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**SCIENTIFIC COOPERATION BETWEEN THE  
EUROPEAN UNION AND TURKEY –  
ADVANTAGES AND POSSIBLE  
SYNERGIES**

**W P**

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## Scientific cooperation between the European Union and Turkey – advantages and possible synergies

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## Scientific cooperation between the European Union and Turkey – advantages and possible synergies

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### Abstract

The Turkish economy has shown remarkable economic performance over the last decade. Currently, it is the 18th largest economy in the world. To increase its competitiveness, Turkey set research and development as a priority area for the next decade, with the ambitious goal of reaching 3% of GERD/GDP by 2023. Despite several controversies about the EU accession process in general, Turkey is an active member of the European research area. It is an associated member of the RDI Framework Programmes since 2002, it participated in and coordinated various scientific projects, policy-coordination actions, mobility programmes and won grants for excellent researchers. In the Turkish national STI strategy for 2011-2016, the three vertical and six horizontal axes consist of various scientific areas like ICT, Energy, Defence, Water, Food, which have been also set as priority areas in the European H2020 programme. We would like to focus in our article on possible synergies between priority areas, as well as on the role of SMEs in the innovation chain, which are enjoying a special attention in both Horizon 2020 and in Turkish national science and economic policy.

*JEL:* F42, H52, I23, O14, O32.

*Keywords:* Turkey; cooperation; research and development; Science, Technology and Innovation policy; Horizon 2020; middle income trap.

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### Introduction

The study focuses on the possibility of scientific cooperation between the European Union and Turkey.

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In the first chapter, we are going to deal with the problems the emerging Turkish economy has to face, and why it is important to increase the country's STI potential. Then we examine the broader terms of EU-Turkey relations, to see the framework of cooperation between the EU and Turkey. Later we give an overview on the Turkish STI system: on the institutional setting and current policies, on the results in an international comparison, and on the future visions. At the end, we try to outline the areas of cooperation between the EU and Turkey in STI to detect possible advantages and synergies.

### **Turkey, an emerging economy of Europe**

The performance of the Turkish economy over the past decade has been rather impressive, judged both by its own historical standards and by the performance of the region as a whole.<sup>3</sup>

As a consequence of the 2001 economic crisis, deep and comprehensive reforms started. The implementation of the reforms was supported by the extended stand-by facility of the International Monetary Fund, but similar, if not even more important factors behind the success were the increasing European political support after 2002, and the forming of a new government by the reform-oriented, moderate Islamic AK party. The results of crisis management were convincing. The average economic growth remained over 6% from 2002 to 2007, and was able to return to this level after 2009 again. The chronically high inflation rate, a major sign of economic imbalances for decades, was reduced to one-digit levels. The stable macroeconomic environment and the prospects of closer integration to the EU encouraged foreign investments, the level of FDI grew from yearly \$1-2 billion to \$10-20 billion, flowing mostly into export-oriented manufacturing.<sup>4</sup> The competitiveness of exports was improved by the depreciation of the currency in the first years. Exports became more diversified, not only in their product structure, but concerning target-countries as well. After the growing importance of European exports in the period 2002 to 2007, the post-crisis period lead

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<sup>3</sup> Öniş – Kutlay, 2013, p. 1415.

<sup>4</sup> Taymaz – Voyvoda, 2009

to an increasing share of neighbouring regions (Middle East, CIS countries, Balkans), not only in trade, but in investment relations as well.

Turkey has started to shift from an economy largely based on agriculture and on an abundant low-skilled labour force used mainly in textile sector towards an industrial economy. Turkey is today a major European automotive producer, a world leader in shipbuilding, and a significant manufacturer of electronics and home appliances (e.g. TV, white goods).<sup>5</sup>

In electronics especially the home appliance sector developed dynamically, where domestic producers (Vestel, Beko) are prominent representatives of the exports. Turkish products are not the top quality brands, rather low and medium price products, but there is a demand for these products both on the domestic markets, and in neighbouring regions (e.g. in the Balkans).

In vehicle production, several multinationals (Ford, Renault, Fiat, Hyundai, Toyota, Honda, Opel, Mercedes, MAN) brought part of their production capacity to Turkey, largely due to the customs union agreement with the EU allowing a free export of products to the European Single Market. In bus production, domestic brands (Otokar, BMC, Temsa) are dominating.

Despite its rapid growth after the crisis in 2001, the Turkish economy falls short of expectations with respect to global competitiveness.<sup>6</sup> Particularly with the integration of China and India into the global economy, it no longer seems possible for Turkey to be able to rely upon cheap labour to get ahead in the competitiveness. Increasing Turkish competitiveness requires the creation of an efficiently functioning market mechanism, an attractive investment environment and institutionalization. Companies have to be able to sustain themselves through a highly skilled workforce.<sup>7</sup>

In the post-war era, many countries have managed to fairly rapidly reach middle-income status, but few have gone on to become high-income economies. Rather, after an

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<sup>5</sup> OECD, 2012

<sup>6</sup> Turkish Industrial Strategy Document 2010, p. 12

<sup>7</sup> *ibid.*

initial period of rapid ascent, many countries have experienced a sharp slowdown in growth and productivity, falling into what has been called a “middle-income trap.”<sup>8</sup>

Turkey is well aware of this. As the Turkish Finance minister, Mehmet Simsek points on it in his article in the Wall Street Journal<sup>9</sup>, despite the progress, Turkey still faces great challenges in its effort to escape the middle-income trap. Success will require sound macroeconomic policies and additional structural reforms, and a supportive global economic environment is necessary, too. Turkey’s top reform priorities are, however, to enhance the quality of the country’s workforce by improving the quality of education, to make progress in labour-market flexibility and to boost productivity through technological advancement.<sup>10</sup>

And the best partner to reach these goals is obviously the European Union. The framework used by the European Union in preparing industrial policies makes important contributions to the strategy determination process of Turkey, both in terms of content and methodology. With the Lisbon Strategy and H2020, the Union intends to make Europe attractive for investment and employment, and to set targets focusing on knowledge and innovation for growth. The question is, how much Turkey and the EU are able to cooperate.

### **Turkey-EU relations<sup>11</sup>**

The relations between the European Union are full of ambiguities. Since its creation in 1923, Turkey showed an eager wish to belong to the European nations. Turks adopted deep reforms in its constitutional, political and economic structure to be able to start accession negotiations with the EU in 2005. The negotiations started a decade ago already, still, while Croatia was able to finish the process and join the EU in this time period, in case of Turkey the process is still open. The idea of enlargement is not popular

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<sup>8</sup> World Bank estimates that of 101 middle-income economies in 1960, only 13 became high income by 2008 (Agénor et al, 2012) Actually, the growth patterns of the remaining countries do not conform to one clear pattern that can be easily characterized as a “trap.” Still, the “MIC Trap” concept is useful for guiding policy discussions. (Im – Rosenblatt, 2013)

<sup>9</sup> Simsek, 2014

<sup>10</sup> *ibid.*

<sup>11</sup> Partly based on Szigetvári, 2014

*Ágota Dávid, Tamás Szigetvári / Scientific cooperation between the European Union and Turkey – advantages and possible synergies*

in Europe, especially not if it is concerning Turkey. Nowadays, the EU plays for time in enlargement, while Turkey becomes more and more frustrated.

Being not clearly a European country, Turkey's inclusion to the integration process in the 1960s came rather from political motives, influenced also by the U.S. strategic interests under Cold War circumstances. The reluctance of Europe was visible in the 1990s, when Turkey was not accepted as a candidate, but also recently, since the beginning of accession negotiations. For a long time, the main arguments against Turkish accession were summarized with the words 'too big, too poor and too Muslim'.

The accession negotiation process with Turkey started in 2005, and came to a near stalemate situation by 2010. Until now, negotiations had been opened in fourteen chapters, but only one<sup>12</sup> was provisionally closed, while most of the others are blocked: eight by the EU Council in 2006, for Turkey's rejection to open its ports and airports to traffic from Cyprus, five by France in 2007, while Cyprus froze six further chapters in 2009.

There are many reasons, however, why the EU should be interested in cooperating with Turkey. Besides regional political issues and Turkey's increasing role as an energy hub, the changing global environment and Turkey's economic potentials are also among them.

If we go back 10 or 15 years in time, when the discussion on Turkey's candidacy began, we meet a different European Union and a different Turkey as well. The EU had the ambition to become the most competitive region in the world by 2010, had successfully introduced a common currency, and had just prepared the 'big bang' enlargement towards the East. Turkey, on the other hand, suffered from economic imbalances and periodically returning crises, its economy was heavily vulnerable, its political elite under change, while its position in the region was rather weak. Currently, however, the EU has to manage the consequences of the economic crisis, and find answers on how the integration will be able to face growing internal and global

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<sup>12</sup> The *acquis* in Chapter 25 – Science and Research – as laid down in Title XVIII of the Treaty requires the Member States to ensure the necessary implementing capacities to pursue the Community objectives and activities in the field of research and technological development, including adequate staffing. The Member States also need to adhere to and to implement specific Science and Research objectives and activities as developed by the open method of coordination. The *acquis* in this Chapter does not require transposition of EU rules into the national legal order. (Screening Report Turkey, 2006)

challenges. And it also has to meet a more self-confident Turkey, with an appreciated strategic position, and a more dynamic economy.

Of course the Turkish economy is still very much depending on the European engine, but with its diversified export structure (both concerning goods and partners) and its increasing domestic demand, the dependency from Europe is decreasing, which gives Turkey a greater manoeuvring room vis-a-vis Europe. The participation of Turkey on the G-20 meetings means that the country's regional and global profile has grown since it first evinced a desire to join the EU, which gives Turkey a further impetus to negotiate more on equal terms with the EU.

In 2012, the European Commission has launched a so called 'positive agenda' towards Turkey. In its framework "working groups" were created to accelerate the process of alignment of Turkey with EU policies and standards. As Enlargement Commissioner Stefan Füle said: „its aim is to keep the accession process alive and put it properly back on track after a period of stagnation, which has been a source of frustration on both sides.”<sup>13</sup> According to official explanation, this initiative is not replacing the existing process but provides a new momentum to Turkey's accession process.<sup>14</sup>

In 2013, the approach initiated by the positive agenda has turned out the most promising tool which ends up in positive results, strengthening both sides readiness for further cooperation. In case of the accession process, the two sides deal fundamentally on an unequal base. The candidate country has to adopt the European „acquis”, and can negotiate only on temporary derogations. Maybe the most important difference by the positive agenda is that there are equal partners negotiating on issues of mutual interest.

The EU-Turkey relations have a deep complexity, but both sides are well aware of the necessity of cooperation. And the area of science and research is one of the issues where cooperation may be mutually advantageous. As Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science said on 4th of June 2014, when Turkey signed the Association Agreement to Horizon 2020:“Turkey is a much valued partner. Its dynamic business environment is a perfect test bed for the development of

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<sup>13</sup> European Commission, 2012

<sup>14</sup> *ibid.*



innovative products and services – making cooperation a win-win for researchers and enterprises on both sides."<sup>15</sup>

## **STI Policy System in Turkey: S&T Governance and Policy-Making Structure<sup>16</sup>**

### **Supreme Council for Science and Technology**

“To contribute to new knowledge and develop innovative technologies to improve the quality of life by transforming the former into products, processes and services for the benefit of the country and humanity” is the Science, Technology and Innovation Vision of Turkey, drafted in the National Science, Technology and Innovation Strategy 2011-2016, which was adopted by the Supreme Council for Science and Technology (SCST/BTYK) in 2010.<sup>17</sup> SCST is the highest ranking STI policy-making and coordinating body in Turkey, established in 1983, with decision-making power for S&T and innovation policy. Headed by and accountable directly to the Prime Minister, SCST uphold important functions, such as to assist the government in determining long-term S&T policies, to identify R&D priority areas and targets related to these S&T areas, to prepare related plans and programmes and assign these to public organs. It is responsible for developing bills and legislations, for effective utilization of R&D human resources and the establishment of R&D centres of private institutions.

SCST unites governmental and non-governmental stakeholders from across Turkey in the STI fields, which enables a more participatory policy-making process. SCST contributes to establish the link between policy on the one hand and its implementation on the other. The regular and well attended meetings of SCST since 2004 have further served to advance a culture within the participating institutions themselves, which holds

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<sup>15</sup> [http://europa.eu/rapid/press-release\\_IP-14-631\\_en.htm](http://europa.eu/rapid/press-release_IP-14-631_en.htm)

<sup>16</sup> Institute and programme descriptions are based on Turkish scientific programmes and strategies, available at the TÜBİTAK website: <http://www.tubitak.gov.tr/enTUBITAK> and ERAWATCH Turkey-specific information, downloadable at:

[http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country\\_pages/tr/country](http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/tr/country) if not otherwise indicated.

<sup>17</sup> TÜBİTAK, 2013, p. 3

promise to further the level of S&T governance to sustain the STI impetus in which Turkey is currently engaged.

In 2013 the agenda of the SCST meetings was determined by hot topics like Energy research and e-Government. Seven decrees were adopted on Energy, more concretely on Thermal Power Plants, Hydroelectric, Wind and Solar Energy Technologies, Coal Gasification and Liquid Fuel Production Technologies as well as on Energy Efficiency. The e-Government theme comprised the development of a National Data Centre as well as various e-Government applications. The roles of Education and Human Resources as well as the National Innovation and Entrepreneurship System have been on the Agenda of SCST recently, too.

With implementation of the SCST decrees by the responsible organizations, positive effects are being observed. As an example, in the context of the decree “Developing Policy Tools to Trigger Innovation and Entrepreneurship in the Universities,” the Entrepreneurial and Innovative University Index has been prepared for the first time in Turkey in 2012 and the most innovative and entrepreneurial 50 universities were announced to public. The Index, which focuses on entrepreneurship and innovation, has increased competition between universities and hence contributes to the development of the entrepreneurship ecosystem by ranking the universities with respect to entrepreneurship and innovation performance.

### **Other organizations in the S&T Policy-Making Process**

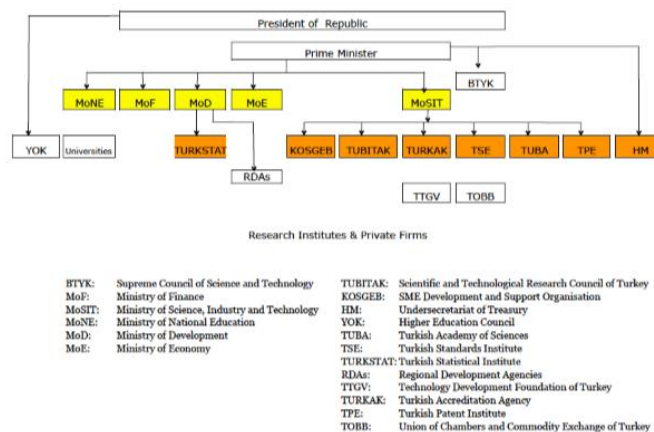
In addition to the highest ranking STI policy-making body in Turkey, there are individual organizations that are continuously contributing to the S&T policy-making process to further influence the efficiency of S&T and respond to the arising needs of the innovation system.

### **Ministry of Science, Innovation and Technology**

The most important change registered in the political context in the previous years is the establishment of the Ministry of Science, Innovation and Technology (MoSIT) which

replaces the Ministry of Industry and Trade (MoIT). The new ministry is responsible for the development, implementation and coordination of the S&T and innovation policies, and the promotion of the R&D and innovation projects, activities and investments. All main actors in the STI system, including the Scientific and Technological Research Council of Turkey (TÜBITAK) and the Turkish Academy of Science (TUBA), are connected to MoSIT. The Turkish Patent Institute (TPE), the National Metrology Institute (UME), the Small and Medium Enterprises Development Organization (KOSGEB), the Turkish Accreditation Agency (TURKAK) and the Turkish Standards Institute (TSE) which are government institutions related to R&D polices, are also affiliated to the MoSIT.

Figure 1: Overview of Turkey's research and innovation system governance structure



Source: ERAWATCH, <http://erawatch.jrc.ec.europa>

## The Scientific and Technological Research Council of Turkey (TÜBITAK)

TÜBITAK is one of the leading institutions in the STI policy system in Turkey since 1963. It is an autonomous institution that is governed by the Science Board. TÜBITAK contributes to the advancement of S&T and innovation in Turkey via its research, development and innovation (RDI) funding and performing functions. TÜBITAK also has an advisory role to the Turkish government on STI policy and acts as the secretariat of SCST. Since 2005, TÜBITAK also acts as a bridging institution between the government, higher education, and the industry in the Turkish Research Area (TARAL).

### **TARAL – the Turkish ERA**

Turkey is an accession country to the European Union and an associated country to Horizon 2020, the current European programme for Research and Innovation. Although not yet a Member State, Turkey's strategies and efforts in the field of S&T and innovation are, to a large extent, in line with the European Research Area (ERA) priorities, which are:

- More effective national research systems,
- Optimal transnational cooperation and competition,
- An open labour market for researchers,
- Gender equality and gender mainstreaming in research,
- Optimal circulation and transfer of scientific knowledge

SCST launched the “Turkish Research Area” (TARAL) initiative in 2004 with inspiration from the ERA. TARAL, a platform for public, private and NGO stakeholders to coordinate future R&D priorities and collaboration, is aimed to be integrated with the ERA. In this respect, Turkey participates in the common programmes and is determined to be involved in the initiatives carried out at European level. Turkey's STI performance can be also analysed on the basis of ERA priorities.

### **More effective national research systems**

In Turkey S&T is still mainly financed by the government, the public support system plays a decisive role in the effectiveness of the research system. Growing public expenditure on R&D, new, more focused support programmes, setting national research priorities with dedicated funding make the national research system more effective.

As for human resources development, a Strategy and Action Plan on Human Resources as well as several new policy measures in the field have been developed to stimulate mobility, to make scientific careers more attractive. Science and Technology Human Resources Coordination Committee has been working on the improvement of the climate for researchers in Turkey by raising researchers' income and further increasing the stock of qualified university-industry collaborations.

### **Optimal transnational cooperation and competition**

Turkey has three kinds of international cooperation activities: it has bilateral S&T agreements with 27 organisations in 22 individual countries in and outside of Europe. It is member of various international scientific organisations like NATO, OECD, European Space Agency or the Black Sea Economic Cooperation. It is one of the most active partners in COST and EUREKA. Last but not least it is an associated country to the European Framework programmes since 2002, participating in ERA-NET, INCO-NET projects, in Joint Programming Initiatives and in Article 185 Initiatives like Eurostars or EMPIR on Metrology.<sup>18</sup>

### **An open labour market for researchers**

International Researchers Coordination Committee aimed to make Turkey an attractive destination for international researchers by offering easy access to work and residence permits, longer contract periods, competitive wages, academic promotion schemes or language courses. Turkey is a member of the EURAXESS Network, which provides legal and procedural information for researchers who plan to come and carry out research in Turkey.

BIDEB (the Science Fellowships and Grant Programmes Department of TÜBİTAK) coordinates mobility schemes mainly to facilitate the returning and re-settling of Turkish researchers but also to encourage foreign researchers to come and carry out science in Turkey.

### **Gender equality and gender mainstreaming in research**

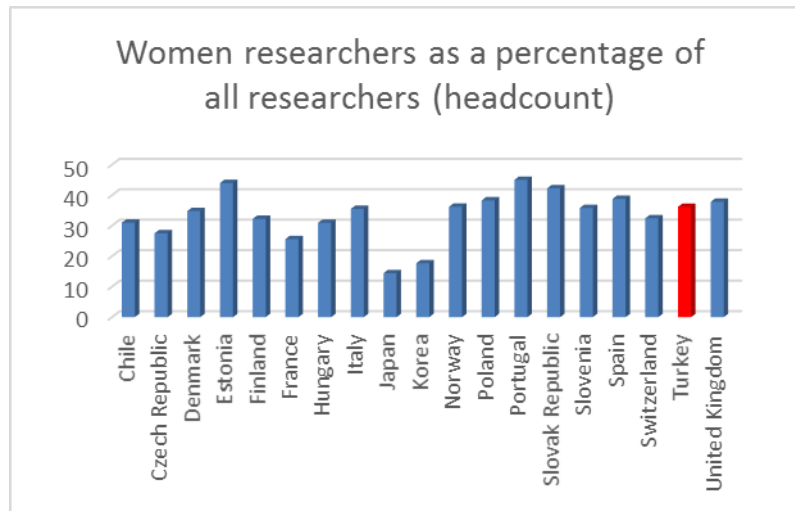
There is no national programme addressing gender equality in Turkey, nevertheless 36,15% of the total number of researchers were females in 2012<sup>19</sup>, which is a high ratio.

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<sup>18</sup> TÜBİTAK, [www.tubitak.gov.tr/en](http://www.tubitak.gov.tr/en)

<sup>19</sup> OECD, Science and Technology Indicators

Figure 2: Women researchers as a percentage of all researchers (headcount)



Source: OECD, *Science and Technology Indicators*

### Optimal circulation and transfer of scientific knowledge

ULAKBIM, the publicly funded Turkish Academy Network and Information Centre under TÜBİTAK aims to build research and education networks among research organisations and universities, and enable linkage of those institutes with their national and international counterparts. Part of this research network is a high-speed computer network, called ULAKNET. Setting up a National Data centre was also an important point on the agenda of SCST in 2013. TRUBA (Turkish National e-Science e-Infrastructure) is a large scale e-infrastructure investment. In 2012, TÜBİTAK launched a programme, which offers grants to universities to encourage them to establish new Technology Transfer Offices and to further develop existing ones. The programme aims to facilitate collaboration between universities and industrial enterprises and allow industry to benefit from new information-based technologies.

## STI Plans of Turkey

### The Tenth Development Plan (2014-2018)<sup>20</sup>

The Tenth Development plan sets the framework for Science, Technology and Innovation between 2014 and 2018. After describing the current status the Plan

<sup>20</sup> The Tenth Development Plan 2014-2018

formulates concrete developments and targets. On the basis of the plan the primary aim of R&D and innovation policy is „contributing to increase of technology and innovation activities with a private sector focus and get benefits from these activities, to commercialization of results of R&D activities via constituting an innovation based ecosystem, and to achievement of high global competitive power with branded technology products.”<sup>21</sup>

*Table 1: Developments and Targets in R&D and Innovation*

	2006	2011	2013	2018
Share of R&D Expenditures in GDP (%)	0.6	0.86	0.92	1.8
Share of Private Sector in R&D Expenditures (%)	37	43.2	46	60
Number of FTE R&D Personnel	54 444	92 801	100 000	220 000
Number of FTE Researchers	42 663	72 109	80 000	176 000
Share of Private Sector in R&D Personnel (%)	33.1	48.9	52	60

*Source: 2006 and 2011 data are from TURKSTAT. 2013 and 2018 data are estimates of the Tenth Development Plan.*

As seen in the table above the original plans for 2013 set by SCST in the National Science and Technology Policies Implementation Plan for 2005-2010 (BTP-UP), the share of R&D Expenditures in GDP: 2% and the number of FTE R&D personnel: 150 000 – had to be modified. The new estimations made by the Tenth Development Plan have been over fulfilled though: GERD/GDP in 2013 was 0.95%, the number of FTE R&D Personnel was about 113 000.

### **Vision 2023**

Vision 2023 was initiated in 2004 by current President, at that time Minister President Recep Tayyip Erdogan for the 100th Anniversary of the Turkish Republic. In a

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<sup>21</sup> *ibid.* p. 86

more general sense it formulates recommendations and targets on the fields of economy, health, energy and tourism. On the field of Science and Technology it has the following concrete targets: GERD/GDP should be 3%, BERD/GDP: 2%. The number of FTE researchers should be 300 000, 180 000 of these should work in the private sector.

If we look at the R&D-innovation target of Europe 2020 – inherited from the Lisbon Strategy – we can see the same target of reaching 3% of GERD/GDP to be invested in R&D and innovation. Compared to the employment target of 75% of the 20-64 year-olds in Europe, Turkey is less ambitious, they want to achieve 55% employment, but on the other hand a very ambitious 5% unemployment rate.<sup>22</sup> As for the climate change and energy priority, while Europe aims at 20% of energy from renewables, Turkey intends to reach the 30% level; both Turkey and Europe want to increase their energy efficiency by 20%. Not mentioned in Vision 2023 but it is an interesting comparison that current drop-out rate in Europe is 12.8%, Europe2020 target is 10% while this number in Turkey is almost 40%. There is also a huge difference in the enrolment to tertiary education: EU is characterized by a current level of 35.8% and with a target of 40% for 2020. Turkey has a current level of 18%. Sustainable growth in the number of research personnel does not seem to be realistic without a proper educational system. The fifth target of Europe2020 about fighting poverty and social exclusion can not be compared with the economic targets of Vision 2023, which focuses rather on economic growth and on the very ambitious goal of becoming one of the 10 largest economies of the world.

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<sup>22</sup> Turkey Vision 2023, [http://www.turkey-japan.com/business/category1/category1\\_70.pdf](http://www.turkey-japan.com/business/category1/category1_70.pdf)



Table 2: Europe2020 Objectives for Growth, Jobs and Societal Challenges

	2006	2007	2008	2009	2010	2011	2012	EU average
	<b>Turkey</b>							
<b>Employment rate of the population aged 20-64</b>	48.2	48.2	48.4	47.8	50	52.2	52,8	<b>68.4</b>
<b>GERD/GDP</b>	0.58	0.72	0.73	0.85	0.84	0.86	0.92	<b>2.07</b>
<b>Greenhouse emission, 1990=100</b>	187	203	196	198				<b>83</b>
<b>Share of population, finished tertiary education</b>	11.9	12.3	13	14.7	15.5	16.3	18	<b>35.7</b>
<b>Share of population (18-24) with maximum lower secondary education</b>	48.8	46.9	45.5	44.3	43.1	41.9	39.6	<b>12.7</b>
<b>Share of population at risk of poverty or exclusion</b>	72.4							<b>24.8</b>

Source: European Commission (2014d)

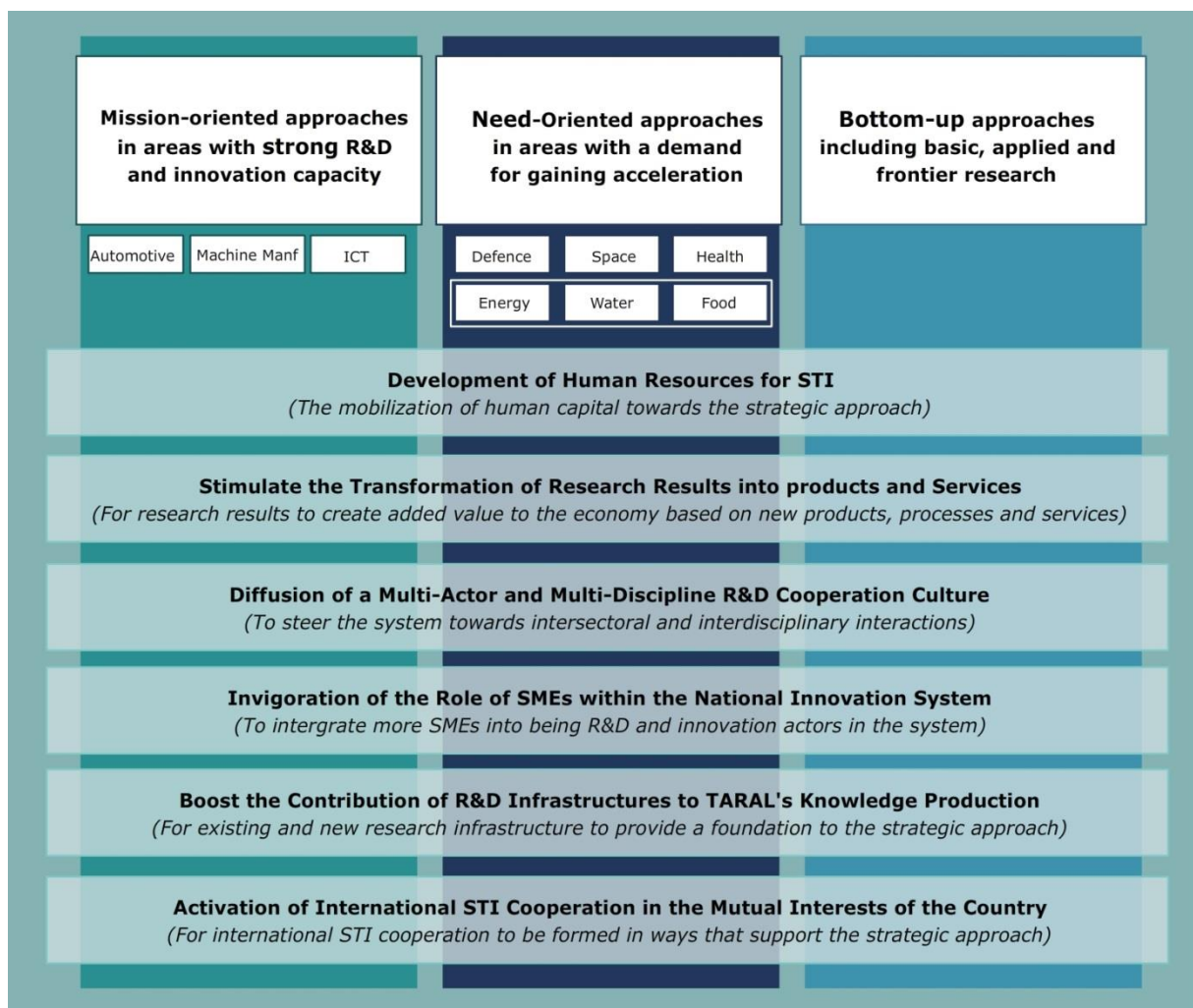
This general vision on STI should be implemented by more concrete plans, the National Science and Technology Policies Implementation Plan for 2005-2010 (BTP-UP) and the National Science, Technology and Innovation Strategy 2011-2016 (UBTYS).

#### **National Science, Technology and Innovation Strategy (UBTYS) 2011-2016**

UBTYS was approved by SCST in 2010. It is a fundamental strategy document comprising of Turkey's STI vision, priorities, and main objectives for a six year period. It

is mainly focusing on disseminating culture of multilateral and multidisciplinary RDI cooperation, stimulating sectoral and regional RDI dynamics, encouraging SMEs to become stronger actors within the national innovation system, and enhancing the contribution of research infrastructures to the knowledge creation capacity of TARAL. UBTYS consists of three vertical and six horizontal axes, which all serve the vertical ones.

Figure 9: Strategic Framework of the National STI Strategy, 2011-2016



Source: TÜBİTAK Turkish scientific programmes and strategies

As it can be seen from the above Figure, the three vertical axes are devoted to three different approaches: Mission-oriented approaches, with strong R&D and innovation capacity cover the automotive industry, Machine manufacturing and ICT. Need-oriented

approaches in areas with a demand for gaining acceleration, mainly coming from the society are Energy, Water, Food, Health, Defence and Space. On the three areas Energy, Water and Food three working groups have been established to prepare national RDI strategies on these fields. These strategies have already been adopted by SCST. The third approach is targeted at bottom-up initiatives including basic, applied and frontier research.

### **Science and Technology Human Resources Strategy and Action Plan 2011-2016<sup>23</sup>**

Devoted to the first horizontal pillar of UBTYS, the S&T Human Resources Strategy was accepted by SCST in 2010. It has the vision „to make Turkey highly competitive “centre of attraction” in the international arena in terms of science and technology human resources”.<sup>24</sup> The strategy tries to increase the quantity and quality of human resources for Science and Technology by providing better research environment and by improving researchers’ skills and experiences partly via mobility schemes.

Although one of the main STI targets of BTP-UP – to reach 150 000 FTE R&D personnel by 2013 – has not been reached, new, even more ambitious targets of Vision 2023 are on the horizon: the number of FTE researchers should be 300 000 and 60% of them should work for the industry. As a result, the strategy does not only have the aim to increase the number of researchers but it has to improve the sectoral and occupational distribution, too.

### **Turkish Industrial Strategy Document (2011-2014)<sup>25</sup>**

Turkey’s 2023 target is to become one of the 10 largest economies in the world, reaching 500 billion dollars of export volume and to be a country manufacturing and exporting national automobile, aircraft, ship and satellites.

The Turkish Industrial Strategy Document (2011-2014) was prepared by the Ministry of Science, Industry, and Technology with the long-term vision of “becoming the

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<sup>23</sup> <http://www.TÜBİTAK.gov.tr/en/about-us/policies/content-st-human-resources-strategy-2011-2016>

<sup>24</sup> idib.

<sup>25</sup> Turkish Industrial Strategy Document, 2010

production base of Eurasia in medium and high-tech products”. In addition to this long-term vision, the overall objective of the strategy was the following: “Increasing the competitiveness and efficiency of Turkish Industry and expediting the transformation to an industry structure which has more share in world exports, where mainly high-tech products with high added value are produced, which has qualified labour and which at the same time, is sensitive to the environment and the society.”<sup>26</sup> The strategic objectives of the document were to increase the weight of companies, to increase the weight of mid- and high-tech sectors, to introduce high added-value products in low-tech sectors.

Eight horizontal industrial policy areas have been identified: Investment and business environment, International Trade and Investment, Skills and Human Resources, SME’s Access to Finance, Technological Development of Companies, Infrastructure Sectors like telecommunication, energy or transport, Environment and Regional Development. The main sectoral areas were the automotive, the machinery, the white goods, the electronics, the textiles and clothing, the food and finally the iron and steel sector.

### **Turkey’s scientific landscape in numbers**

In 2014, with a total GDP of 799.5 billion USD, Turkish economy ranked 18th in the list of world economies<sup>27</sup>. Most of the scientific statistics<sup>28</sup> show that Turkey still lags behind the EU or the OECD average, nevertheless almost all the indicators show a stable and significant growth since 2000.

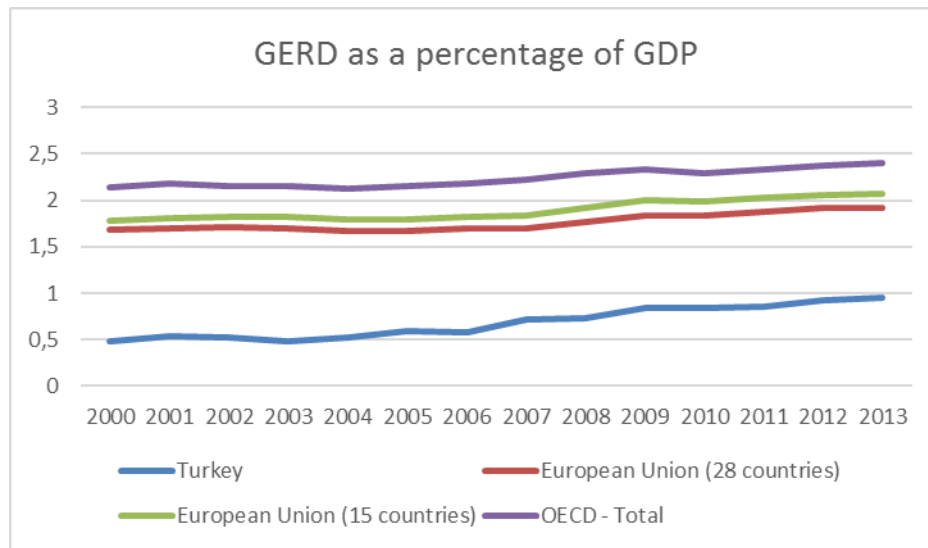
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<sup>26</sup> idib. p. 49

<sup>27</sup> Worldbank statistics

<sup>28</sup> OECD, Science and Technology Indicators

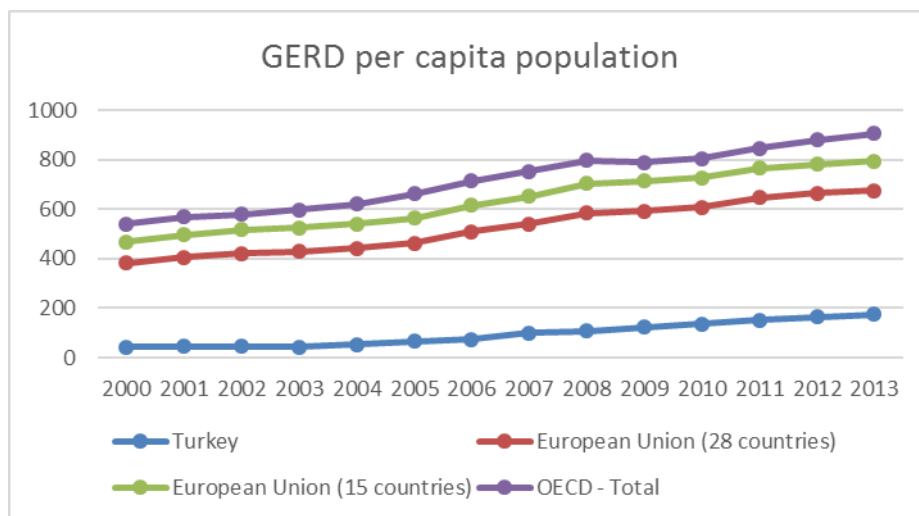
Figure 3: GERD as a percentage of GDP in Turkey, in EU15 and EU 28 and in the OECD



Source: OECD, Science and Technology Indicators

Both the EU and Turkey have the ambitious goal to reach 3% GERD (gross domestic expenditure on R&D) related to their GDP until 2020, 2023 respectively. According to the latest data (2013) the EU 15 is slightly above 2% (2.06%) but the new member states make the picture less positive, the aggregated data is 1.92%. Turkey stands at 0.95% but it has a larger yearly growth – GERD/GDP has grown at a rate of 17% between 2003 and 2013. Nevertheless growing GDP levels make the 3% target even more difficult to reach. Both the EU and Turkey have already failed to fulfil similar objectives – the same objective of reaching the 3% GERD/GDP set by the Lisbon Strategy has been passed by 5 years. Turkey is also far from the wishful 2% of the Ninth Development Plan for 2013.

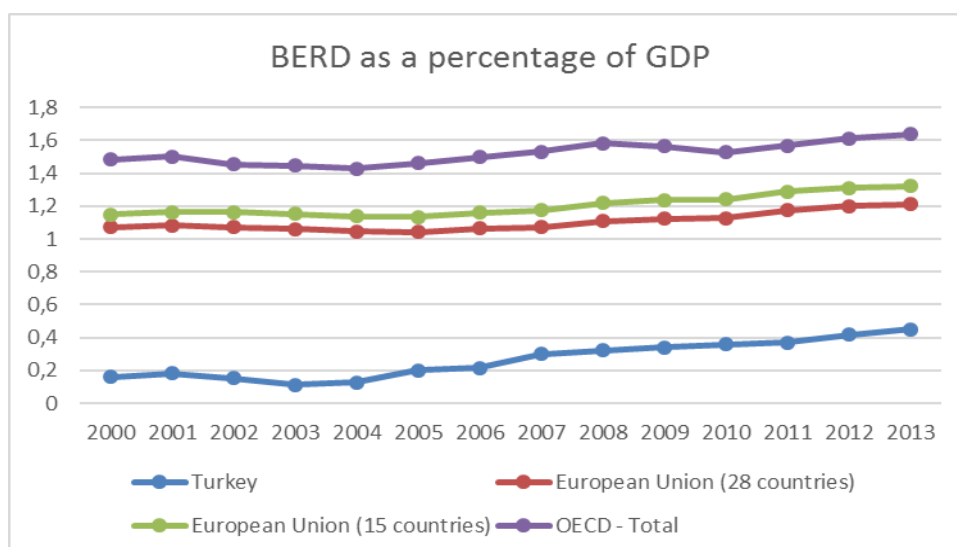
Figure 4: GERD per capita population in Turkey, in EU15 and EU 28 and in the OECD



Source: OECD, Science and Technology Indicators

Turkey has a large – based on the national census in 2014 it is about 77 695 904 persons<sup>29</sup> – and growing population, which makes the difference in terms of GERD per capita even more significant. Nevertheless a stable growing tendency is also to be observed in these statistics. There is also another target shared by the EU and Turkey, which is the active involvement of the business sector both in carrying out and in funding Research and Development.

Figure 5: BERD as a percentage of GDP in Turkey, in EU15 and EU 28 and in the OECD

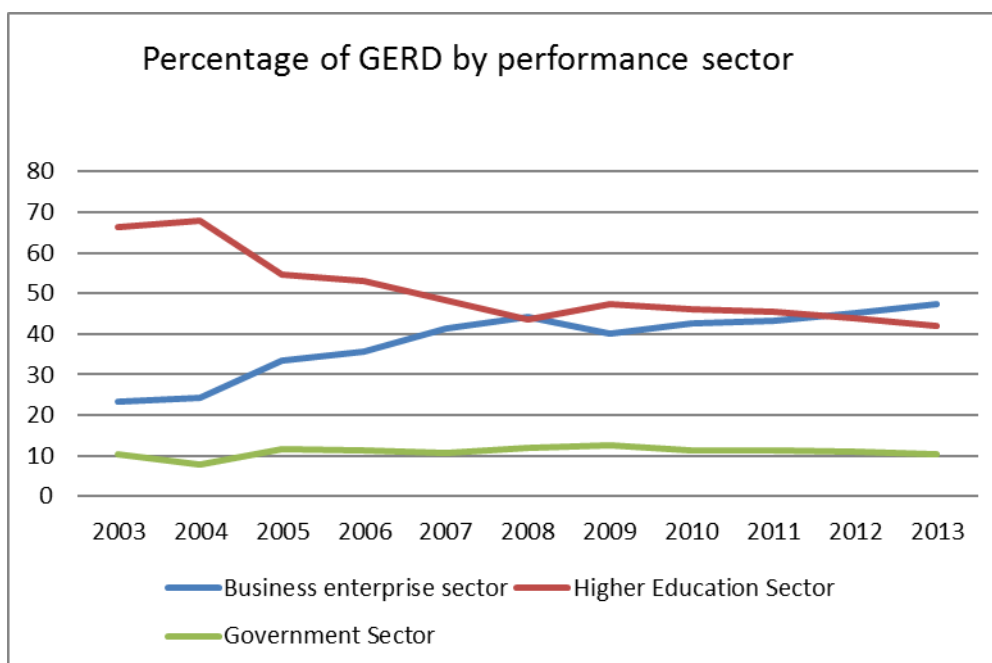


Source: OECD, Science and Technology Indicators

<sup>29</sup> Turkstat R&D and innovation statistics

The so called Business enterprise expenditure on R&D (BERD) should amount to 60% of the total GERD, which should reach 2% until 2020 and 2023 if we take into consideration of the 3% GERD targets of the EU2020 and of the Vision 2023 strategies. Turkey, with its current level of 0.45% is relatively close to the 60% proportion but very far from the 2% general BERD goal. Even if we take into consideration its current pace of growth, reaching this target does not seem to be realistic. Nevertheless the changing tendency between the business sector and the higher education sector is a remarkable phenomenon (next figure), which can be the result of increased support for the business sector.

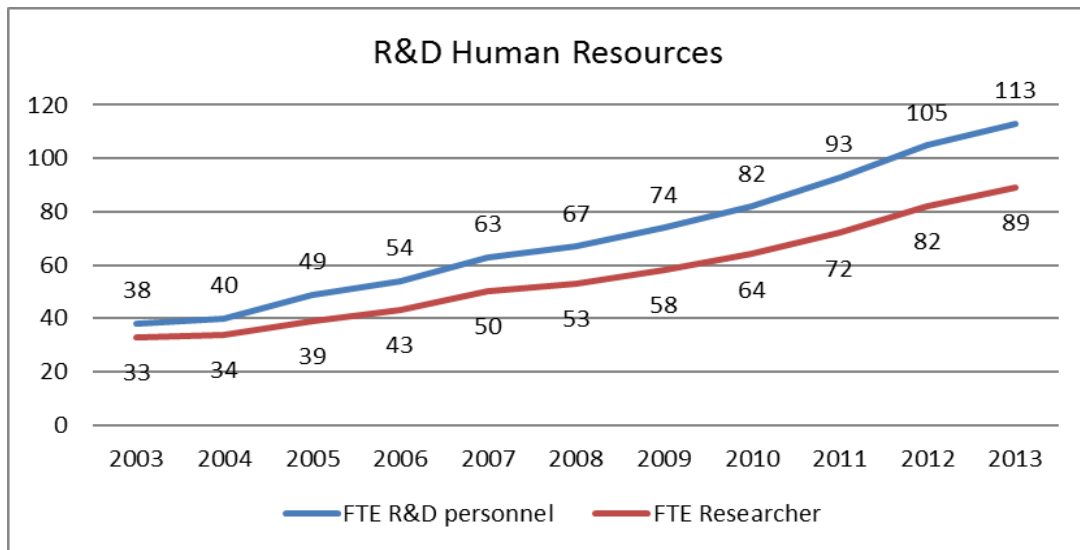
Figure 6: Percentage of GERD by Performance Sectors in Turkey



Source: TÜBİTAK scientific, technological and innovation statistics

Statistics on human resources is another hot-topic in the future plans for Turkey. As it can be seen on the below figure, the original goals of the BTP-UP – 180 000 FTE researchers for 2013 – could not be reached but the estimations of the 10th Development Plan’s – 80 000 FTE researchers – could be easily fulfilled.

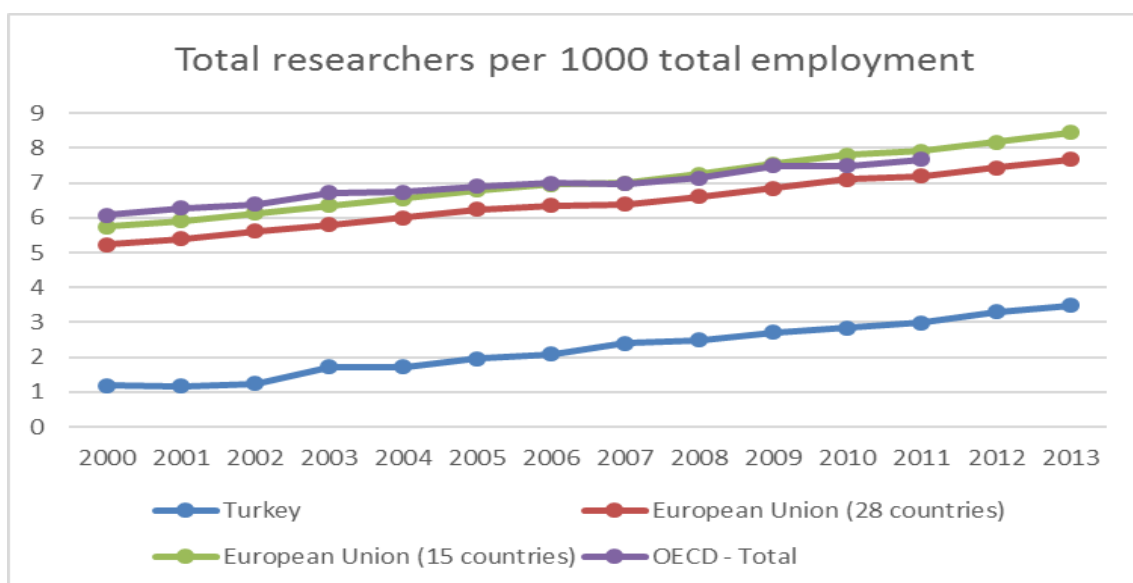
Figure 7: R&D Human Resources in FTE in Turkey (Number x 1000)



Source: TÜBİTAK scientific, technological and innovation statistics

If we want to compare the human resources development in Turkey with data in the EU and the OECD countries, we can see a similar trend to the ones in GERD and BERD: lower initial levels and rapid growth is characteristic for Turkey. The Full Time Equivalent (FTE) number of researchers increased from 38 000 to 113 000 between 2003 and 2013.

Figure 8: Total researchers per 1000 total employment in Turkey, EU15/28 and OECD



Source: OECD, Science and Technology Indicators



Due to the large population and the low employment rate<sup>30</sup> of Turkey simple comparison of the above data – total researchers per 1000 total employment – might be misleading though. Such interpretations, which only emphasise the quick growth compared to the previous year or period, do not mention the originally low standards. The pace of growth in European and OECD countries might seem slower but there is hardly any difference in real growth between these country groupings and Turkey, so the original differences hardly diminish. Nevertheless quick and balanced growth is a positive phenomenon, which can ensure the stable development of the Turkish innovation-based economy.

## **Possibilities for cooperation: advantages and synergies in EU and Turkish priorities**

### **Participation in Framework Programme 7**

Turkey has been an associated member in EU Framework Programmes for Research and Development since 2002; it also signed the Association Agreement to Horizon 2020 on 4th of June 2014. The Agreement was signed by Ahmet Yücel, Acting Undersecretary of Ministry for EU Affairs on behalf of Turkey and by Robert-Jan Smits, Director General of DG Research and Innovation on behalf of EU.

In his presentation about Turkey's participation in Framework Programme 7 Mr Smits highlighted the strong participation of Turkish scientists in Marie Skłodowska Curie Actions, in the Research for the benefit of SMEs instrument as well as in the thematic fields ICT and Environment.<sup>31</sup> As it can be seen in the below table, on the basis of the seventh FP7 Monitoring Report the number of successful applicants in Turkey was 1122 with a funding of 165 million Euro.<sup>32</sup> The success rate of Turkish researchers was around 16.1%, which is below the EU average (21.6%). It is remarkable that the success

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<sup>30</sup> According to the latest OECD data from 2015 employment is slightly above 50% in Turkey, compared to the EU 65,3 % and the OECD 66,1% average data.

(<http://stats.oecd.org/viewhtml.aspx?datasetcode=STLABOUR&lang=en>) This is mainly due to the low employment of women – only 30% of women are employed in Turkey, which is about half of the EU average (60%). Almost the same percentage of men are employed in Turkey and in the EU (69% vs. 70%).

<sup>31</sup> Smits, 2014

<sup>32</sup> Due to a number of still running projects, this amount might further increase.

rate of Candidate and Associated countries was even higher than the one of the EU28 countries (21.9%). The difference is even more conspicuous if we have a look at the success rates in retained EU contribution: compared to the 19.2% EU average Turkey had a success rate of 7.2%. Candidate and Associated countries are close to the EU average again with a success rate of 18.7%.

*Table 3: Number of applicants in retained proposals and corresponding success rate for the 7-year period*

	2007	2008	2009	2010	2011	2012	2013	Total	Rate
Turkey	141	119	183	206	200	182	91	1122	16.1%
EU	19242	12412	17592	15174	17493	19031	11454	112398	21.6%
Candidate&Associated	1583	1221	1730	1455	1543	1699	1072	10303	21.9%

*Source: European Commission (2015) Seventh FP7 Monitoring Report*

*Table 4: Number of requested EU financial contribution in retained proposals (in € million) and corresponding success rates*

	2007	2008	2009	2010	2011	2012	2013	Total	Rate
Turkey	25.15	16.32	24.04	21.33	30.04	37.09	11.39	165.4	7.2%
EU	5881	4340	5306	4999	5705	6794	4261	37289	19.2%
Candidate&Associated	482	442	599	484	513	722	417	3658	18.7%

*Source: European Commission (2015) Seventh FP7 Monitoring Report*

Research Organisations were the most active applicants (25.41%) closely followed by Public Bodies – mainly TÜBİTAK (22.22%). The Higher Education sector (16.02%) and Private business – SMEs – were responsible for another third of the applications. The top 5 participants were TÜBİTAK, the Middle East Technical University, Koç University, Bilkent University and Sabanci University.<sup>33</sup>

## **Synergies and Possibilities in H2020**

Horizon 2020 is the new Framework Programme for Research and Development of the European Union for the period 2014-2020. For this seven-year period H2020 has a budget of around 80 billion Euro.

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<sup>33</sup> Smits, 2014

Turkey has published a Position Paper on Horizon 2020 in June 2012.<sup>34</sup> Generally speaking they welcomed the new programme and highlighted the similarities with their National Science, Technology and Innovation Strategy (2011-2016). Nevertheless they emphasised the importance of SMEs in the economies of both the EU and Turkey and mentioned the relative importance of capacity building compared to scientific excellence for Candidate Countries, which cannot benefit from the Structural Funds. This comment has not been finally taken into consideration by the EU but the new IPA II (Instrument for Pre-accession Assistance) can be also used for scientific capacity building purposes.

TÜBİTAK EU Framework Programmes National Coordination Office (NCO) is taking actions in order to enable Turkey to benefit from Horizon 2020 to the highest extend. In this context, researchers will be supported for their travels, organization of events, writing projects, and pre-evaluations of the proposals. Besides, successful Turkish researchers in Horizon 2020 Programme will also be financially awarded by TÜBİTAK. The next table tries to summarise all the similarities, synergies and adaptation techniques of Turkey with the three main pillars of Horizon 2020.

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<sup>34</sup> Turkish Position Paper on Horizon 2020, 2012

Table 5: Synergies between Horizon 2020 and Turkish STI policy programmes/strategies

Horizon 2020	Turkey
Pillar I.: Excellent Science: reinforce and extend the excellence in RDI (25.3 B €)	New policy tool to improve the quality and impact of scientific publications – articles in high impact factor journals are rewarded
I.1: European Research Council (ERC)  - ERC starting grants - ERC consolidator grants - ERC advanced grants	ERC Principal Investigator Support Programme for - project writing - pre-evaluation - interview trainings  Above Threshold Awards (Reserve list 12000€ etc.) ERC Success Award - 25000 € + budget x 9% - 30000 € + budget x 9% - 35000 € + budget x 9%
I.2: Future and Emerging Technologies (FET) - FET Open (mainly on ICT) - FET Proactive - FET Flagships (Human Brain, Graphene)	ICT is one of the Mission-oriented areas of UBTYS
I.3: Marie Skłodowska-Curie actions (MC) Individual Fellowships (IF) European Fellowships (EF) Global Fellowships (GF) Research and Innovation Staff Exchange (RISE)	MSCA Pre-Evaluation Support programme Above Threshold Awards (above 80 scores) TÜBİTAK Science Fellowship Grant Programmes (BİDEB) - Fellowship for Visiting Scientists and Scientists on Sabbatical Leave (2221) - Reintegration Research Fellowship Programme (2232) - Co-Funded Brain Circulation Scheme (2236) - Graduate Scholarship Programme for International Students (2215) - Research Fellowship Programme for Foreign Citizens (2216)
I.4: European Research Infrastructures, including e-Infrastructures	E-Government and e-Infrastructures – SCST – 2013 Turkey is member of ESFRI (European Strategy Forum on Research Infrastructures), Ministry of Development is working on a roadmap 108 research infrastructures activated, 65 being developed + 97 advanced research centres
Pillar II: Industrial Leadership: focus on innovation and the private sector	Turkish Industrial Strategy Document: „to make Turkey the production base of medium and high technology products in Eurasia.”
II.1: Leadership in Enabling and Industrial Technologies	

*Ágota Dávid, Tamás Szigetvári / Scientific cooperation between the European Union and Turkey – advantages and possible synergies*

ICT Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology Space	Automotive industry, machine manufacturing and ICT are the three mission-oriented research areas in UBTYS  Space is one of the Need-oriented areas in the second pillar of UBTYS
II.2: Access to risk finance	Industry Oriented Support Programme of TÜBITAK on Venture Capital (1514)
II.3: Innovation in SMEs – SME Instrument (from idea to market)	Individual Entrepreneurship Support Programme (1512) with a very similar structure to the SME instrument: idea – prototype – commercialization
Pillar III: Societal Challenges Health, Demographic Change and Wellbeing Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy Secure, Clean and Efficient Energy Smart, Green and Integrated Transport Climate Action, Environment, Resource Efficiency and Raw Materials Europe in a changing world - Inclusive, innovative and reflective societies Secure societies – Protecting freedom and security of Europe and its citizens	Health, Food, Water, Energy and Security (Defence) are five areas of the second pillar of UBTYS  The National Food, Water and Energy R&D and Innovation Strategies 2011-2016 have been accepted by SCST and are coordinated by TÜBITAK  The Turkish Energy Efficiency Strategy (2012-2023) has been adopted

Source: European Commission Horizon2020 Programme official website <http://ec.europa.eu/programmes/horizon2020/>, TÜBITAK Turkish scientific programmes and strategies <http://www.tubitak.gov.tr/en>, Gölükcü, 2015, Karatas, 2015

EU member states and Associated Countries of the Framework Programmes foster the successful participation of their scientific community in Horizon 2020 by providing various support mechanisms. There are three major types of support structures: countries might apply EU priorities and funding schemes in their own national support system. The second mechanism is built on giving professional advice and support during the application procedure. The third option is that the national government provides funds to motivate researchers for the application. The Turkish government applies a mixture of these three mechanisms. National Contact Points under TÜBITAK are mainly

responsible for giving information and advice during the proposal preparation. The other two forms are used in various ways connected to the main pillars of Horizon 2020.

As Excellence remained an important pillar of Horizon 2020, and both OECD and the Innovation Union have criticized Turkey because of its low performance on innovation and excellent research, some new policy tools have been developed to achieve better results. Two important programmes of the Excellent Science pillar are the Grants of the European Research Council (ERC) and the mobility programmes of the Marie Skłodowska-Curie Actions. On the one hand TÜBİTAK facilitates applicants in both schemes by providing project-writing, pre-evaluation and interview support and training possibilities, which makes the project-preparation phase more successful. Another tool is the Above Threshold Award, which provides financial support for highly evaluated but in the final round not selected proposals. Such a scheme reduces the risk of application and increases the possibilities to receive financing. Most excellent researchers are the target group for the so called ERC Success Awards, which tops up ERC grants with an additional national budget, giving even more scientific freedom and possibilities for the best scientists. There are Turkish mobility schemes, which are developed in line with MSC Actions. They mainly facilitate the reintegration of Turkish scientists or offer a possibility to international visiting scientists to carry out research in Turkey.

Future and Emerging Technologies, Enabling and Industrial Technologies as well as the thematic fields of the Societal Challenges are reflected in the national priorities of the Turkish science policy, more concretely in the vertical pillars of the National Science, Technology and Innovation Strategy. European targets and priority areas have been taken into account while the National Food, Water and Energy R&D and Innovation Strategies have been developed for 2011-2016.

Turkey is not only a member country of ESFRI, the European Strategy Forum on Research Infrastructures, but national decisions about new infrastructures are also made in accordance with the guidelines of the Forum.

The SME instrument is a new tool in the second pillar of Horizon 2020. It gives support to small and medium-sized enterprises to develop and commercialise their innovative ideas in three phases. TÜBİTAK 1512, a support programme for individual

entrepreneurs is a very similar initiative in four stages. In the first stage a feasibility study has to be developed and submitted in both programmes. In the second phase – in the second and third stage in the Turkish system – the real work is carried out by the realisation of the innovative project idea. At the end of this stage the prototype has to be ready for commercialisation, which is facilitated in the last stage. This is a progressive funding scheme, where you can only apply for the next phase if you have accomplished the previous one with success. Using the Turkish model can be a very good test bed for local SME-s to cope with higher competition on the EU level.

*Table 6: TÜBİTAK 1512 - Support Programme for Individual Entrepreneurs*

	Applicant	Duration	Type of support	Budget (€)	Output
<b>Stage 1: from idea to project</b>	entrepreneur	-	entrepreneurship training, coaching	-	Project proposal
<b>Stage 2: start-up, technology</b>	entrepreneur	12 months	100% grants and coaching	max. 47000	Prototype, demo etc.
<b>Stage 3: Advanced R&amp;D project support</b>	corporation	18 months	75% grants	max. 238000	Commercial prototype
<b>Stage 4: commercialisation</b>	corporation	12 months	Brokerage event, access to venture capital	-	Marketed product

*Source: ERAWATCH Turkey-specific information*

## Conclusions

Turkey has the ambitious goal to become one of the 10 largest economies in the world. In order to realise this ambition, further investment in RDI is necessary. The STI target of 3% GERD/GDP seems to be a precondition for the economic targets of Vision 2023. And in spite of its impressive growth, the current levels of GERD and BERD are still far away from Vision 2023 goals.

Becoming one of the largest economies of the world means also internationalisation, openness and networking with the rest of the world. In addition to Turkey's strong

relations to the USA and to the MENA region, Europe is the main partner not only in economic but also in scientific terms.

Taking into account previous tendencies and current efforts Turkey has good chances to increase its participation in Horizon 2020 compared to previous Framework Programmes. It already has a lot of experience and a strong NCP support on the field of Marie Skłodowska Curie actions, so an active participation is very likely on this field. Due to massive support for excellence, an increased number of applications and winning proposals for ERC grants are to be expected.

The Individual Entrepreneurship Support Programme can be a good test bed for Turkish SME-s to apply successfully in the SME instrument. New strategies on Food, Water and Energy help to build up local excellence and facilitate the participation in international consortia on these three Societal Challenges.

Nevertheless there are still some challenges for Turkey to cope with:

- I. Developing and implementing a Smart Specialisation Strategy could support more focussed programme building and funding, which would enhance economic growth and international cooperation on these selected areas.
- II. Strengthening capacity building on a national level with the use of IPA II funds by investing in universities, national research centres and infrastructures.
- III. Further encouraging knowledge transfer from academia to industry.
- IV. Supporting scientific excellence by encouraging patent applications and international scientific co-publications in high impact factor journals.
- V. Constant monitoring and impact assessment of current programmes by developing indicators and monitoring systems.

Existing programmes, strategies and funding schemes already cover all these challenging areas and Vision 2023 targets might give another impetus to further growth in RDI investments on the side of the government. Nevertheless it is of crucial importance that these investments should not only be reflected in improving statistics but also in real structural changes. Scientific excellence cannot be achieved by solely facilitating the number of patent applications and the publication in high impact-factor journals. Excellence is much more a bottom-up, organic process, which is built upon a



well-developed education system, on stable government policy and a transparent and effective support system.

Turkey is a large emerging market economy with steadily growing performance indicators. Nevertheless the coming years will show if Turkey is able to become from an agriculture and labour-intensive industry-based economy, built on cheap low-skilled labour force to a highly competitive, innovation and technology-based economy. Focused, efficient and properly monitored investment in STI and international cooperation are the only ways to achieve the ambitious goals of Vision 2023.

## References

- Agénor, P-R. – Canuto, O. – Jelenic, M [2012], Avoiding middle-income traps, *Economic Premise* No. 98, November, The World Bank, Washington D.C.
- Cetin, .D – Erdil, E. [2014], ERAWATCH Country Reports 2013: Turkey, *JRC Science and Policy Reports*, 2014, Luxembourg
- ERAWATCH Turkey-specific information. Downloadable at:  
[http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country\\_page\\_s/tr/country](http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_page_s/tr/country) (downloaded: 08.08.2015.)
- European Commission [2012]: Positive EU-Turkey agenda launched in Ankara. Downloadable from the webpage of the European Commission:  
[http://ec.europa.eu/commission\\_2010-2014/fule/headlines/news/2012/05/20120517\\_en.htm](http://ec.europa.eu/commission_2010-2014/fule/headlines/news/2012/05/20120517_en.htm)  
(downloaded: 19. 07. 2013)
- European Commission [2014a], Innovation Union Scoreboard 2014, European Union
- European Commission [2014b], European Research Area Facts and Figures 2014 Turkey
- European Commission [2014c], Turkey Progress Report, COM (2014)700 final of 8. 10. 2014
- European Commission [2014d], Research and innovation performance in the EU, Innovation Union Progress at country level 2014, European Commission, DG for Research and Innovation, 2014, Brussels
- European Commission [2015], Seventh FP7 Monitoring Report, Monitoring Report 2013, European Commission, DG for Research and Innovation, Brussels
- European Commission Horizon2020 Programme official website at:  
<http://ec.europa.eu/programmes/horizon2020/> (downloaded: 05. 03. 2015)
- Gölkücü, N. [2015]: European Union Marie Skłodowska Curie, TÜBİTAK Science Fellowships and Grant Programmes. Presentation. Downloadable at:  
<http://www.h2020.org.tr/sites/default/files/u198/numangolukcu.pdf>  
(downloaded: 04. 04. 2015)
- Im, F. G. – D. Rosenblatt [2013], Middle income traps: A conceptual and empirical survey, *Policy Research Working Paper* 6594, The World Bank, Washington D.C.
- Izmen, Ü. – Yilmaz, K. [2009], 'Turkey's recent trade and foreign direct investment performance', in: Z. Önis – F. Senses (eds.): *Turkey and the Global Economy. Neo-liberal restructuring and integration in the post-crisis era*, London – New York: Routledge, pp. 173-204.

*Ágota Dávid, Tamás Szigetvári / Scientific cooperation between the European Union and Turkey – advantages and possible synergies*

- Karatas, H. [2015]: Horizon 2020 TÜBITAK support and award programmes. Presentation. Downloadable at: <http://www.h2020.org.tr/sites/default/files/u198/hakankaratas.pdf> (downloaded: 04. 04. 2015)
- Kutay, M. A.: Turkish Research Area (TARAL), recent development and opportunities, Presentation. Downloadable at: <http://www.h2020.org.tr/sites/default/files/u198/alperkutay.pdf> (downloaded: 04. 04. 2015)
- OECD [2012], OECD Science, Technology and Industry Outlook 2012, OECD Publishing, Paris
- OECD [2013], OECD Science, Technology and Industry Scoreboard 2013, Innovation for Growth, OECD Publishing, Paris
- OECD [2014], OECD Science, Technology and Industry Outlook 2014, OECD Publishing, Paris
- OECD Science and Technology Indicators. Downloadable at: <https://stats.oecd.org/> (downloaded: 01. 04. 2015.)
- Öniş, Z. – Kutlay, M. [2013]. Rising powers in a changing global order: the political economy of Turkey in the age of BRICS. *Third World Quarterly*, 34: 8, pp. 1409-1426
- Şimşek, M. [2014], How Turkey will escape the middle-income trap, *The Wall Street Journal Europe*, October 1, p. 15.
- Smits, R.-J [2014]: Horizon 2020, The new EU Framework Programme for Research and Innovation 2014-2020, Presentation. Downloadable at: [http://www.h2020.org.tr/sites/default/files/keynote\\_rjs\\_final\\_draft\\_smits\\_4\\_jun\\_e.pdf](http://www.h2020.org.tr/sites/default/files/keynote_rjs_final_draft_smits_4_jun_e.pdf) (downloaded: 04. 04. 2015)
- Szigetvári, T. [2014], EU-Turkey relations: Changing approaches. *Romanian Journal of European Affairs*, 14:1, pp. 34-48.
- TÜBITAK [2010], S&T and Innovation in the Republic of Turkey, The Republic of Turkey's model of instigating an STI impetus, The Scientific and Technological Research Council of Turkey (TÜBITAK), Ankara
- TÜBITAK [2011], Science, Technology and Innovation in Turkey 2010, The Scientific and Technological Research Council of Turkey (TÜBITAK), Ankara
- TÜBITAK [2013], Science, Technology and Innovation in Turkey 2012, The Scientific and Technological Research Council of Turkey (TÜBITAK), Ankara

*Ágota Dávid, Tamás Szigetvári / Scientific cooperation between the European Union and Turkey – advantages and possible synergies*

TÜBİTAK Turkish scientific programmes and strategies, Downloadable at: <http://www.tubitak.gov.tr/en> (downloaded: 02. 04. 2015)

TÜBİTAK scientific, technological and innovation statistics, Downloadable at: <http://www.tubitak.gov.tr/en/content-national-science-technology-and-innovation-statistics-of-turkey> (downloaded: 28. 03. 2015)

The Tenth Development Plan 2014-2018, Ministry of Development, Republic of Turkey, Ankara

Turkey – Vision 2023, Republic of Turkey Prime Ministry, Investment Support and Promotion Agency of Turkey, Presentation. Downloadable at: [http://www.turkey-japan.com/business/category1/category1\\_70.pdf](http://www.turkey-japan.com/business/category1/category1_70.pdf) (downloaded: 08. 08. 2015)

Turkish Industrial Strategy Document 2011-2014, Towards EU membership, Ministry of Industry and Trade, Republic of Turkey, Ankara

Turkish Position Paper on Horizon 2020 the Framework Programme for Research and Innovation (2014-2020), [2012], Republic of Turkey

Turkstat R&D and innovation statistics. Downloadable at: [www.turkstat.gov.tr](http://www.turkstat.gov.tr) (downloaded: 02. 04. 2015)

*Wedekind, G K* [2013], “Turkey’s research, development and innovation targets for 2023: Realistic or far-fetched?, Vol. II, Issue 8, pp.19-29, Centre for Policy and Research on Turkey (ResearchTurkey), London, Research Turkey.

Worldbank statistics about Turkey, 2015. Downloadable at: [http://data.worldbank.org/country/turkey#cp\\_gep](http://data.worldbank.org/country/turkey#cp_gep), <http://www.worldbank.org/en/country/turkey> (downloaded: 07. 08. 2015)