>43</td>
</tr>
</tbody>
</table>

**Institutions**

1. Political environment ........................................ 370 102
2.1. Political stability & safety* ................................ 18.4 124
2.1.1 Government effectiveness* .................................. 46.4 68
2.2. Regulatory environment ......................................... 55.6 97
2.2.1 Regulatory quality* ......................................... 491 60
2.2.2 Rule of law* ............................................ 39.5 71
2.2.3 Cost of redundancy dismissal, salary weeks .......... 29.8 11 1
2.3. Business environment ........................................ 60.4 97
2.3.1 Ease of starting a business* ................................ 876 66
2.3.2 Ease of resolving insolvency* ............................. 33.3 112

**Human capital & research**

3.1. Educational level ............................................... 42.5 82
3.1.1 Expenditure on education, % GDP ......................... 4.4 69
3.1.2 Government funding/pupil, secondary, % GDP/cap ...... 11.2 82
3.1.3 School life expectancy, year* .............................. 17.4 15
3.1.4 Microfinance gross loans, % GDP ......................... 13.7 16
3.2. Business environment ........................................ 49.4 36
3.2.1 Graduates in science & engineering, % ................. 20.2 58
3.2.2 Tertiary enrolment mobility, % ............................. 12.8 78
3.2.3 Researchers, FTE/mn pop .................................. 1215.8 46
3.2.4 Gross expenditure on R&D, % GDP* ....................... 0.9 21
3.2.5 Global R&D companies, top 3, mn US$ ................. 52.5 27
3.2.6 QS university ranking, average score top 3* .......... 28.2 41

**Infrastructure**

4.1. Information & communication technologies (ICTs) ....... 58.8 65
4.1.1 ICT access* .................................................. 63.0 67
4.1.2 ICT use* ..................................................... 49.2 67
4.1.3 Government's online service* .............................. 601.4 87
4.1.4 E-participation* ............................................ 62.7 59
4.2. General infrastructure ........................................ 48.7 33
4.2.1 Electricity output, kWh/cap ................................. 3,493.8 56
4.2.2 Logistics performance* ..................................... 52.9 33
4.2.3 Gross capital formation, % GDP ......................... 29.6 21
4.3. Ecological sustainability ...................................... 40.5 54
4.3.1 GDP/unit of energy use ................................... 13.7 16
4.3.2 Environmental performance* ............................. 53.0 87
4.3.3 ISO 14001 environmental certificates/bn PPP$ GDP ....... 0.9 70

**Market sophistication**

5.1. Credit ........................................................ 28.0 95
5.1.1 Ease of getting credit* ...................................... 55.0 70
5.1.2 Domestic credit to private sector, % GDP ............... 69.9 45
5.1.3 Microfinance gross loans, % GDP* ....................... 0.0 77
5.2. Investment ................................................... 38.4 77
5.2.1 Ease of protecting minority investors* .................. 71.7 20
5.2.2 Market capitalization, % GDP ............................ 218.6 61
5.2.3 Venture capital deals/bn PPP$ GDP ...................... 0.0 78
5.3. Trade, competition, & market scale ......................... 78.9 9
5.3.1 Applied tariff rate, weighted mean ....................... 4.0 60
5.3.2 Intensity of local competition* ........................... 81.3 8
5.3.3 Domestic market scale, bn PPP$ ......................... 2,132.7 13

**Business sophistication**

6.1. Knowledge creation ........................................ 22.8 41
6.1.1 Patents by origin/bn PPP$ GDP ............................ 3.4 30
6.1.2 PCT patents by origin/bn PPP$ GDP ....................... 0.6 32
6.1.3 Utility models by origin/bn PPP$ GDP .................... 17.6 16
6.1.4 Scientific & technical articles/bn PPP$ GDP .......... 8.3 59
6.1.5 Citable documents H index ................................ 25.9 35
6.2. Knowledge impact .......................................... 38.9 53
6.2.1 Growth rate of PPP$ GDP worker ......................... 2.2 33
6.2.2 New businesses/tn pop 15–64 ............................. 12.6 66
6.2.3 Computer software spending, % GDP ................... 0.5 20
6.2.4 ISD 9001 quality certificates/bn PPP$ GDP ........... 3.5 73
6.2.5 High- & medium-high-tech manufactures, % ................ 0.2 31
6.3. Knowledge diffusion ....................................... 15.5 90
6.3.1 Intellectual property receipts, % total trade ............... n/a n/a
6.3.2 High-tech net exports, % total trade ....................... 1.3 63
6.3.3 ICT services exports, % total trade ....................... 0.1 122
6.3.4 FDI net outflows, % GDP ................................. 0.6 63

**Creative outputs**

7.1. Intangible assets ............................................. 60.1 11
7.1.1 Trademarks by origin/bn PPP$ GDP ..................... 97.2 14
7.1.2 Industrial designs by origin/bn PPP$ GDP ................ 19.8 1
7.1.3 ITCs & business model creation* ......................... 63.2 53
7.1.4 ITCs & organizational model creation* ................. 50.8 75
7.2. Creative goods & services .................................. 23.5 60
7.2.1 Cultural & creative services exports, % total trade ... 0.0 75
7.2.2 National feature films/tn pop 15–69 ...................... 2.5 58
7.2.3 Entertainment & Media market/tn pop 15–69 ........... 6.2 43
7.2.4 Printing & other media, % manufacturing ................. 0.9 62
7.2.5 Creative goods exports, % total trade ..................... 31.8 38
7.3. Online creativity ........................................ 10.9 56
7.3.1 Generic top-level domains (TLDs)/tn pop 15–69 ........... 11.8 36
7.3.2 Country-code TLDs/tn pop 15–69 ......................... 2.0 66
7.3.3 Wikipedia edits/tn pop 15–69 ............................... 4.4 85
7.3.4 Mobile app creation/bn PPP$ GDP ....................... 26.8 36

**Knowledge & technology outputs**

8.1. Knowledge workers ........................................... 33.4 71
8.1.1 Knowledge-intensive employment, % .................... 21.0 72
8.1.2 Firms offering formal training, % ......................... 28.4 52
8.1.3 GERD performed by business, % GDP* .................. 0.4 36
8.1.4 GERD financed by business, % ......................... 50.1 19
8.1.5 Females employed w/advanced degrees, % ................ 8.6 70
8.2. Innovation linkages .......................................... 20.8 102
8.2.1 Universities & industry research collaboration* ....... 41.3 62
8.2.2 State of cluster development* .............................. 470.0 56
8.2.3 GERD financed by abroad, % .............................. 11.1 90
8.2.4 JV–strategic alliance deals/bn PPP$ GDP ............ 0.9 92
8.2.5 Patent families 2+ offices/bn PPP$ GDP ............... 0.2 42
8.3. Knowledge absorption ...................................... 31.9 57
8.3.1 Intellectual property payments, % total trade ......... 0.4 71
8.3.2 High-tech net imports, % total trade ..................... 12.3 21
8.3.3 ICT services imports, % total trade ....................... 0.1 121
8.3.4 FDI net inflows, % GDP .................................. 16.8 88
8.3.5 Research talent, % in business enterprise* .......... 476.0 25

**Notes:**
- * indicates a strength; ○ a weakness; ◊ an income group strength; ◊ an income group weakness; * an index; † a survey question.
- ◊ 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.