Information and Communications Technologies (ICT)
2017 Market Data
May 2018
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   List of sponsors and data providers

2 PROJECT SCOPE
   Definition of market and breakdowns by sub-sectors

3 TOTAL ICT MARKET SIZE
   Turkish Information and Communications Technologies total market size

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   Exports, employment, types and value of incentives utilized, factors driving growth, major issues faced in the sector, investment and impact areas, etc.
Project stakeholders

Project Consultant

Deloitte.

Project Data Providers
## Project scope

TUBISAD's Market Data study, which has been conducted since 2012, has been performed with Deloitte with a standardized scope and methodology for the last 5 years.

<table>
<thead>
<tr>
<th>Information Technologies</th>
<th><strong>Hardware</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Computers (PC, Tablet, e-Reader and Others)</td>
</tr>
<tr>
<td></td>
<td>• Servers and Storage Units</td>
</tr>
<tr>
<td></td>
<td>• Peripherals (Printers, Monitors etc.)</td>
</tr>
<tr>
<td></td>
<td>• Local Network Devices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Software</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operating systems and databases</td>
</tr>
<tr>
<td>• System management software</td>
</tr>
<tr>
<td>• Desktop applications</td>
</tr>
<tr>
<td>• Security applications</td>
</tr>
<tr>
<td>• Business applications</td>
</tr>
<tr>
<td>• Mobile applications and games</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Services</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Outsourcing</td>
</tr>
<tr>
<td>• Consulting</td>
</tr>
<tr>
<td>• Development and Integration</td>
</tr>
<tr>
<td>• Maintenance and Education</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Equipment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fixed and Mobile Phones</td>
</tr>
<tr>
<td>• Networks and Telecom Equipment and related services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electronic Communications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fixed and mobile communication services</td>
</tr>
<tr>
<td>• Infrastructure management services</td>
</tr>
<tr>
<td>• Cable broadcasting services</td>
</tr>
<tr>
<td>• Satellite communication and platform services</td>
</tr>
</tbody>
</table>
Sector size is calculated and verified through a bottom-up approach.

In addition to the data provided by our sector companies through a comprehensive survey, data from institutions such as BTK, Context, SASAD, and the Ministry of Science, Industry and Technology are also utilized.

- Company and sector data are measured properly to avoid any overlaps or duplicate calculations
- Company data are gathered together with different breakdowns:
  - Sales direct to End-users vs through distributors
  - Import vs export
  - Origin of products and services
  - R&D center share

\[\text{Import} = \quad \text{Export}\]
The number of companies whose data is being measured within the scope of our work has increased 5 times over the last five years and reached 4,701 in 2017.
Total sector size (bn TRY)

ICT market size in Turkey
(billion TRY)

- **2016**: 94.3
- **2017**: 111.9
- **2018 Forecast**: 116.9

**Actual Growth Rate**: 18.2%

**Expected growth rate last year**: 5-10%

**2018 Growth Forecast**: 10-15%

Annual changes refer to comparable growth rates

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Sector growth components

25% of the growth in the sector is coming from the Electronic Communications sector and about 20% is due to changes in foreign exchange rates.

**ICT Market Growth in 2016-2017**

(billion TRY)

<table>
<thead>
<tr>
<th>Year</th>
<th>IT Hardware</th>
<th>IT Software</th>
<th>IT Service</th>
<th>CT Hardware</th>
<th>Electronic Comms</th>
<th>Currency Impact</th>
<th>New Additions</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>1.3</td>
<td>2.6</td>
<td>1.4</td>
<td>3.5</td>
<td>5.7</td>
<td>4.3</td>
<td>3.9</td>
<td>94.3</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>116.9</td>
</tr>
</tbody>
</table>

TRY Change
2012-2017 sector development (billion TL)

Size of the Turkish ICT sector has almost doubled by growing at annual average rate of 15% since 2012

ICT Market Size in Turkey
(billion TRY)

Annual changes refer to comparable growth rates
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Total sector size (USD bn)

ICT Market Size in Turkey
(USD bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>ICT Market Size (USD bn)</th>
<th>Actual Growth Rate</th>
<th>Expected Growth Rate last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>31.2</td>
<td>1.5%</td>
<td>-5 to -10%</td>
</tr>
<tr>
<td>2017</td>
<td>30.7</td>
<td>1.4</td>
<td></td>
</tr>
</tbody>
</table>

Annual changes refer to comparable growth rates

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2012-2017 sector development (USD bn)
The Turkish ICT market has been trending in the USD 30-32bn range since 2012

ICT Market Size in Turkey
(USD bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Size of newly added companies this year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>30.4</td>
</tr>
<tr>
<td>2013</td>
<td>32.0</td>
</tr>
<tr>
<td>2014</td>
<td>31.6</td>
</tr>
<tr>
<td>2015</td>
<td>29.9</td>
</tr>
<tr>
<td>2016</td>
<td>31.2</td>
</tr>
<tr>
<td>2017</td>
<td>30.7</td>
</tr>
</tbody>
</table>

USDTRY = 1.80
USDTRY = 1.90
USDTRY = 2.19
USDTRY = 2.73
USDTRY = 3.02
USDTRY = 3.64
Information and Communications Technologies market breakdown (billion TL)

ICT Market Size in Turkey
(billion TRY)

2013-17 Annual Average Growth

Information Technologies
19%

Communications Technologies
15%

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Information and Communications Technologies market breakdown (billion TL)

<table>
<thead>
<tr>
<th>Year</th>
<th>ICT Market Size in Turkey (billion TRY)</th>
<th>Information Technologies</th>
<th>Communication Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>31.9</td>
<td>9.4</td>
<td>22.5</td>
</tr>
<tr>
<td>2014</td>
<td>31.6</td>
<td>10.1</td>
<td>21.5</td>
</tr>
<tr>
<td>2015</td>
<td>29.9</td>
<td>9.5</td>
<td>20.4</td>
</tr>
<tr>
<td>2016</td>
<td>31.2</td>
<td>9.8</td>
<td>21.4</td>
</tr>
<tr>
<td>2017</td>
<td>32.1</td>
<td>11.3</td>
<td>20.8</td>
</tr>
</tbody>
</table>


2013-2017 Annual Average Growth:
- Information Technologies: 1.4%
- Communication Technologies: -2.0%
Information and Communications Technology sector subcategories

Information Technologies (billion TRY)

- Hardware: 16.0 (20.5%)
- Software: 18.8 (29.1%)
- Service: 6.4 (13.8%)

Communications Technologies (billion TRY)

- Electronic Communications: 51.1 (12.6%)
- Electronic Equipment: 24.5 (30.3%)

2016-17 Growth Rate

- Information Technologies: 18.9%
- Communications Technologies: 17.8%

Annual changes refer to comparable growth rates

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The mix of sector components has been trending closer to that of developed countries since 2013 and the share of value-added activities such as software and services has continued to grow.

- Although the share of Information Technology remained mostly stable within the total, the distribution of its components has been evolving in favor of value-added sectors.
- Among the drivers of growth in the Software and Information Services sectors are cloud computing and digital transformation. Growth in the R&D centers has also been a significant contributor.
- However, when compares with the EU and other developed countries, the development opportunities in the service sector are especially noteworthy.
The IT services sector in Turkey appears to have a relatively small size when assessed within the total.
Technology Development Zones (Technoparks)

14% of the total sector volume was generated through Technoparks in 2017

<table>
<thead>
<tr>
<th>Technoparks in Turkey</th>
<th>2016</th>
<th>2017</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Technoparks</td>
<td>64</td>
<td>69</td>
<td>7.8%</td>
</tr>
<tr>
<td>Number of Companies</td>
<td>4,217</td>
<td>4,624</td>
<td>9.7%</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>41,172</td>
<td>45,274</td>
<td>10.0%</td>
</tr>
<tr>
<td>Total Revenues (bn TRY)</td>
<td>11.6</td>
<td>15.8</td>
<td>36.6%</td>
</tr>
<tr>
<td>Total Exports (bn TRY)</td>
<td>2.4</td>
<td>2.9</td>
<td>20.8%</td>
</tr>
<tr>
<td>Revenue per Company (million TRY)</td>
<td>2.7</td>
<td>3.4</td>
<td>24.6%</td>
</tr>
<tr>
<td>Revenue per Employee (thousand TRY)</td>
<td>282</td>
<td>350</td>
<td>24.3%</td>
</tr>
<tr>
<td>Exports per Technopark (million TRY)</td>
<td>37.5</td>
<td>42.0</td>
<td>12.1%</td>
</tr>
<tr>
<td>Exports as a share of Revenues</td>
<td>20.7%</td>
<td>18.3%</td>
<td>-239 bps</td>
</tr>
</tbody>
</table>

Source: Republic of Turkey, Ministry of Science, Industry and Technology

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## ICT Exports

**mn TRY**

<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Export</th>
<th>% Share in Subcategory</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>389 mn TRY</td>
<td>2.4%</td>
<td>35%</td>
</tr>
<tr>
<td>Software</td>
<td>3,268 mn TRY</td>
<td>17.4%</td>
<td>36%</td>
</tr>
<tr>
<td>Service</td>
<td>404 mn TRY</td>
<td>6.3%</td>
<td>27%</td>
</tr>
<tr>
<td>Communications Equipment</td>
<td>630 mn TRY</td>
<td>13.9%*</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Total Exports 2017**

4,691 mn TRY

**Comparable Year-over-Year Growth:** 33%

*Mobile phones are excluded.

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ICT Exports

ICT exports have nearly doubled since 2014 reaching US $ 1.3 billion.

### ICT Exports (mn USD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Export Value (mn USD)</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>654</td>
<td>12.1</td>
</tr>
<tr>
<td>2015</td>
<td>809</td>
<td>19.7</td>
</tr>
<tr>
<td>2016</td>
<td>1,022</td>
<td>10.6</td>
</tr>
<tr>
<td>2017</td>
<td>1,289</td>
<td></td>
</tr>
</tbody>
</table>

- Especially with the depreciation of the Turkish lira and the support of export oriented policies, sector exports have doubled in USD over the past three years.
- According to information which are collected from study:
  - A large share of sector exports comes from technology development zones.
  - 63% of exports are made to European Union countries.
ICT exports
Development of sub categories- mn USD

ICT Exports
(mn USD)

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>654</td>
<td>809</td>
<td>1,022</td>
<td>1,289</td>
</tr>
<tr>
<td>Hardware</td>
<td>68</td>
<td>72</td>
<td>105</td>
<td>111</td>
</tr>
<tr>
<td>Software</td>
<td>409</td>
<td>505</td>
<td>676</td>
<td>898</td>
</tr>
<tr>
<td>Services</td>
<td>104</td>
<td>84</td>
<td>74</td>
<td>107</td>
</tr>
<tr>
<td>Comms Equipment</td>
<td>74</td>
<td>150</td>
<td>167</td>
<td>173</td>
</tr>
</tbody>
</table>

2016-17 Comparable Growth Rate

- Hardware: 5.4%
- Software: 13.0%
- Services: 11.9%
- Comms Equipment: 3.7%
- Total: 10.6%
ICT export destinations

Based on responses of 71 firms, breakdown of total exports to regions

- **North America**: 3%
- **South America**: 4%
- **European Union**: 63%
- **Non-EU Europe**: 7%
- **Asia Pacific**: 4%
- **Middle East and Africa**: 19%

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ICT employment
in thousands

<table>
<thead>
<tr>
<th>Total Employment 2017</th>
<th>Information Technologies</th>
<th>Employment</th>
<th>% Share</th>
<th>% Change *</th>
</tr>
</thead>
<tbody>
<tr>
<td>128k</td>
<td></td>
<td>89K</td>
<td>69%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Growth*: 5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communications Technologies</td>
<td>39K</td>
<td>31%</td>
<td>-0.8%</td>
</tr>
</tbody>
</table>

|                | Female employees¹         | 27%        |
|                | University graduates¹     | 70%        |
|                | R&D employees¹            | 10%        |
|                | Subcontractors¹           | 1%         |

¹ Based on survey responses and BTK data

* 2015 data was updated. Growth rates represent comparable rates (calculated by excluding surveyed firms for the first time this year)
Why a career in ICT
Opinions of women in technology

Why do women workers prefer the technology sector:

Promoting a positive and successful future
- 68%
- 32%

Development opportunities
- 59%
- 41%

Dynamic and everchanging sector
- 50%
- 50%

Globally applicable sector
- 40%
- 60%

Education background in this field
- 30%
- 70%

Percentage of those who want to continue their career in the industry

Why do they want to leave?
- No job-private life balance
- No promotion opportunities
- Inadequate wages and benefits
- No opportunities for career advancement
- Males are dominant in sector

Source: Deloitte Turkish Women in Technology Report, 2018
In your view, how is the number of employees for your company likely to change this year?

### 2018 survey vs. 2017 survey

- **Decrease more than 10%**: 2% (2017) vs. 2% (2018)
- **Decrease between 5% and 10%**: 2% (2017) vs. 4% (2018)
- **Decrease between 0% and 5%**: 3% (2017) vs. 1% (2018)
- **No Change**: 23% (2018) vs. 30% (2017)
- **Increase between 0% and 5%**: 23% (2018) vs. 23% (2017)
- **Increase between 5% and 10%**: 14% (2018) vs. 18% (2017)
- **Increase more than 10%**: 27% (2018) vs. 18% (2017)

---

2018 N = 124; 2017 N = 168
Incentives utilized

- **45%** KOSGEB Support Programs
- **41%** TÜBİTAK-TEYDEB Support and Grant Programs
- **38%** No.4691 Technology Advancement Regions
- **38%** Incentives provided by the Ministry of Economy

- **23%** No.5746 R&D Support

**% of firms that utilized incentives in 2017**: 49%

**Total value of incentives used**: 228 million TL

1 Based on responses of 68 firms answering the question
Over the years, sector companies have been raising the same concerns in a consistent manner - 'lack of qualified talent' and 'price oriented outsourcing / public procurement policies' continues to be the leading issues impeding growth.
What are the 3 major problems faced in the sector?

- Price-oriented public procurement policies: 46% (2017), 52% (2016), 47% (2015)
- High and complex tax system: 34% (2017), 31% (2016), 33% (2015)
- Inadequacy of regulation on intellectual property rights: 17% (2017), 16% (2016), 17% (2015)
- Problems related to foreign trade legislation applications: 18% (2017), 14% (2016), 17% (2015)
- Lack of demand for outsourcing: 18% (2017), 12% (2016), 18% (2015)
- Other: 9% (2017), 7% (2016), 8% (2015)

Criteria: 115 firms that responded to the question
Impact Areas

For the next two years, which of the following technological areas will have the most impact on your business (Choose at most three answers)

- Cloud Computing 57% (56%)
- Digital Transformation 50% (48%)
- Analytics / Big Data / AI & Machine Learning 42% (40%)
- Cyber security 29% (39%)
- Developing Technologies (3D Printers, Robotics, Blockchain, etc.) 30% (30%)
- Modernization of Old/Legacy Systems 28% (30%)
- None 6% (9%)

N = 115

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2017 ICT Market in Turkey

Total Market Size: 116.9

Information Technologies:
- Hardware: 16.0
- Software: 18.8
- Service: 6.4
- Total: 41.3

Communications Technologies:
- Equipment: 24.5
- Electronic Comms: 51.1
- Total: 75.6

Total Exports: 4.7 bn
Total Employment: 128k

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### 2017 ICT Market in Turkey

**Total Exports**: 1.3 bn USD

**Total Employment**: 128k

**Total Market Size**: 32.1 bn USD

#### Information Technologies

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4</td>
<td>5.2</td>
<td>1.8</td>
</tr>
</tbody>
</table>

#### Communications Technologies

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Electronic Comms</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7</td>
<td>14.1</td>
</tr>
</tbody>
</table>
Thank You

We would like to thank to Ministry of Science, Industry and Technology, BTK, SASAD, Context, TÜBİSAD members and sector companies for their valuable contributions.

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