BRIEF
No. 85

MAY
2025

THE 2024 EU INDUSTRIAL R&D INVESTMENT SCOREBOARD AND HORIZON EUROPE PROJECTS OF TÜRKİYE

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Introduction

Research and development (R&D) is a broad concept encompassing basic research, applied development, and development activities. In general, it means systematic activities to increase knowledge and use of this knowledge when developing new products, services or processes. Also, innovation activities are related to concept of R&D.[1] Innovation and productivity have been part of research and policy agendas for decades with several policy responses as R&D expenditure and subsidies.[2] R&D expenditure have always been one of the important components of the economic growth and to increase impact of the R&D investment on growth and development, it is significant to provide efficiency of investment.[3]

The EU seeks to enhance its position in the global competition for technological and scientific leadership by increasing investment and expenditure. Countries such as South Korea, the United States, and China already stand out globally in the field of research and development. In response, the EU has significantly increased its R&D investments in recent years. In addition to rising financial commitments, the EU aims to strengthen its innovation capacity by fostering collaboration with Associated Countries through framework programmes such as Horizon Europe. This study provides an analysis of both the EU's and Türkiye's R&D investments, as well as their positions within Horizon Europe programme.

1. A General Look to the R&D in the EU

In the EU, research and experimental development comprise the "creative and systematic work undertaken to increase the stock of knowledge - including knowledge of humankind,

[1] Sakari Kainulainen, Research and Development (R&D), Springer Nature Link, https://link.springer.com/referenceworkentry/10.1007/978-94-007-0753-5_2482 Accessed on 09.04.2025

[2] David B. Audretscha and Maksim Belitski, The role of R&D and knowledge spillovers in innovation and productivity, *European Economic Review*, 2020, 123, https://doi.org/10.1016/j.euroecorev.2020.103391

[3] Ashraful Alam, Moshfique Uddin, Hassan Yazdifa, Sujana Shafique, Theophilus Lartey, R&D Investment, Firm Performance and Moderating Role of System and Safeguard: Evidence from Emerging Markets, *Journal of Business Research*, 106, pp.2.

culture and society - and devise new applications of available knowledge."[4] The meaning of the concept of innovation that is related to R&D, is the use of new ideas, products or methods where they have not been used before. Innovations are based on the result of the new technological developments, the use of other knowledge and new technology combinations, acquired by the enterprise.[5] In order to ensure Europe's resilience, technological independence and competitiveness, the EU has invested in R&D since 1984.[6]

According to the European Commission maintaining new knowledge and increasing innovation will lead to the develop green and digital transformation, which will accelerate the sustainability and well-being of Europe. Research and development policy, which has increased its significance during the COVID-19 pandemic is valuable both for addressing current challenges and supporting economic resilience.[7]

Because of the increasing significance of R&D there is a department in the Commission which is working to conduct EU policy on research, innovation and science. The Directorate-General for Research and Innovation oversees Horizon Europe programme and contributes to the European Commission's 2024–2029 priorities by funding innovation and the generation of new knowledge. It is also working to increase the EU's global standing in the field of artificial intelligence and to advance the European Research Infrastructure, which forms a key component of the EU's long-term strategy. In addition, the Directorate-General coordinates various research and innovation projects across EU member states.[8]

To carry out the EU's R&D policy the Directorate-General for Research and Innovation published the Strategic Plan 2020-2024 on October 8, 2020. According to the Strategic Plan, the policies implemented by the Directorate are in line with the Commission's seven headline ambitions and these policies are boosting innovation and turning social challenges into innovation opportunities. As stated in the Strategic Plan, the Directorate

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[4] Eurostat, Glossary:Research and development (R & D), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Research_and_development_(R_%26_D) Accessed on 09.04.2025

[5] Eurostat, Glossary:Innovation, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Innovation Accessed on 09.04.2025

[6] European Commission, "Ex post evaluation of Horizon 2020, the EU framework programme for research and innovation", COM(2024) 49 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A49%3AFIN&qid=1706527941657 Accessed on 15.04.2025

[7] European Commission, "Strategy on research and innovation", https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation_en Accessed on 11.04.2025

[8] European Commission, "Research and Innovation", https://commission.europa.eu/about/departments-and-executive-agencies/research-and-innovation_en Accessed on 11.04.2025

contributes to seven general objectives (A European Green Deal, A Europe Fit for the Digital Age, An Economy That Works for People, Promoting Our European Way of Life, A Stronger Europe in the World, A New Push for European Democracy and A Modern, High Performing and Sustainable European Commission) selected by the Commission. For example, according to the Strategic Plan, strong research and innovation can lead to support EU's goal of becoming the world's first climate-neutral continent and research and innovation policy empowers combating climate change and facilitating a green industry. Also, as stated in the Strategic Plan, to maintain the digital transition, which is one of the priorities of the EU, knowledge and producing innovative solutions under the Research and Innovation Framework Programme and a modernised European Research Area are very significant.[9]

To understand the Commission's current position on about R&D, the Political Guidelines for the Next European Commission 2024-2029, which was published on July 18, 2024, can be the key document. In Political Guidelines for the Next European Commission 2024-2029, the President of the European Commission Ursula von der Leyen pointed out the importance of both R&D and innovation many times. In the Political Guidelines, the President underlines the need for a new European Prosperity plan to put research and innovation at the heart of the economy. In the document, it is emphasised that innovation should be placed at the centre of the economy for the sake of Europe's competitiveness and to ensure its digital and green economy. In the continuation of the document, it was stated that the expenditure on research and innovation will be increased to achieve these aims and strategic priorities, and disruptive innovation will be taken into consideration. In the Guidelines, it was underlined that researchers should be provided with innovative laboratories and infrastructure through new public-private partnerships for the EU is set to be a leader in innovation.[10]

Another step taken to strengthen the EU's position on research and innovation infrastructure is the EU's framework programmes for research and innovation. The programmes, which started in 1984, were coordinating community-level research initiatives in the first place. Then, these programmes were transformed into a financial

[9] European Commission, Strategic Plan 2020-2024, https://commission.europa.eu/document/download/5ac1ff20-d41e-4c10-9a05-048b7339292e_en Accessed on 11.04.2025

[10] Ursula von der Leyen, "Europe's Choice Political Guidelines fort he Next European Commission 2024-2029", 18.07.2024, https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en Accessed on 11.04.2025

and strategic tool which contributes EU's innovation process.[11] The Council approved the principle of framework programmes for four years on July 25, 1983. With first framework programme, launched in 1984, the Commission became responsible for the execution of the framework programme.[12]

Table 1. EU's Framework Programmes for Research and Innovation

Programme Name	Period	Budget (million euros)
First Framework Programme (FP1)	1 January 1984- 31 December 1987	3,750
Second Framework Programme (FP2)	1 January 1987- 31 December 1991	5,396
Third Framework Programme (FP3)	1 January 1990- 31 December 1994	5,700
Fourth Framework Programme (FP4)	1 January 1994- 31 December 1998	11,046
Fifth Framework Programme (FP5)	1 January 1998- 31 December 2002	13,700
Sixth Framework Programme (FP6)	1 January 2002- 31 December 2006	1,670
Seventh Framework Programme (FP7)	1 January 2007- 31 December 2013	50,521
Horizon 2020	1 January 2014- 31 December 2020	77,028,3
Horizon Europe	1 January 2021- 31 December 2027	95,500

Source: *European Commission*

2. Horizon 2020 and Horizon Europe

Horizon 2020, with a budget of 75,6 billion euros, was the EU's research and innovation programme between 2014-2020. Horizon 2020 has been succeeded by Horizon Europe. Horizon 2020, which was the fundamental initiative to support long-term investment for R&D[13], maintained a significant input which has enabled the creation of a Europe

[11] European Union, "Celebrating 40 years of innovation: The journey of EU Framework Programmes", 19.02.2024, https://data.europa.eu/en/news-events/news/celebrating-40-years-innovation-journey-eu-framework-programmes Accessed on 26.04.2025

[12] European Commission, "Framework programmes for Community research, development and demonstration activities and a first framework programme, (1984 to 1987)", 05.03.2014, https://cordis.europa.eu/programme/id/FP1 Accessed on 26.04.2025

[13] European Commission, "Ex post evaluation of Horizon 2020, the EU framework programme for research and innovation", COM(2024) 49 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A49%3AFIN&qid=1706527941657 Accessed on 15.04.2025

connected to innovation and knowledge. According to the Commission, Horizon 2020 is more profitable for Europeans compared to achieved at the national or regional level.[14]

In the "Ex post evaluation of Horizon 2020, the EU framework programme for research and innovation" report, which was published on January 29, 2024, the scientific, societal and economic impact of Horizon 2020 was analysed by the European Commission. According to the report, fundamental goal of Horizon 2020 was creating jobs and increasing economic growth by boosting R&D. There were over 1 million individual applications from 177 countries between 2014 and 2020 also, 35,000 projects involving 40,000 organisations were funded. To fund every high-quality proposal, it would have required an additional 159 billion euros. In addition, owing to this programme, the target of investing 3% of GDP in R&D by 2020 was supported and additional fund for innovation was mobilised. The EU's R&D investments, which were 2.02% of GDP when Horizon 2020 was started, rose to 2.32% in 2020.[15]

The report where the scientific impact of Horizon 2020 was analysed was stated that progress has been made in cancer treatment by the development of experimental personalised cancer vaccines. Due to Horizon 2020, the improvement has taken place in the fields of chemical engineering, composite materials (with applications in clean energy technologies) and quantum technologies. In the report it was added that advancement has been recorded regarding drug discovery by making the use of artificial intelligence in protein structure prediction. The report which continued to examine the societal impact of Horizon 2020 underlined that this programme has played a significant role in improvement of solutions for climate action. Climate science, sustainable fishing, smart electricity grid, urban transport, culture and cultural heritage are some of the areas contributed to under this programme, according to the report. Thirdly, in the economic impact part of the report, it was emphasised that Horizon 2020 achieved a great contribution to the European economy within the scope of economic growth, employment and productivity. According to the report, the programme led to an increase in R&D spending in Europe by promoting investment from the public and private sectors. It was underlined in the report that for each euro invested in private for-profit participants, Horizon 2020 leveraged an additional 0.57 euros in funding from the private sector. As

[14] European Commission, "Horizon 2020 evaluation shows that investment in EU research and innovation greatly pays off", 29.01.2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_24_461 Accessed on 15.04.2025

[15] European Commission, "Ex post evaluation of Horizon 2020, the EU framework programme for research and innovation", COM(2024) 49 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A49%3AFIN&qid=1706527941657 Accessed on 15.04.2025

Horizon 2020 affected intellectual property rights developments positively, it also played a significant role in economic performances of participating firms in key areas.[16]

The ninth framework programme Horizon Europe, which emerged after the eighth framework programme, Horizon 2020, is the EU's key funding innovation programme covering 2021-2027. The programme, with a budget of 93,5 billion euros, not only contributes to combating climate change, but also supports Europe's capacity to fight against global challenges. Horizon Europe, which boosts the effects of investments within the European Research Area, helps to strengthen economic growth, competitiveness and creates jobs.[17]

Table 2. Horizon Europe Programme Structure

Pillar I	**Pillar II**	**Pillar III**
Excellent Science	**Global Challenges and European Industrial Competitiveness**	**Innovative Europe**
European Research Council	**Clusters**	European Innovation Council
Marie Sklodowska-Curie Actions	• Health	European Innovation Ecosystems
Research Infrastructures	• Culture, Creativity and Inclusive Society	European Institute of Innovation and Technology
	• Civil Security for Society	
	• Digital, Industry and Space	
	• Climate, Energy and Mobility	
	• Food, Bioeconomy, Natural Resources, Agriculture and Environment	
	Non-nuclear direct actions of the Joint Research Centre	
Widening participation and strengthening the European Research Area		

[16] Ibid.

[17] European Commission, "Horizon Europe", https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en Accessed on 16.04.2025

Source: *European Commission*

The general objective of Horizon Europe is to maintain economic, technological, scientific and societal output from the EU's investments in R&I to bolster the scientific and technological developments of the EU and to support the competitiveness of the EU. Also, addressing strategic priorities of the Union, promoting the EU's policies and goals, combating global challenges, including the SDGs and improving the European Research Area are the other general objectives of Horizon Europe.[18] In addition, there are five mission areas of Horizon Europe[19]:

- Adaptation to climate change, including societal transformation,
- Cancer,
- Healthy oceans, coastal and inland waters,
- Climate-neutral and smart cities,
- Soil health and food.

On April 30, 2025, The European Commission published a communication titled "Horizon Europe: Research and Innovation at the heart of competitiveness", sharing insights into added value created by Horizon Europe programme. Firstly, it was highlighted in the paper that competitiveness is strongly driven by progress in research and innovation. Referring to the Draghi and Letta reports, it was underlined in the paper that research and innovation leads to increase in the economic growth, productivity and well-being of Europe. The communication highlights that both competitiveness and innovation are long-term investments, emphasizing that Europe's industrial resilience and competitiveness were being strengthened, while new ideas were supported through the Framework Programmes. It is also underlined that Europe must respond to global challenges such as climate change and environment, civil security, digital and artificial intelligence, through strong investments in research and innovation.[20]

[18] REGULATION (EU) 2021/695 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013, EUR-Lex, 12.05.2021, https://eur-lex.europa.eu/eli/reg/2021/695/oj/eng Accessed on 17.04.2025

[19] European Commission, Horizon Europe The EU Research and Innovation Programme 2021-2027, 19.03.2021, https://research-and-innovation.ec.europa.eu/document/download/9224c3b4-f529-4b48-b21b-879c442002a2_en?filename=ec_rtd_he-investing-to-shape-our-future.pdf Accessed on 17.04.2025

[20] European Commission, Horizon Europe: Research and Innovation at the heart of competitiveness, SWD(2025) 110 final, 30.4.2025, https://research-and-innovation.ec.europa.eu/document/download/1a80e2e1-df28-4f1a-8a52-a0e1b47a1860_en Accessed on 21.05.2025.

In the communication, it was pointed out that the Framework Programmes contributes scientific achievements. According to paper, the European Innovation Council (EIC) has so far distributed approximately 2 billion euros and supported over 700 startups and SMEs (more than any other part of the programme) under Horizon Europe. It was stressed that the automotive industry in Europe need to improve its R&D capacity, and it was announced that Horizon Europe will make available 1 billion euros for automotive sector for the period 2025-2027.[21]

The communication continues by stating that Horizon Europe contributes to not only economic growth but also, international cooperation and diplomacy. To date, Horizon Europe programme has attracted applications from 194 countries and brought 19 associated countries. Non-EU countries have also shown interest in the programme, also Horizon Europe and Copernicus one of the first two EU programmes for which the United Kingdon sought associated country status after Brexit. Additionally, Switzerland will become an associated country to Horizon Europe, and Canada and Republic of Korea have concluded association agreements. Associated countries contributed over 4 billion euros between 2021 and 2024, leading to significant increase in programmes funding for research and innovation. [22]

European Commission published "Interim Evaluation of Horizon Europe Framework Programme for Research and Innovation (2021 - 2024)" on April 30, 2025, to indicate the evolution of the programme and first results. According to the report, the budget of Horizon Europe was 95.5 billion euros, however, the budget was reduced to 93.5 billion euros in February 2024. By the end of 2024, 58.4% of the voted budget -including NGEU funds- had been committed, with 34.5% of the payments completed. 15,148 grants were signed, with the value of 43.2 billion euros in EU contribution between 2021 and 2024. 51% of Horizon Europe participants did not participate in any Horizon 2020 projects and most of them are from private sector, particularly SMEs. Horizon Europe has advanced the proposal success rate of 81%, a substantial rise from Horizon 2020's 12%. The largest contribution has been obtained from higher education establishments, followed by research organisations and private for-profit entities.[23]

[21] Ibid.

[22] Ibid.

[23] European Commission, Interim Evaluation of the Horizon Europe Framework Programme for Research and Innovation (2021 – 2024), SWD(2025) 110 final, 30.4.2025, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=SWD:2025:110:FIN#footnoteref31 Accessed on 21.04.2025

Table 3. Distribution of Horizon Europe Grant Funding by Type of Beneficiary

Organization Type	Distribution of Funding (%)
Higher or Secondary Education Establishments	34.7
Research Organizations	27.6
Private for-profit entities (excluding Higher or Secondary Education Establishments)	27.5
Other	6.5
Public Bodies (excluding Research Organisations and Secondary or Higher Education Establishments)	3.7

***Source**: Interim Evaluation of the Horizon Europe Framework Programme for Research and Innovation (2021 - 2024*)

So far, Horizon Europe 15 widening Member States[24] have been allocated 14% of all funding and these countries have been allocated 9% of the total funding in Horizon 2020. Non-widening Member States (Germany, France, Spain and the Netherlands) have received 50.9% of all funding for Horizon Europe. According to the report, at present, newcomer entities make up most of all grant participants, accounting for 51%. Additionally, 14,365 newcomers have been allocated 4.2 billion euros in EU contribution which means 12% of all funding allocated under Horizon Europe.[25]

The interim report also highlights the program's social and scientific outcomes. By January 6, 2025, Horizon Europe beneficiaries had reported 6922 peer-reviewed scientific publications validated by the Commission department. This marks significant progress compared to Horizon 2020, where beneficiaries had reported 2,827 validated peer-reviewed publications at a comparable stage. In total, 10,222 publications have been reported under Horizon Europe to date, representing an improvement over the 69.8% reported at the same stage in Horizon 2020.

Moreover, the program has contributed to addressing EU policy priorities and global challenges. Among projects aligned with the Sustainable Development Goals (SDGs), SDG 3 (Good Health and Well-being) received the most support, accounting for 44% of projects. This was followed by SDG 7 (Affordable and Clean Energy) at 24.2%, and SDG 9 (Industry, Innovation, and Infrastructure) at 22.9%. By the end of 2023, Horizon Europe achieved a 35% contribution towards climate objectives, surpassing Horizon 2020's 32%.

[24] Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia

[25] Ibid.

Additionally, Horizon Europe's expenditure on biodiversity increased from 7.9% to 8.7% between 2021 and 2023.

In parallel, the report highlights various measures implemented and progress achieved in alignment with Horizon Europe's objectives. Furthermore, it emphasizes that Horizon Europe has made notable advancements in gender equality, one of the programme's key goals, showing clear improvements compared to Horizon 2020.[26]

Table 4. Gender Balance in Horizon Europe

Indicators	Horizon 2020	Horizon Europe	Horizon Europe Target
Percentage of women expert evaluators	42%	45%	50%
Percentage of women participating in Horizon 2020 / Horizon Europe advisory groups and expert groups*	43%	51%	50%
Percentage of women coordinators in FP projects	24%	31%	n/a
Percentage of women researchers in FP projects	37%	38%	n/a

***Source**: Interim Evaluation of the Horizon Europe Framework Programme for Research and Innovation (2021 - 2024) (cut-off date: 6 January 2025)*

Later in the report, cooperation with third countries is highlighted, emphasizing the importance of operating within a win-win framework. The financial contribution from associated countries to Horizon Europe has nearly reached 3 billion euros, underscoring the strong support for the programme and R&D initiatives. Additionally, the report notes that Horizon Europe has contributed to narrowing the innovation gap between regions. Finally, participation levels of associated and third countries in collaborative projects have increased compared to Horizon 2020.[27]

Table 5. Collaborations, Participations, and Funding by Type of Country

Indicators	Associated countries		Other third countries	
	Horizon Europe	Horizon 2020	Horizon Europe	Horizon 2020
Share of participation in collaborative projects	10%	7%	6%	5%

[26] Ibid.

[27] Ibid.

Share of EU contribution in collaborative projects	6%	7%	1%	1%

Source: Interim Evaluation of the Horizon Europe Framework Programme for Research and Innovation (2021 – 2024) [28]

The EU Industrial R&D Investment Scoreboard 2024

The EU Industrial R&D Investment Scoreboard, which has been published annually since 2004, includes financial data and analysis of top global corporate R&D investors. This scoreboard provides data on top 2000 companies investing in R&D and the top 800 EU-based companies investing in R&D.[29]

The 2024 EU Industrial R&D Investment Scoreboard showed R&D investment continued to increase in 2023. According to the report, the top 2000 global companies realised an investment of 1,257,7 billion euros in R&D, and this investment was 7.8% more than what was undertaken in 2022 (90,6 billion euros). Also, it should be noted that, this amount was not as strong as the one made in the post-COVID period. The growth realised in 2021 was 13.8%, and 12.6% in 2022, and this means that even R&D investments continued to growt in 2023, it was not quite as vigorously. There are 22 US, 11 EU, 5 Chinese, 5 Japanese and 7 in the rest of the world[30] in the top 50 companies in the Scoreboard and these countries made investment the amount of 504 billion euros in 2023, this means 40.1% of the total R&D investment by listed companies in the Scoreboard. This means that R&D investments have been implemented by only a handful of companies over the last two decades.[31]

The US-based Alphabet became the company that invested the most in R&D in the world in 2023. In addition, the top four companies investing the most in R&D in the world were US-based companies like Alphabet. However, among the top five companies that invest the most in R&D in the world, the company that increased the volume of R&D investments compared to the 2022 was a German company, Volkswagen, which was the only EU

[28] For more detailed information about associated countries and other third countries, please refer to the following source: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf Accessed on 22.05.2025

[29] European Commission, 2024 EU Industrial R&D Investment Scoreboard, 18.12.2024, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC140129/JRC140129_01.pdf Accessed on 17.04.2025

[30] Rest of the world (ROW) is a phrase that used in The EU Industrial R&D Investment Scoreboard 2024 to imply other countries in the world

[31] Ibid.

country among the top 10 countries. Moreover, as sectoral analysis of the reports shows that, like in 2022, R&D investments in 2023 were more concentrated in four sectors (ICT hardware and software, health and automotive). In the EU it has been observed that R&D investments were mostly undertaken in the automotive sector.[32]

Table 6. Top 20 Companies by R&D Investment in the World in 2023

Rank	Company	Country	Sector	R&D (million euro)	R&D one-year growth (%)
1	Alphabet	US	Software & Computer Services	39,804,2	10.7
2	Meta	US	Software & Computer Services	33,229,2	8.5
3	Apple	US	Technology Hardware & Equipment	27,242,5	14.0
4	Microsoft	US	Software & Computer Services	26,873,7	8.5
5	Volkswagen	Germany	Automobiles & Parts	21,779,0	15.2
6	Huawei Investment & Holding	China	Technology Hardware & Equipment	19,939,2	2.2
7	Samsung Electronics	South Korea	Electronic & Electrical Equipment	19,890,5	14.4
8	Intel	US	Technology Hardware & Equipment	14,612,5	-8.5
9	Roche	Switzerland	Pharmaceuticals & Biotechnology	14,225,6	-6.0
10	Johnson & Johnson	US	Pharmaceuticals & Biotechnology	13,972,3	5.1
11	Merck Us	US	Pharmaceuticals & Biotechnology	11,703,9	8.7
12	Mercedes-Benz	Germany	Automobiles & Parts	9,980,0	17.3
13	Pfizer	US	Pharmaceuticals & Biotechnology	9,633,0	-7.4
14	Astrazeneca	UK	Pharmaceuticals & Biotechnology	9,502,8	9.4
15	General Motors	US	Automobiles & Parts	9,015,6	1.0
16	Eli Lilly	US	Pharmaceuticals & Biotechnology	8,481,4	29.5
17	Bristol-Myers Squibb	US	Pharmaceuticals & Biotechnology	8,384,5	-2.2

[32] Ibid.

18	Oracle	US	Software & Computer Services	8,118,6	3.4
19	Tencent	China	Software & Computer Services	8,117,6	5.7
20	Novartis	Switzerland	Pharmaceuticals & Biotechnology	8,070,3	-2.5

Source: *2024 EU Industrial R&D Investment Scoreboard*

Looking at the EU section of the report, the 322 companies listed in the Scoreboard and headquartered in the EU raised their nominal R&D investment by 9.8%. Thus, EU companies that left US companies behind for the second time also prevailed over Chinese companies for the first time.[33]

In 2023, investment in the R&D of the 800 EU companies was increased by 8.7%. 73% of these companies are based in Germany, France and the Netherlands. Among 800 EU companies, the automotive sector executed the largest portion of R&D investment in 2023, and these top companies were Volkswagen, Mercedes-Benz, Stellantis and BMW. The automotive industry was followed respectively by health (19.3%), ICT hardware (14%) and ICT software (7.8%). The 800 EU-based companies include 99 SMEs with more than two-thirds engaged in the health sector. SMEs based in France invested the most in R&D, accounting for 34% of the total, while Sweden SMEs came second at 21.3% and the Netherlands the third at 16.6%.

Table 7. Top 20 Companies by R&D Investment in the EU in 2023

Rank	Company	Country	Sector	R&D (million euros)	R&D one-year growth (%)
1	Volkswagen	Germany	Automobiles & Parts	21,779,0	15.2
2	Mercedes-Benz	Germany	Automobiles & Parts	9,980,0	17.3
3	BMW	Germany	Automobiles & Parts	7,755,0	8.0
4	Robert Bosch	Germany	Automobiles & Parts	7,564,0	1.1
5	Stellantis	Netherlands	Automobiles & Parts	7,484,0	11.4
6	Sanofi	France	Pharmaceuticals & Biotechnology	6,728,0	0.3
7	SAP	Germany	Software & Computer Services	6,282,0	2.3
8	Siemens	Germany	Electronic & Electrical Equipment	6,183,0	10.6
9	Boehringer Sohn	Germany	Pharmaceuticals & Biotechnology	5,766,0	14.2

[33] Ibid.

10	Bayer	Germany	Pharmaceuticals & Biotechnology	5,461,0	-17.6
11	Ericsson	Sweden	Technology Hardware & Equipment	4,440,3	4.1
12	Nokia	Finland	Technology Hardware & Equipment	4,266	-5.5
13	Novo Nordisk	Denmark	Pharmaceuticals & Biotechnology	3,941,2	35
14	ASML Holding	Netherlands	Technology Hardware & Equipment	3,724,9	21.3
15	Airbus	Netherlands	Aerospace & Defence	3,634,0	6.9
16	Geely Sweden Holdings	Sweden	Automobiles & Parts	3,234,0	69.7
17	Continental	Germany	Automobiles & Parts	2,876,3	-0.7
18	ZF	Germany	Automobiles & Parts	2,730	2.5
19	Renault	France	Automobiles & Parts	2,582	14.3
20	Volvo	Sweden	Automobiles & Parts	2,579	17

Source: *2024 EU Industrial R&D Investment Scoreboard*

In 2023, the top 2000 global companies carried out 1,257,7 billion euros for R&D investment in 2023 which means the volume of investment increased 7.8% compared to 2022. It has been observed that the number of EU-based companies among the top 2000 R&D investors increased by 14. Notably, Germany not only hosted the highest number of top R&D investing companies but also recorded the largest increase in the number of such companies compared to the other EU countries.

Table 8. EU Countries in R&D Investment and Number of Companies

EU Countries	Number of Companies in 2023	R&D Investment (billion euros) in 2023
Germany	106(95)	119,2
France	50(49)	33,7
Netherlands	33(33)	29,8
Sweden	22(20)	15,3
Ireland	24(9)	10,4
Denmark	23(22)	9,8
Finland	9(9)	5,4
Italy	17(16)	5,4
Spain	11(11)	5,6
Belgium	9(10)	3,2
Austria	11(10)	1,9
Luxembourg	3(4)	1,9
Portugal	1(1)	0,2
Hungary	1(1)	0,2
Slovenia	1(1)	0,2

Malta	1(1)	0,1
Total EU	322(308)	235,2

Source: *2024 EU Industrial R&D Investment Scoreboard*

Note: *Figures in brackets show the number of companies in the 2023 edition of the Scoreboard*

3. Türkiye's Position in Horizon Europe and R&D Investments

Türkiye participated in the FP4 and FP5 on project basis and then, Türkiye became an associate country to FP6 in 2002.[34] "Framework Agreement between the European Community and the Republic of Turkey on the general principles for the participation of the Republic of Turkey in Community programmes" was signed on February 26, 2002 and this framework agreement enabled Türkiye to participate in the programme, also providing necessary legal arrangements. This framework agreement was published in the Republic of Türkiye Official Gazette on September 1, 2002.[35] The Scientific and Technological Research Council of Türkiye (TÜBİTAK) is the National Contract Point Organization for EU Framework Programme and aim of the programme is to facilitate the Turkish participation in EU programmes and integration of the Turkish Research Area (TARAL) and European Research Area (ERA).[36]

The agreements, signed on October 27, 2021, ensured Türkiye's association with the current framework agreement Horizon Europe. This step, which allows Türkiye and the EU to continue their cooperation in the field of research and innovation, aims to enable Türkiye's digital and green transition. Also, with this initiative, it was planned to carry out projects and activities together to combat global issues.[37] It was published in the Republic

[34] Republic of Türkiye Ministry of Foreign Affairs Directorate for EU Affairs, "AGENDA ITEM 2: RESEARCH POLICY AND PROGRAMMES", 14.11.2005, https://www.ab.gov.tr/files/tarama/tarama_files/25/SC25DET%202_Research%20Policy%20and%20Programmes.pdf Accessed on 26.04.2025

[35] The Republic of Türkiye Official Gazette, No: 24863, 01.09.2002, https://www.resmigazete.gov.tr/eskiler/2002/09/20020901.htm#1 Accessed on 26.04.2025

[36] Republic of Türkiye Ministry of Foreign Affairs Directorate for EU Affairs, "AGENDA ITEM 2: RESEARCH POLICY AND PROGRAMMES", 14.11.2005, https://www.ab.gov.tr/files/tarama/tarama_files/25/SC25DET%202_Research%20Policy%20and%20Programmes.pdf Accessed on 26.04.2025

[37] Republic of Türkiye Ministry of Foreign Affairs Directorate for EU Affairs, "Agreements On Türkiye's Associatıon To Horızon Europe, Erasmus+ And European Solıdarıty Corps (Esc) Programmes For The Perıod 2021-2027 Sıgned In Brussels", https://www.ab.gov.tr/agreements-on-turkeys-association-to-horizon-europe-erasmus-and-european-solidarity-corps-esc-programmes-for-the-period-_52756_en.html Accessed on 26.04.2025

of Türkiye Official Gazette on November 16, 2021, then entered into force.[38] Horizon Europe in Türkiye is coordinated by the Scientific and Technological Research Council of Türkiye (TÜBİTAK).[39]

Table 9. Horizon Europe Participation by Region (NUTS 3) in Türkiye

Region (NUTS 3)	Participation	Net EU Contribution (euros)
Totals	**970**	**311,549,062**
İstanbul	445	153,944,060
Ankara	245	96,205,085
İzmir	70	15,459,545
Not Available	54	10,151,561
Kocaeli	38	11,263,760
Bursa	15	3,301,709
Sivas	12	1,785,575
Adana	11	1,666,438
Eskişehir	9	2,524,661
Manisa	7	751,699
Kayseri	5	3,758,801
Konya	5	1,323,31
Düzce	4	1,333,789
Isparta	4	1,156,491
Antalya	4	917,762
Balıkesir	4	892,275
Tekirdağ	4	735,613
Çanakkale	4	508,000
Sakarya	4	435,505
Muğla	3	365,531
Yalova	2	329,713
Bolu	2	328,800
Kastamonu	2	204,706
Samsun	2	166,750
Erzurum	2	146,125
Gaziantep	2	20,750
Mardin	1	600,323
Amasya	1	315,697
Malatya	1	281,063
Burdur	1	249,813
Ordu	1	155,625
Mersin	1	70,000

[38] [38] The Republic of Türkiye Official Gazette, No: 31661, 16.11.2021, https://www.resmigazete.gov.tr/eskiler/2021/11/20211116-2.pdf Accessed on 26.04.2025

[39] Republic of Türkiye Ministry of Foreign Affairs Directorate for EU Affairs, "Horizon Europe Programme",

Trabzon	1	69,475
Kırklareli	1	69,351
Aydın	1	58,781
Kahramanmaraş	1	0
Kilis	1	0

Source: *Horizon Europe Dashboard*[40]

The number of participants and net EU contributions (funding received by the project's participants after deduction of their linked third parties' funding) under Horizon Europe are presented in Table 9. As seen in the table, İstanbul is the region with highest number of participants as well as the city receiving the largest share of funding. Following İstanbul, Ankara ranks second, with approximately half the number of participants and nearly half the amount of funding. İzmir and Kocaeli follow as the next most active regions in terms of participation and funding received. According to the latest figures, under Horizon Europe programme, Türkiye has been received 311 million euros from the EU.

Table 10. Türkiye's General Position in Horizon Europe

Horizon Europe	Türkiye's Participation	Türkiye's Participation (%)
Net EU Contribution (Funding received by the project's participants after deduction of their linked third parties' funding)	311,5 million	0.69
Signed Grants (Number of grant agreements signed, including suspended, terminated and closed agreements)	592	3.20
Participation (Number of organizations involved in Horizon Europe projects. One organisation participating in N projects is counted N times)	970	0.90
Unique Participation (Number of unique organisations involved in Horizon Europe projects. One organisation participating in N projects is counted 1 time)	395	1.37
Success Rate (Ratio of the retained proposals to the total number of eligible proposals received.)		12.69%[41]
Eligible Proposals (Proposals that have not failed at the eligibility or admissibility step of the evaluation,	4,108	3.74

[40] European Commission EU Funding & Tenders, R&I Country Profiles, https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/1213b8cd-3ebe-4730-b0f5-fa4e326df2e2/sheet/0c8af38b-b73c-4da2-ba41-73ea34ab7ac4/state/analysis Accessed on 26.04.2025

[41] Average success rate is 9,68%

that have not been withdrawn, that are not duplicates nor not fully evaluated yet.)		
Applications (Number of organisations applying for Horizon Europe grants. One organisation applying in N proposals is counted N times)	7,194	1.36

Source: *Horizon Europe Dashboard*[42]

Table 10 presents Türkiye's participation framework within Horizon Europe. Türkiye's net EU contribution amounts to 311 million euros and this means Türkiye's participation of the programme is 0.69%. The number of signed grant agreements involving Türkiye is 592, corresponding to 3.20% of the total grants awarded under Horizon Europe. A total of 970 organisations from Türkiye have been involved in Horizon Europe projects, while 7,194 applications have been submitted. Türkiye's success rate stands at 12.69%, which is notably higher than the overall average success rate of 9.68%. Additionally, 395 unique organisations from Türkiye have participated in Horizon Europe, representing a 1.37% share in terms of unique participants.

Table 11. Top 10 Organizations in Türkiye in Horizon Europe by Net EU Contribution (Private-For-Profit Entities (Excluding Higher and Secondary Education Establishments))

Top Organizations	Net EU Contribution (million euros)
Ge Marmara Technology Center Muhendislik Hizmetleri Limited Sirketi	8,17
Ford Otomotiv Sanayi Anonim Sirketi	7,34
Arcelik A.S.	6,63
Tofas Turk Otomobil Fabrikasi Anonim Sirketi	5,18
Turkiye Petrol Rafinerileri Anonim Sirketi	5,01
Enerjisa Enerji Uretim Anonim Sirketi	3,5
Air Liquide Gaz Sanayi Ve Ticaret Anonim Sirketi Arcelik A.S.	3,49
Siro Silk Road Temiz Enerji Depolama Teknolojileri Sanayi ve Ticaret Anonim Sirketi	3,03
SRDC Yazilim Arastirma ve Gelistirme Ve Danismanlik Ticaret Anonim Sirketi	2,94
FEV TR Otomotiv ve Enerji Arastirma ve Muhendislik Limited Sirketi	2,2

Source: *Horizon Europe Dashboard*[43]

[42] Ibid.

[43] European Commission EU Funding & Tenders, R&I Country Profiles, https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/1213b8cd-3ebe-4730-

Table 11 shows the top 10 private-for-profit entities based in Türkiye that received the most funding from the EU. The 10 organizations which was received the highest net EU contribution are *Ge Marmara Technology Center Muhendislik Hizmetleri Limited Sirketi*, *Ford Otomotiv Sanayi Anonim Sirketi*, *Arcelik A.S.*, *Tofas Turk Otomobil Fabrikasi Anonim Sirketi,* respectively. As shown in the table *Ge Marmara Technology Center Muhendislik Hizmetleri Limited Sirketi* holds the top position and has obtained a support of 8,17 million euros.

Table 12. Top 10 Organizations in Türkiye in Horizon Europe by Participation (Private-for-profit entities (excluding higher and secondary education establishments))

Top Organizations	Participation
Arcelik A.S.	27
Ford Otomotiv Sanayi Anonim Sirketi	21
Tofas Turk Otomobil Fabrikasi Anonim Sirketi	16
Farplas Otomotiv Anonim Sirketi	8
Turkiye Petrol Rafinerileri Anonim Sirketi	7
AVL Arastirma ve Muhendislik Sanayi Ve Ticaret Limited Sirketi	6
Elkon Elektrik Sanayi ve Ticaret Anonim Sirketi	6
Ericsson Arastirma Gelistirme ve Bilisim Hizmetleri Anonim Sirketi	6
Migros Ticaret Anonim Sirketi	6

Source: *Horizon Europe Dashboard*[44]

According to the Glossary of Horizon Europe Dashboard, "participation" means the act of involvement of a legal entity in a grant agreement. Among private-for-profit entities in *Türkiye Arcelik A.S.* is the first one means of participation by 27. It was followed by *Ford Otomotiv Sanayi Anonim Sirketi* by 21, *Tofas Turk Otomobil Fabrikasi Anonim Sirketi* by 16, *Farplas Otomotiv Anonim Sirketi* by 8 and *Turkiye Petrol Rafinerileri Anonim Sirketi* by7 respectively, according to Table 12.

Table 13. Top 10 Organizations in Türkiye in Horizon Europe by Participation (Higher or Secondary Education Establishments, Public Bodies, Research Organizations and other)

Top Organizations	Participation
Turkiye Bilimsel ve Teknolojik Arastirma Kurumu	81
Koc University	36
Middle East Technical University	31

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[44] Ibid.

Sabanci Universitesi	24
Bilkent Universty Vakif	15
Istanbul Teknik Universitesi	15
Izmir Institute of Technology	13
ODTU Gunes Enerjisi Uygulama ve Arastirma Merkezi	13
Bogazici Universitesi	12
Marmara University	11

Source: *Horizon Europe Dashboard*[45]

Table 14. Top 10 Organizations in Türkiye in Horizon Europe by Net EU Contribution (Higher or Secondary Education Establishments, Public Bodies, Research Organizations and other)

Top Organizations	Net EU Contribution (million euros)
Turkiye Bilimsel ve Teknolojik Arastirma Kurumu	45,7
Koc University	20,08
Middle East Technical University	13,88
Sabanci Universitesi Nanoteknoloji Arastirma Ve Uygulama Merkezi Sunum	8,49
Bilkent Universty Vakif	7,24
Istanbul Metropolitan Municipality	6,97
Izmir Institute of Technology	6,79
Sabanci Universitesi	6,55
Istanbul Teknik Universitesi	5,56

Source: *Horizon Europe Dashboard*[46]

Table 13 and Table 14 provides detailed information about Public Bodies and Research Organizations, Higher or Secondary Education Establishments and others in Türkiye. Accordingly, when the participation data examined, *Turkiye Bilimsel ve Teknolojik Arastirma Kurumu* leads by a significant margin which is 81. Following this, the participation count for *Koc University* is 36. Next in line, Middle East Technical University has participation of 31.

In the net EU contribution section, it is noticeable that *Türkiye Bilimsel ve Teknolojik Arastirma Kurumu* takes the lead by a large gap. Then, it was followed by Koc University,

[45] European Commission EU Funding & Tenders, R&I Country Profiles, https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/1213b8cd-3ebe-4730-b0f5-fa4e326df2e2/sheet/0c8af38b-b73c-4da2-ba41-73ea34ab7ac4/state/analysis Accessed on 26.04.2025

[46] Ibid.

Middle East Technical University, *Sabanci Universitesi Nanoteknoloji Arastirma Ve Uygulama Merkezi Sunum* and *Bilkent Universty Vakif*, respectively.

Table 15. EU Contribution (euro) across Missions in Türkiye

Missions	EU Contribution
Ocean	3,52 million euros
Cities	2,77 million euros
Climate	2,06 million euros
Soil	1,3 million euros
Cancer	989 thousand euros

Source: *Horizon Europe Dashboard*[47]

When the funds provided in Türkiye are examined in terms of missions, it is seen that "ocean" is in the first place by 3,52 million euros. According to the Table 15, this was followed by cities with 2,77 million euros, climate with 2,06 million euros, soil with 1,3 million euros and lastly cancer with 989 thousand euros.

Table 16. Horizon Europe Contribution to Member States

Country/Territory	Net EU Contribution (euros)
Germany	7,16 billion
France	5,09 billion
Spain	4,76 billion
Netherlands	3,93 billion
Italy	3,84 billion
Belgium	3,39 billion
Greece	1,74 billion
Sweden	1,52 billion
Austria	1,46 billion
Denmark	1,33 billion
Finland	1,29 billion
Portugal	1,05 billion
Ireland	943,63 million
Poland	687,43 million
Czechia	535,45 million
Slovenia	366,93 million
Greek Administration of Southern Cyprus	310,57 million

[47] European Commission EU Funding & Tenders, R&I Country Profiles, https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/1213b8cd-3ebe-4730-b0f5-fa4e326df2e2/sheet/d23bba31-e385-4cc0-975e-a67059972142/state/analysis Accessed on 26.04.2025

Romania	296,95 million
Estonia	270,32 million
Luxembourg	204,81 million
Hungary	201,03 million
Bulgaria	167,16 million
Lithuania	164,18 million
Croatia	145,13 million
Slovakia	126,76 million
Latvia	103,32 million
Malta	51,28 million

Source: *Horizon Europe Dashboard*

Table 16 illustrates that; Germany is by far the country receiving the highest amount of funding under the programme. It is followed by France and Spain, respectively. The country receiving the least funding is Malta.

Table 17. Horizon Europe Contribution (euro) to Associated Countries

Country/Territory	**Net EU Contribution (euro)**
Norway	1,48 billion
Israel	838,85 million
United Kingdom	664,97 million
Türkiye	**311,55 million**
Serbia	130,03 million
Iceland	76,49 million
Ukraine	60,89 million
Tunisia	14,44 million
North Macedonia	12,38 million
Canada	11,45 million
Bosnia and Herzegovina	9,4 million
Moldova	7,52 million
Faroes	7,34 million
Armenia	7,03 million
Albania	6,96 million
New Zealand	6,9 million
Georgia	6,26 million
Montenegro	4,55 million
Kosovo *	1,51 million

Source: *Horizon Europe Dashboard*[48]

As shown in the Table 17, which presents the funding provided by Horizon Europe to the Associated Countries, Türkiye ranks forth, following Norway, Israel and UK. Norway's substantial lead over the other countries, as the top-ranked, is noteworthy. After

[48] Ibid.

Norway's 1,48 billion euros contribution, Israel and the UK come with 838,85 million euros and 664,97 million euros, respectively. Furthermore, Türkiye is observed to be in fourth place with 311,55 million euros, with Serbia coming next.

A comparison of Tables 16 and 17 reveals that Norway receives more funding than many EU Member States. Under the Horizon Europe programme, Norway has received 1,48 billion euros, ranking first among the Associated Countries. However, when compared to all EU Member States, Norway ranks ninth overall, just behind Sweden.

Examining Türkiye's position, which ranks fourth among the Associated Countries, shows that it has surpassed several EU Member States in funding received. With 311 million euros granted under the programme, Türkiye ranks just after Slovenia among Member States, placing it 16th overall when compared with EU countries.

According to Eurostat data published on May 13, 2025, Germany had a population of 83 million in 2024 and received 7,16 billion euros from the EU under the Horizon Europe programme as of May 2025. When this funding is divided by the population, the per capita amount is approximately 85 euros (€85.82 per person). In contrast, Türkiye's 2024 population was approximately 85,37 million. Under Horizon Europe, Türkiye received a net contribution of around 311,5 million euros. This corresponds to roughly 3 euros (€3.65) per person. This comparison highlights a significant disparity: despite having similar population sizes, Germany receives a substantially higher per capita contribution than Türkiye.

A similar comparison can be made with EU Member States that receive less total funding than Türkiye, such as Romania and Bulgaria. According to the latest Eurostat data as of May 13, 2025, Romania's population in 2024 was approximately 19,07 million. Romania received about 297 million euros from the EU under Horizon Europe, which corresponds to a per capita funding of roughly 155 euros (€155.74). Similarly, Bulgaria had a population of about 6,45 million in 2024 and received approximately 167 million euros in Horizon Europe funding. This translates to around 259 euros (€259.34) per person. Therefore, despite having smaller populations than Türkiye, both Romania and Bulgaria receive significantly higher per capita funding than Türkiye under the Horizon Europe programme.

Table 18. Collaboration Links in the Projects Where Türkiye is Involved (Top 10 Countries)

Collaborative Country/Territory	Collaboration Links
Spain	1,911
Italy	1,813
Germany	1,632

France	1,175
Belgium	975
Greece	950
Netherlands	752
Austria	656
United Kingdom	599
Portugal	581
Finland	430
Sweden	383
Denmark	363
Switzerland	347
Poland	317
Norway	283
Ireland	268
Romania	229
Czechia	222
Slovenia	182

Source: *Horizon Europe Dashboard*[49]

According to the Glossary, collaborative link is assumed to exist between each pair of participants in each contract. When collaborative links in the projects where Türkiye is involved, the highest number belongs to Spain by 1,911. Based on the Table 18, Spain is followed by Italy and Germany.

Table 19. Share of GDP on R&D of EU and Türkiye (%)

Reference Area	YEARS									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Austria	3.11(e)	3.07	3.13(e)	3.07	3.11(e)	3.14	3.21(e)	3.26	3.18(e)	3.29(p)
Belgium	2.36	2.43	2.53	2.68	2.86	3.15	3.37	3.41	3.29(e)	3.32(p)
Bulgaria	0.79	0.95	0.77	0.74	0.76	0.84	0.85	0.77	0.75	0.79
Croatia	0.77	0.82	0.85	0.84	0.95	1.08	1.24	1.24	1.42	1.39(p)
Czechia	1.94	1.91	1.65	1.75	1.88	1.90	1.95	1.93	1.89	1.83(p)
Denmark	2.92	3.06	3.10	2.94	2.98	2.91	2.97	2.74(p)	2.87	2.99(p)
Estonia	1.41	1.44	1.22	1.25	1.38	1.59	1.73	1.75	1.76	1.84
Finland	3.16	2.89	2.75	2.75	2.78	2.82	2.93	3.01	2.98	3.09
France	2.27(b)	2.22	2.22	2.20	2.20	2.20	2.27	2.21	2.22(p)	2.19(p)
Germany	2.82	2.88	2.88	2.99	3.05	3.11	3.09	3.08(p)	3.07(p)	3.11(p)
Greece	0.85	0.97	1.01	1.15	1.21	1.26	1.49	1.43	1.48(p)	1.49(p)
Hungary	1.34	1.34	1.18	1.31	1.50(b)	1.46	1.58	1.63	1.39	1.39(p)
Ireland	1.48(e)	1.14(e)	1.15(e)	1.21(e)	1.08(b,e)	1.14	1.12	1.07	1.53	1.58(p)
Italy	1.33(e)	1.33	1.36(b)	1.36	1.42	1.46	1.50	1.41	1.37	1.31(p)

[49] Ibid.

Latvia	0.71	0.64	0.45	0.53	0.66	0.66	0.76	0.77	0.81	0.82
Lithuania	1.03	1.04	0.84	0.90	0.93	0.99	1.12	1.10	1.05	1.05(p)
Luxembourg	1.22	1.25	1.27	1.24	1.17	1.18	1.10(e)	1.04	1.05	1.03(p)
Netherlands	2.15	2.12	2.12	2.14	2.10	2.14	2.27	2.22	2.18(b)	2.23(p)
Poland	0.95	1.00	0.96	1.03	1.19	1.31	1.37	1.42	1.44	1.56
Portugal	1.29	1.25	1.28	1.32	1.35	1.39	1.61	1.67	1.69	1.69(e,p)
Romania	0.38	0.49	0.49	0.51	0.50	0.47	0.46	0.47	0.46	0.52(p)
Slovak Republic	0.87	1.15	0.79	0.88	0.83	0.82	0.89	0.90	0.98	1.04
Slovenia	2.39	2.22	2.03	1.88	1.96	2.06	2.16	2.14	2.10	2.13(p)
Spain	1.23	1.21	1.18	1.20	1.23	1.24	1.40	1.40	1.41(p)	1.49(p)
Sweden	3.12(e)	3.24(v2)	3.26(e)	3.39(v2)	3.35(e)	3.40 (e,v2)	3.50	3.42 (e,v2)	3.47	3.60
Türkiye	**0.86**	**0.97**	**1.12(b)**	**1.18**	**1.27**	**1.32**	**1.37**	**1.40**	**1.32**	**1.42**
European Union (27 countries from 01/02/2020)	1.99(e)	1.99(e)	1.98(e)	2.02(e)	2.06(e)	2.09(e)	2.16(e)	2.12(e)	2.11(e)	2.13(e)

***Source*[50]*: OECD*[51]

Table 19 presents the share of GDP on R&D of EU countries and Türkiye. Although Türkiye has consistently increased its percentage of GDP on R&D over the years, there was a decline in 2022. However, it is observed that Türkiye increased its R&D again in 2023. It is noteworthy that Türkiye has consistently remained below the EU average in terms of the percentage of GDP on R&D.

The EU countries with notably high R&D-to-GDP ratios include Sweden, Germany, Austria, and Belgium. It is also noteworthy that these countries have generally increased the share of R&D in their GDP over the years. According to 2023 figures, Türkiye's R&D investment level is comparable to that of countries such as Hungary, Greece, Spain, and Italy.

[50] OECD, Main Science and Technology Indicators (MSTI database), Measure: Gross Domestic Expenditure on R&D (GERD) Combined unit of measure**:** Percentage of GDP, https://data-explorer.oecd.org/vis?lc=en&tm=msti&snb=1&vw=tb&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_MSTI%40DF_MSTI&df[ag]=OECD.STI.STP&df[vs]=&pd=2014%2C&dq=.A.G.PT_B1GQ..&to[TIME_PERIOD]=false Accessed on 23.04.2025

[51] E: Estimated value, B: Time series break, P: Provisional value, V2: The sum of the breakdown does not add to total

Table 20. Gross Domestic Expenditure on R&D by Business Enterprise Sector (million euros)

Geopolitical entitiy	Time									
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
European Union - 27 countries (from 2020)	159,607,928 (e)	167,262,858(e)	174,106,975(e)	186,689,919(e)	196,586,944(e)	207,889,761(e)	203,519,198(e)	218,320,24(e)	239,583,629(e)	25,076,75(e)
Germany	56,996,5	60,952	62,826	68,787,3	72,101,3	75,830,4	71,032	75,761,156	81,809,385	88,707 (p)
Spain	6,784,311	6,920	7,126	7,729	8,445	8,741	8,767	9,696,15	10,901,728	12,615,739(p)
Hungary	1,021,992 (d)	1,109,625 (d)	1,016,925 (d)	1,223,104 (d)	1,550,847 (bd)	1,620,933 (d)	1,679,178 (d)	1,909,86 (d)	1,689,829 (d)	1,982,343
Poland	1,800,086	2,010,325	2,700,426	3,117,665	3,977,67	4,428,261	4,582,277	5,206,576	6,285,632	7,549,249(p)
Türkiye	**3,013,941**	**3,704,182**	**4,361,244**	**4,469,144**	**4,437,316**	**5,023,858**	**4,780,502**	**5,935,863**	**7,009,554**	**9,548,487**
South Korea	35,657,706	40,696,214	42,013,169	49,002,496	52,987,47	54,780,944	54,697,438	59,678,026	65,844,397	66,740,872

Source[52]*:Eurostat*[53]

Table 21. Gross Domestic Expenditure on R&D by Government Sector (million euro)

Geopolitical entitiy	Time									
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
European Union - 27 countries (from 2020)	30,769,81 (e)	31,652,631 (e)	30,900,13 (e)	32,162,452 (e)	33,629,499 (e)	35,455,391 (e)	36,029,299 (e)	38,545,269 (e)	37,946,167 (e)	41,148,166 (e)
Germany	12,319,97 (d)	12,485,607 (d)	12,720,861 (d)	13,484,009 (d)	14,168,026 (d)	15,022,2 (d)	15,589,054 (d)	16,761,071 (d)	14,697,104 (b)	15,770 (p)
Spain	2,408,695	2,520	2,453	2,495	2,515	2,648	2,753	2,910,025	3,329,694	3,992,243 (p)
Hungary	196,328 (d)	200,778 (d)	183,98 (d)	210,084 (d)	223,06 (bd)	215,849 (d)	217,862 (d)	258,058 (d)	287,692	298,984
Poland	925,531	1,052,986	103,365	110,453	116,997	89,402	143,843	168,732	184,316	211,811 (p)
Türkiye	**586,754**	**704,269**	**699,421**	**693,694**	**623,581**	**478,858**	**461,436**	**436,019**	**549,324**	**711,412**
South Korea	5,111,392	6,164	6,239,411	6,602,531	6,647,988	6,816,81	6,991,543	7,370,158	7,784,368	8,096,04

[52] Eurostat, GERD by sector of performance, https://ec.europa.eu/eurostat/databrowser/view/rd_e_gerdtot__custom_16415143/default/table?lang=en Accessed on 26.04.2025

[53] : not available, bd: break in time series definition differs (see metadata),b: break in time series, d: definition differs (see metadata), p: provisional

Source[54]: *Eurostat[55]*

Tables 20 and 21 show the amount spent on R&D by the public and private sectors. According to the tables comparing some significant countries and Türkiye, Türkiye's private sector expenditure is higher than that of the public sector. While private sector spending has generally shown an upward trend, the public sector has experienced a decline in recent years.

In public sector expenditures, it is noteworthy that Spain has seen a significant increase since 2021, while Türkiye appears to be ahead of Hungary and Poland. In the private sector, Poland and Türkiye are in a similar position. Germany and South Korea stand out as highly successful in both the public and private sectors in terms of research and innovation performance.

Conclusion

Since Türkiye's participation in the EU Framework Programmes began in 2002, cooperation between Türkiye and the European Union in the realms of research and innovation has grown progressively stronger. Notably, Chapter 25 — Science and Research — remains the only chapter in Türkiye's accession negotiations to have been both opened and provisionally closed, underscoring the strategic importance and relative consensus in this domain.

The European Commission's Türkiye 2024 Report underscores the robust collaboration between Türkiye and the EU in the field of innovation. The report highlights Türkiye's positive trajectory within the Horizon Europe programme and draws attention to the increased involvement of Turkish innovators in the European Institute of Innovation and Technology (EIT). It further notes the concerted efforts dedicated to advancing the establishment of the EIT Community Regional Innovation Scheme (RIS) Hub in Türkiye.

An additional and strategic measure to enhance bilateral cooperation in the domain of research and to jointly address global challenges has been the initiation of high-level dialogue meetings. The first meeting of the Türkiye–EU High-Level Dialogue on Science, Research, Technology and Innovation was convened on 15 November 2022. The second iteration of this dialogue, co-chaired by H.E. Mehmet Fatih Kacır, Minister of Industry and Technology of the Republic of Türkiye, and H.E. Iliana Ivanova, European Commissioner

[54] Eurostat, GERD by sector of performance, https://ec.europa.eu/eurostat/databrowser/view/rd_e_gerdtot__custom_16414814/default/table?lang=en Accessed on 26.04.2025

[55] : not available, bd: break in time series definition differs (see metadata),b: break in time series, d: definition differs (see metadata), p: provisional

for Innovation, Research, Culture, Education and Youth, was held on 25 April 2024 in Istanbul. The discussions primarily centred on advancing collaboration in areas of green and digital transformation, as well as emerging technologies.

The tangible outcomes of these collaborative efforts are reflected in several key developments. Notably, Prof. Dr. Rana Sanyal, a distinguished Turkish scientist, was awarded the 2023–2024 European Prize for Women Innovators—an acknowledgment of both individual excellence and the growing presence of Turkish actors in the European innovation landscape. Furthermore, the establishment of the EIT Community Hub Türkiye on 12 February 2025 marks a significant step towards enhancing Türkiye's innovation capacity and fostering deeper integration of Turkish stakeholders into the broader EU innovation ecosystem.

The European Union, which began to take significant steps in research and development (R&D) policy through the launch of its Framework Programmes in the 1980s, has since institutionalized and systematized its approach through successive initiatives, most notably Horizon 2020 and its successor, Horizon Europe. Within this evolving landscape, Türkiye has positioned itself as a key stakeholder in the European Research Area participating in the Framework Programmes since the Fifth Framework Programme.

Under the current Horizon Europe programme, Türkiye is receiving its highest level of funding to date among all Framework Programmes it has participated in. It ranks as the fourth-largest recipient of funding among the Associated Countries and has been classified as an "Emerging Innovator" in the European Innovation Scoreboard 2024. Notably, Türkiye's success rate within Horizon Europe exceeds the programme average, and the country has secured more funding than 11 EU Member States. However, a closer examination of funding in per capita terms reveals a considerable disparity: while Türkiye's overall population is comparable to that of Germany, the Horizon Europe funding per capita is substantially lower. Moreover, despite receiving more total funding than Bulgaria and Romania—two EU Member States with smaller populations—Türkiye lags behind these countries in per capita terms.

Domestically, R&D expenditure by the private sector in Türkiye has shown a consistent upward trajectory over recent years. Public R&D expenditure, however, has displayed periodic fluctuations, although it remains relatively high in comparison to some EU countries. Importantly, the overall share of R&D in Türkiye's Gross Domestic Product (GDP) has demonstrated a positive trend. Following Türkiye's association with Horizon Europe in 2021, both government and business sector R&D spending increased in 2022 and 2023 relative to previous years. Nonetheless, the R&D-to-GDP ratio experienced a temporary decline in 2022 before rebounding in 2023.

Geographically, it is observed that larger metropolitan areas in Türkiye have benefitted disproportionately from Horizon Europe funding. However, this presents a clear opportunity for more balanced regional development; with targeted support, smaller cities could play a more significant role in the future. Taken together, these developments indicate strong potential for Türkiye to expand its engagement and impact within the Framework Programmes in the coming years.

Following the political stagnation and the partial suspension of high-level dialogue between the European Union and Türkiye in 2019—primarily due to geopolitical tensions in the Eastern Mediterranean—one of the key areas in which engagement was revived was research and innovation. This resumption underscores the strategic importance of innovation as a shared priority area, reflecting both parties' commitment to generating reciprocal benefits and addressing common challenges—particularly in the context of digital and green transitions.

The active participation of researchers from EU Member States and Turkish innovators in joint research and innovation projects is increasingly viewed as a meaningful step toward deepening not only scientific collaboration but also fostering intercultural understanding and long-term societal ties. These initiatives contribute to addressing transnational issues through collective expertise, while also strengthening the European Research Area.

In recognition of the strategic and scientific value of Türkiye's continued involvement in EU Framework Programmes—particularly in enhancing the international visibility of Turkish researchers, promoting cross-border collaboration, and jointly addressing global challenges, TÜBİTAK issued a formal declaration in November, expressing its intent to participate in the upcoming 10th Framework Programme.