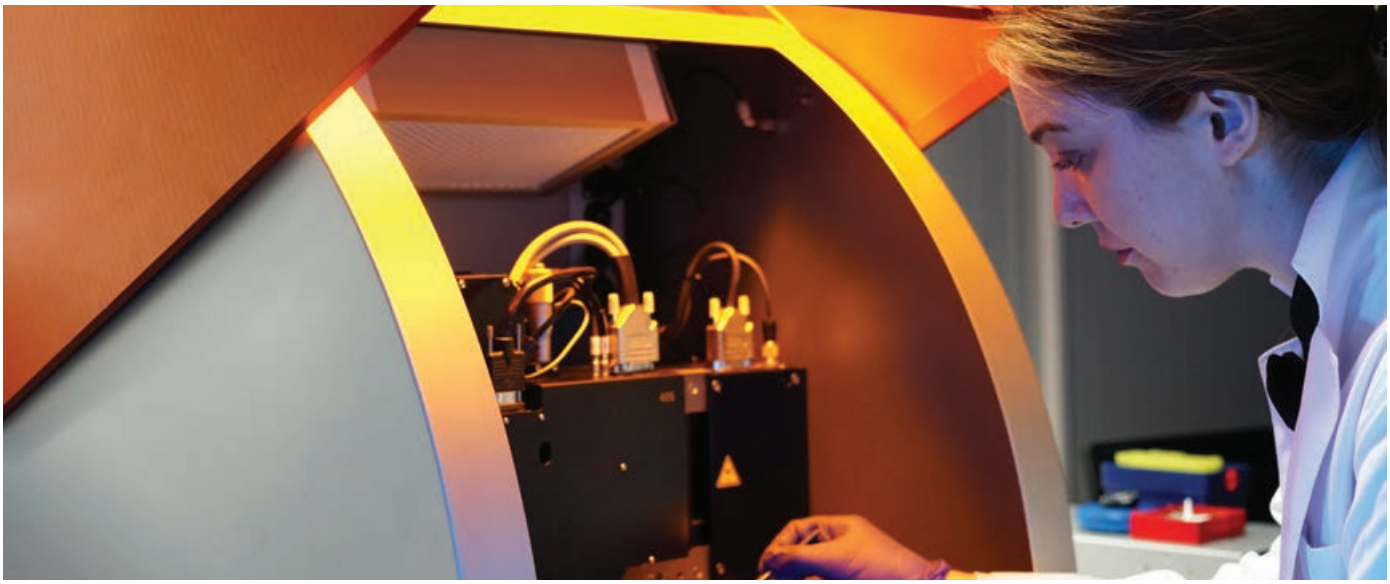
TEKPOL STI POLICY NEWSLETTER

Science, Technology and Innovation Policy in Turkey
April 2021

The aim of STI Policy Newsletter is to present information regarding the science, technology and innovation (STI) policy landscape in Turkey.

What is in this issue?



Topic in focus

Increased government role in STI policy making through missions

The role of government in supporting research and innovation is a recent trend in STI policy-making. Moving away from a passive state mode (government regulate) to an active state mode (government creates market), government actively involves in technology development and innovation. The seminal book of Mariana Mazzucato, The Entrepreneurial State, gives many examples from different countries and different technologies regarding how governments induce technological change by actively creating markets rather than regulating the existing ones (1). The argument is that radical technologies and scientific breakthroughs seldom emerge from firms. Governments create such technologies and the market until a risk-taking environment is set for firms.

Turkey is somewhere between the passive and active state modes (2). In some sectors, such as defence and energy, and specific technologies, such as unmanned aerial vehicles and now electric automobiles, the government is definitely more active. The establishment of Indigenous Technology Directorate in 2020 under the Ministry of Industry and Technology can also be taken as a sign of movement towards a more active mode. Automotive sector is a good example in this manner (3, 4). Especially after the Customs Union agreement with the European Union (EU) in 1996 the automotive sector was by and large left to market forces and the government mostly had a regulating role. Now with Turkey's Automobile Initiative Group (Türkiye Otomotiv Girişim Grubu, TOGG) this is changing. The investment decision and the current activities to produce a fully electric automobile led to sharp changes in other firms' attitude. Currently, many brands are advertising heavily about fully electric and hybrid automobiles much earlier than planned. For instance, Ford is establishing Turkey's first battery assembly plant.

As a reflection of the active state mode mission-oriented policy is increasingly being adopted by developing as well as developed countries. The US missions, France and Germany moving towards mission-oriented principles, the role of government in Brazil's renewable energy technology development and health sector and Italy's recent attempt in creating missions are just a few examples around the world. The statement that the new FP of the EU, Horizon Europe, will follow mission-oriented policy principles even further enhanced the popularity of missions (5). Horizon Europe with a budget of more than €100 billion will be the leading research and innovation fund of the EU for the next 7 years (2021-2027). New missions focus on "sustainability" thus differ from the old missions (e.g., man on the moon of the US). Research and innovation efforts are organized around a bold clear aim (e.g., 100 carbon free cities in the EU by 2030) defined by a mission.

It is difficult to say that Turkey moves toward mission-oriented policy. How the TOGG electric automobile is publicized may sound like a mission- An indigenous electric car on the road by 2022- but it cannot be said that all research and innovation efforts are organized around this mission. The recent attempts of the government are an indication that the Turkish government wants to be actively involved in technology production. For instance, Covid-19 platform lists all organized events of the government including government funded research to combat Covid-19. The recent National Space Program could also be an example in this manner. But it is hard to say that such organized attempts define missions.

Active state mode and mission-oriented policy making need massive research and innovation finance, macroeconomic stability, good coordination among government bodies and between the government and the firms, and dynamic capabilities on the government side. Though Turkey has structural problems that are difficult to address quickly in all these areas, it is still recommended that Turkey experiments with mission-oriented policy making in niche areas such as clean energy production.

Main statistics

Main STI Indicators for Turkey

	TR 2005	TR 2010	TR 2015	TR 2018	TR 2019	EU 27 2019
GDP per capita (€)	5,964	8,060	10,001	8,148	8,287	31,279
GERD (million €)	2,287	4,642	6,814	6,752	7,228	307,845
GERD as % of the GDP	0.57	0.80	0.88	1.03	1.06	2.2
GERD (€ per capita)	33.6	64.0	87.7	83.5	88.1	688.7
R&D personnel (FTE) as a percentage of active population	0.24	0.33	0.42	0.55	0.56	1.13
Human resources in Science and Technology as a percentage of active population	---	20.9	26.3	28.8	30.3	46.9
Employment in high and medium-high tech. manufacturing as a share of total employment (%)	---	3.0	3.3	3.5	3.6	6.2
Employment in total knowledge-intensive activities as a share of total employment (%)	---	18.3	20.5	24.2	25.8	39
Exports of high technology products as a share of total exports (%)	---	2.0	1.9	2.4	---	17.9

Source: *TurkStat, Eurostat. GERD: Gross Expenditure in R&D. FTE: Full time equivalent. GDP: Gross Domestic Product.. GDP per capita is calculated as GDP in current prices (millions of €) divided by population 1st of January. The definitions of active population, human resources in S&T, high and medium-high technology and knowledge-intensive activities are available in the links given for each indicator. The figures for EU 27 are preliminary.*

Recent STI related statistics

Turkish Statistical Office (TurkStat) has issued an assessment study for Turkey's performance on the UN's Sustainable Development Goals, on 2 February 2021.

According to 2019 Biotechnology Statistics, issued by TurkStat on 30 October 2020, 363 ventures have been defined to conduct Biotechnology activities, with DNA/RNA as the most widely used technique and human health as the main field of research.

Research and Development Activities Survey (2019), issued by TurkStat on 23 October 2020, revealed that the share of R&D expenditure in total Gross Domestic Product has reached 1.06%.

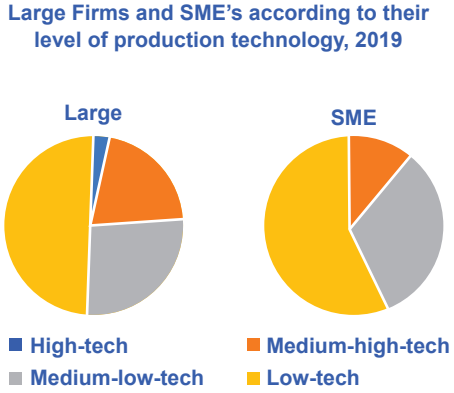
2020 Survey on Information and Communication Technology (ICT) Usage in Enterprises, issued by TurkStat on 28 August 2020, has revealed a 94.9% access to the internet by companies. 53.7% of the firms have a website. 9.8% conducted e-commerce activities and 14.1 used cloud computing services.

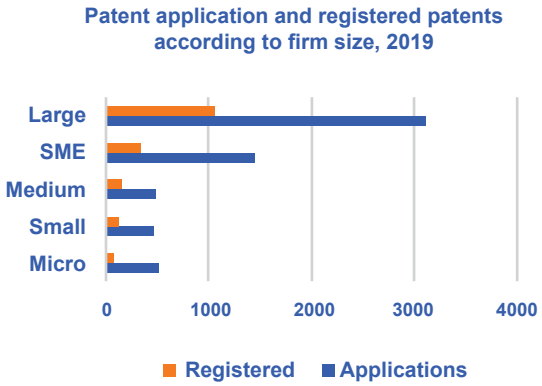
2020 Survey on Information and Communication Technology (ICT) Usage in Households and by Individuals, issued by TurkStat on 25 August 2020, revealed that 79.0% use the internet, 51.5% use e-government services, while %36.5 use the internet for product purchase.

Central Government Budget Appropriations and Outlays on R&D, issued by TurkStat on 19 June 2020 reports that 14.9 billion TL (€2.8 billion) have been spent on R&D from the central budget.

Statistics in focus

According to the Small and Medium Sized Enterprises (SME) Statistics 2019, SMEs constitute 99.8% of the total number of firms, 72.4% of total employment and 36.6% of total exports. Only 0.5% of the SMEs in the manufacturing sector in Turkey produce using high-technology. About 90% of the SMEs are classified as low-tech and medium-low tech. But still in absolute numbers there are 2,153 SMEs that are classified as high-tech.





SMEs total R&D expenditure in 2019 is 9 billion TL (roughly about €1 billion) which is about one third of total business R&D expenditure of Turkey. 112,338 personnel engage in R&D activities in SMEs on full-time-equivalent (FTE) bases which is about half (47.1%) of the total R&D workforce in Turkey.

In 2019 SMEs registered 345 patents. Success rates of medium-sized and even small firms in obtaining patents are comparable to large firms. While SMEs register roughly about one in every four patent applications, large firms' patent applications are about 35% of the time successful on average. However, only one in seven patent applications of micro firms are successful warranting specific policy design for micro firms.

Reports, publications and official documents

In Turkish

TÜBA Doğal Gaz Raporu (TÜBA Natural Gas Report), Turkish Academy of Sciences (TÜBA). April 2021.

BiGG - 1512 Girişimcilik Destek Programı Performans Analizi (BiGG-1512 Entrepreneurship Support Program Performance Analysis), The Scientific and Technological Research Council of Turkey (TÜBİTAK), March 2021.

Türkiye'nin Dijitalleşme Endeksi Raporu (Digitilization Index for Turkey Report). Informatics Industry Association (TÜBİSAD). February 2021.

Derin Teknolojiye Derinlemesine Bakış (Deeper Look into Deep Technology). Cube Incubation. February 2021.

Türkiye'de Yazılım Ekosisteminin Geleceği (The future of Turkey's Software Ecosystem). Turkish Industry and Business Association (TÜSİAD). January 2021.

Tarım Ekosisteminde İnovasyon Fırsatları (Innovation Opportunities in the Agriculture Ecosystem). Technology Development Foundation of Turkey (TTGV). January 2021.

KPMG Turkish Startup Investments Review 2020, KPMG Turkey. 2021.

Otonom ve Bağlantılı Araç Teknolojileri Geliştirme, Eğitim ve Test Altyapısı Projesi Raporu (Autonomous and Connected Vehicle Technologies Development, Education and Test Infrastructure Project Report). İstanbul Development Agency and Turkish Management Sciences Institute (TÜSSİDE). December 2020.

Türkiye Bilim Raporu (Turkey Science Report). Turkish Academy of Sciences (TÜBA). November 2020.

Teknolojik İnovasyon Sisteminde İnsan Kaynakları Araştırması (Human resources in Technological Innovation Systems). Technology Development Foundation of Turkey (TTGV). November 2020.

TÜBA–Jeotermal Enerji Teknolojileri Raporu (Report on Geothermal Energy Technologies). Turkish Academy of Sciences (TÜBA). November 2020.

Bilişim Teknolojileri ve İletişim: Birey ve Toplum Güvenliği (ICT Technologies and Communication: Individual and Society Safety). Turkish Academy of Sciences (TÜBA). November 2020.

Küresel Salgının Anatomisi: İnsan ve Toplumun Geleceği (Anatomy of the Global Pandemic: The Future of Human and Society). Turkish Academy of Sciences (TÜBA). 2020.

Tüba Enerji Depolama Teknolojileri Raporu (Energy Storage Technologies Report). Turkish Academy of Sciences (TÜBA). 2020.

Tarım ve Gıda 2020: Sürdürülebilir Büyüme Bağlamında Tarım ve Gıda Sektörünün Analizi (Agriculture and Food 2020: Analysis of the Agriculture and Food Sector in the Context of Sustainable Growth). Turkish Industry and Business Association (TÜSİAD). 2020.

Ekonomik Göstergeler Merceğinden Yeni İklim Rejimi Raporu (New Climate Regime Report from the Lens of Economic Indicators). Turkish Industry and Business Association (TÜSİAD). 2020.

Mesleki ve Teknik Liselerde Sanayi 4.0 için STEM Eğitimi (STEM Education in Vocational High School for Industry 4.0). Turkish Industry and Business Association (TÜSİAD). June 2020.

In English

The State of Turkish Startup Ecosystem: An In-Depth Analysis and Evaluation. Presidency of the Republic of Turkey Investment Office. 2020.

Notes

(1) Mazzucato, M. (2013) Entrepreneurial State, Anthem Press.
(2) Akçomak, I.S. and Emiroğlu, U. (2020), Devlet Kaynaklı Teknolojik Gelişme: Girişimci Devlet ve Doğurgan Devlet, in Tiryakioğlu, M. (eds) Devletle Kalkınma, İletişim Yayınevi: Ankara, 73-102.
(3) Akçomak, I.S. and Bürken, S. (2020), Middle-Technology Trap: The case of Automotive Industry in Turkey, in Ferreira, J. J., Teixeira, S.J., Rammal, H.G. (eds). Technological Innovation and International Competitiveness for Business Growth, Palgrave, pp. 263-306.
(4) Akçomak, İ.S. (2021), Orta-Teknoloji Tuzağında Devletin Rolü, in Tiryakioğlu, M. (eds). Türkiye'nin Yerli Üretimi ve Politik Ekonomisi, İstanbul Bilgi Üniversitesi Yayınları, pp. 281-288.
(5) See also the full account of reports on mission-oriented policy: https://ec.europa.eu/info/horizon-europe/missions-horizon-europe/mission-oriented-policy-studies-and-reports_en.

April 2021 TEKPOL STI Policy Newsletter is prepared by: İbrahim Semih Akçomak, Esin Yazıcı, Seda Kılıçaslan and Yelda Erden Topal. Graphic design by Yasemin Oran.

Science and Technology Policy Research Center (TEKPOL), Middle East Technical University
http://stps.metu.edu.tr
stps@metu.edu.tr