# ASSESSMENT OF INVESTMENT AND INNOVATION ACTIVITY OF HIGH-TECH TNCs

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The work is devoted to the analysis of modern trends in the investment and innovation activity of high-tech TNCs. The key factors of the intensive development of TNCs in the global economy are outlined. It was established that innovations play an ever-increasing role in the competitive advantages of TNCs in modern conditions. The results and dynamics of investments in R&D of leading TNCs are analyzed. It is emphasized that the increase in international competition in the conditions of growing techno-globalism determines the need to improve the innovative activity of TNCs through its internationalization. The peculiarities of the creation and functioning of international strategic alliances in the innovation sphere are considered.

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The rapid development of TNCs falls on the III stage of transnationalization of world economic processes (second half of the 19th – 21st centuries). Modern TNCs of the III and IV generations have concentrated more than half of world industrial production and about 2/3 of world trade flows. TNCs control more than ¾ of the world market of grains, coffee and tea, iron ore, copper, and hydrocarbons. The amount of revenue from the sale of products of individual TNCs exceeds the national budgets of entire countries and regions (table 1).

The intensive development of TNCs at the current stage is due to the effective functioning of such business entities within the framework of the global economy, which is associated with the following key factors:

- speed of accumulation of financial resources for expansion in new markets, overcoming export barriers through direct investments;
- effective use of the advantages of horizontal and vertical global diversification of the functioning of TNCs;
- flexibility of transformation of the TNC business model and the possibility of adaptation to new conditions of the global economy;
- optimization of placement of subsidiary companies taking into account the economic and political conditions of business in the country;
- possibility of extending the life cycle of obsolete technologies, goods, works and services due to their transfer to subsidiaries of TNCs abroad;
– using of the latest innovative strategies;
– advantages of access to resources, capital and research and development in the country where the

**Table 1**
**Top 10 TNCs according to sales revenue, profits and assets in 2022, mln (compiled by the author according to [2])**

| № | Company | Country | Industry | Revenuers | Profits | Assets |
|---|---|---|---|---|---|---|
| 1 | Wal-Mart Store, Inc | USA | General Merchandise | 572,754 | 13,673 | 244,860 |
| 2 | Saudi Aramco | Saudi Arabia | Mining, Crude-Oil Production | 400,399 | 105,369 | 576,134 |
| 3 | State Grid | China | Utilities | 460,617 | 7,138 | 735,430 |
| 4 | Amazon | USA | Internet Services and Retailing | 469,822 | 33,364 | 420,549 |
| 5 | China National Petroleum | China | Petroleum Refining | 411,69 | 9,638 | 660,008 |
| 6 | Sinopec Group | China | Petroleum Refining | 401,314 | 8,316 | 380,675 |
| 7 | Exxon Mobil | USA | Petroleum Refining | 285,640 | 23,040 | 338,923 |
| 8 | Apple | USA | Computers, Office Equipment | 365,817 | 94,680 | 351,002 |
| 9 | Shell | USA | Petroleum Refining | 272,657 | 20,101 | 404,379 |
| 10 | United Health Group | USA | Health Care: Insurance and Managed Care | 287,597 | 17,285 | 212,206 |

parent structure of the TNC is based.

Growing role in the competitive advantages of TNCs in the 21st century is played by the efficiency of using innovations and investments in R&D. The latter are one of the determining factors of economic growth and competitiveness in the global economy.

The top 2500 global companies invested a total of EUR 1093.9 billion in R&D in 2021, which is 14.8% more than in the previous year.

After the relative slowdown in 2021 – R&D investments at global level grew at 6.0% compared to 8.9% R&D growth in the 2020 – the pace of R&D growth increased again and even surpassed pre-pandemic levels.

For the first time, China overtook the EU, both in the number of companies and also in terms of the total volume of R&D invested.

This year's data also confirms the sector shift reported in 2020: high-tech sectors are progressively widening the gap with mid- and low-tech sectors.

EU specialization in the automobile industry is still strong. Despite having fewer companies in this sector than China and the USA, EU automotive companies invest 41.1% the biggest share of the total R&D investment in the sector.

Innovators around the world filed 3.4 million patent applications in 2021, slightly higher than the pre-COVID peak of 3.3 million filed in 2018. Patent applications worldwide grew by 3.6% in 2021 compared to 2020. This follows an increase of 1.5% in 2020 which came after a 3% drop in 2019. A substantial rise in filings by China, which made 88,504 more applications than it did in 2020, combined with robust contributions from the intellectual property (IP) office of the Republic of Korea (11,239 additional applications) and the European Patent Office (EPO) (8,432), was the main driver of growth in 2021. The IP offices of India (4,802) and South Africa (4,272) also made notable contributions to overall growth [3].

Thus, the share of TNCs as a subject of the global innovation market (other subjects are the state and venture funds) in the early 2000s approached 50%. Meanwhile, this indicator will increase if we take into account that TNCs will absorb smaller innovative companies with already financed innovative developments, will establish formally independent innovative units and will become executors of state orders for innovative products [1]. Throughout 2021, the world's leading TNCs increased spending on R&D (table 2).

**Table 2**
**Volumes and dynamics of investments in R&D, net sales, number of employees of leading TNCs (compiled by the author according to [1])**

| № | Name of the company | Country | Industry | RD | | Net sales | | Employments | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | euro million | 1 year growth rate (%) | euro million | 1 year growth rate (%) | N of employees | 1 year growth rate (%) |
| 1 | Alphabet | USA | ICT service | 27866,8 | 14,5 | 227273,9 | 41,2 | 156500 | 15,7 |
| 2 | Meta | USA | ICT service | 21768,5 | 33,7 | 104122,3 | 37,2 | 71970 | 22,8 |
| 3 | Microsoft | USA | ICT service | 21642,2 | 18,3 | 175057,3 | 18 | 221000 | 22,1 |
| 4 | Hiawei Investment holding | China | ICT service | 19533,8 | 0,7 | 121786,3 | -1,4 | 195000 | -1 |
| 5 | Apple | USA | ICT service | 19348,4 | 16,9 | 322988,6 | 33,3 | 154000 | 4,8 |
| 6 | Volkswagen | DE | Automobiles other transport | 15583 | 12,2 | 250200 | 12,3 | 643297 | 2,9 |
| 7 | Intel | USA | ICT service | 13416,6 | 12,1 | 69772,2 | 1,5 | 121100 | 9,5 |
| 8 | Johnson and Johnson | USA | Health Industries | 12991 | 21 | 82796,2 | 13,6 | 141700 | 5,4 |
| 9 | Phizer | USA | Health Industries | 10239,3 | 20,6 | 71771,1 | 95,2 | 79000 | 0,6 |
| 10 | Bristol-Myers SQUIBB | USA | Health Industries | 9283,1 | 1,9 | 40954,4 | 9,1 | 32200 | 6,4 |

The ICT services sector is led by the US whose R&D in this sector has more than tripled over the last 10 years. China is in second place but with less than one quarter of the US's R&D, even though its R&D in this sector has increased by almost ten times over the decade. The EU has just over half of the R&D of China with Japan in fourth place with around two-thirds of EU R&D.

The biotech sector is also led by the US with over two-and-a-half times the R&D of the EU in second place. Japan is in third place with less than half of the EU's R&D and China follows with around half the R&D of Japan. The US is particularly strong in biotechnology and several US pharmaceutical companies have enhanced their pipelines of new drugs by acquiring biotech companies.

The ICT producers' sector is again led by the US with more than twice the R&D of China. The EU has around two-thirds of China's R&D in this sector with Japan around two-thirds of the EU's.

The automotive sector is led by the EU with nearly twice the R&D of Japan. The US has around two-thirds the R&D of Japan with China following with about half of Japan's R&D.

Overall, the EU companies lead the automotive sector. They have much larger R&D investment, larger sales, larger profitability and more employees than their competitors. There are 9 EU companies among the top 20 companies by R&D investment, and 4 EU companies among the top 9 companies by EV sales.

15 different companies appear in the top 10 of both the 2012 and the 2022 years. At first sight, this shows a rather high turnover, with 5 new companies in the top 10 in 2022. However, apart from Facebook/Meta the same 9 companies have populated the top 10 since 2017 [1].

Furthermore, their investment share of the 2 500 companies is rather stable and has even increased slightly. This points to a stability in R&D investments of the key R&D investors. Their total R&D investment was EUR182.2 billion in 2012, which represents a compound average growth rate of 9.3% since 2012, higher than that was 7.2%. The highest compound average growth rate was registered by Facebook/Meta (52%), followed by Apple (25%), Huawei (20%), and Alphabet (20%). Acquisitions made by these companies played a significant role in this impressive growth. The other companies of the top 10 had single digit R&D growth.

Facebook (Meta), Apple and Huawei have seen the greatest improvements of their rankings during the assessed period, with Meta encountering the sharpest increase in its ranking, starting with a jump from the 297$^{th}$ position to 105 in the 2013 and to rank 55 in 2015 from the 101$^{st}$ rank of the previous year.

TNCs of the IV generation participate in the creation of inter-corporate technological alliances to conduct joint scientific research and knowledge-intensive production, more actively use the opportunities of global scientific and technical outsourcing.

The creation of inter-corporate strategic alliances allows TNCs not only to maintain competitiveness, but also leads to the emergence of new regional clusters of economic cooperation in the global economy. The modern form of such transnational cooperation is the creation of flexible business networks, the members of which closely cooperate, while remaining independent and self-sufficient in the process of their financial and economic activities.

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