

The Impact of Funding R & D Activity in Economy

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Abstract

In any economy, research activity is seen as a 'driver' of the economy. Despite the fact that the 2020-2021 time period has been considered a pandemic period due to the SARS Cov-2 outbreak, many economic entities in the world's major economies have continued to invest considerable amounts in Research and Development (R&D) funding knowing that this epidemic would pass, as have other epidemics in the course of the world's evolution. Even if the funds invested are not comparable to those allocated before the pandemic, it should be noted that the large economic entities have tried not to reduce the number of employees, although they have received state aid from governments for this purpose. Our study follows the evolution of these fundings over the period 2014-2020 for the main European "players" in the funding of R&D.

Key words: research and development, funding, activity, economy, private society

J.E.L. classification: B26, E32, G53

1. Introduction

The economic crisis of 2007-2008 was a wake-up call for all economies, especially as the crisis in the construction sector worked like a snowball, one by one, affecting all sectors of the economy. Research has not been spared either, especially as most of the companies that had invested large amounts of money have had to cut back.

However, a revival of the economy was observed after 2010 and, slowly, the funds allocated to research and development began to be consistent again, so that new models appeared in the automobile industry, new models of telephones, televisions, etc., even in the medical field a revival could be observed, with the introduction of new medicines, new treatments, etc. (Rus, 2016, p. 190)

Unfortunately, the SARS Cov-2 pandemic has caused a reprioritization of these businesses. Our scientific research follows, through the data available, the evolution of this part of the R&D funding in the top 10 economic companies of Europe and, as it will be noticeable, the amount allocated to this activity has had a predictable but also interesting evolution in terms of the other indicators present in this scientific research.

2. Theoretical background

Research and development have emerged throughout history mainly because, with the development of a competitive market, every manufacturer and trader wanted to make as much profit as possible. As consumer demands grew and diversified, they had to come up with new products, and to do so they had to make investments which, over time, led to the emergence of the R&D activity, and at the beginning of the 20th century to the emergence of the innovation activity.

If we refer to the economic companies that are the subject of our scientific approach, it can be observed that among them, five are automotive and parts industry producers, four are drugs producers in the pharmaceutical industry and one carries out its activity in the electrical and electronic components area. (Aivaz, 2021, p. 9)

Somehow this distribution of the fundings allocated to R&D is to be expected, since having high sales revenue has allowed the economic companies to allocate large amounts of fundings to this activity. And the results in these areas are visible: new car models, more reliable, more fuel-

efficient, or electrically adapted, new medicines to treat serious illnesses or those that occur cyclically in everyday life, electrical and electronic components that lead to a longer life of electrical and electronic equipment, etc.

3. Research methodology

From the outset, this paper was intended to approach the matter from a qualitative point of view. Throughout the study, the need to extend the research with elements of quantitative data, designed to give greater relevance to the research findings and at the same time to eliminate subjective factors, became more and more pressing. The topic of this paper can be analyzed from several angles. However, to understand the diversity of all the meanings that can be associated with research and development, it is important to have an adequate knowledge of the concept, its origins, and its usefulness both in theory and in practice. (Bloch and Sørensen, 2015, p. 33)

The choice of the quantitative method was determined by reference to the fact that this method allowed the selection and analysis of a comprehensive bibliographical material, both national and international, represented both by scientific articles and international databases, books and legislation, as well as the websites of various national and international bodies in the field of development research. (Micu *et al.*, 2021, p. 140)

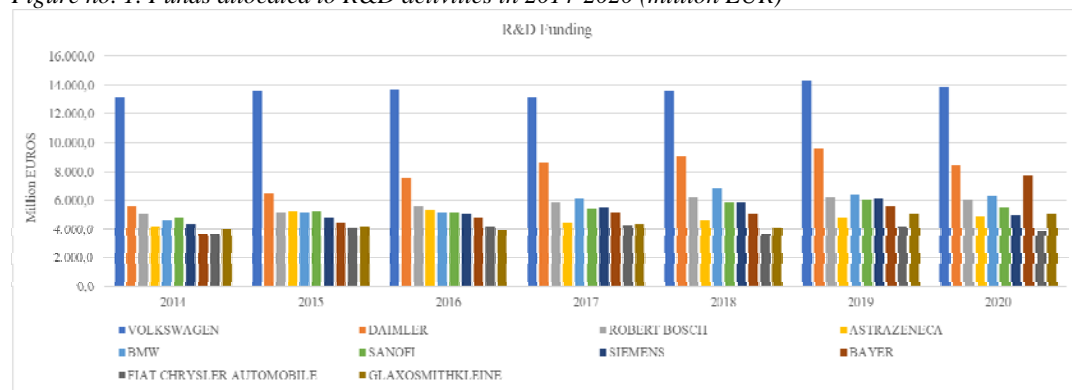
A comparative analysis of the underlying elements was used to carry out this scientific approach. Thus, the information used covers a period of seven years, more precisely the period between 2014 and 2020, to highlight the variation of four indicators: the amount allocated to R&D activity, sales value, operating profit, and number of employees.

4. Findings

As previously mentioned, we will present a detailed evolution of four company indicators, for the top 10 companies in Europe according to the amount of money spent on R&D. These companies are Volkswagen (DE), Daimler (DE), Robert Bosch (DE), AstraZeneca (UK), BMW (DE), Sanofi (FR), Siemens (DE), Bayer (DE), Fiat Chrysler Automobile (NET) and GlaxoSmithKline (UK).

The Appendix presents the data on which the following figures are based.

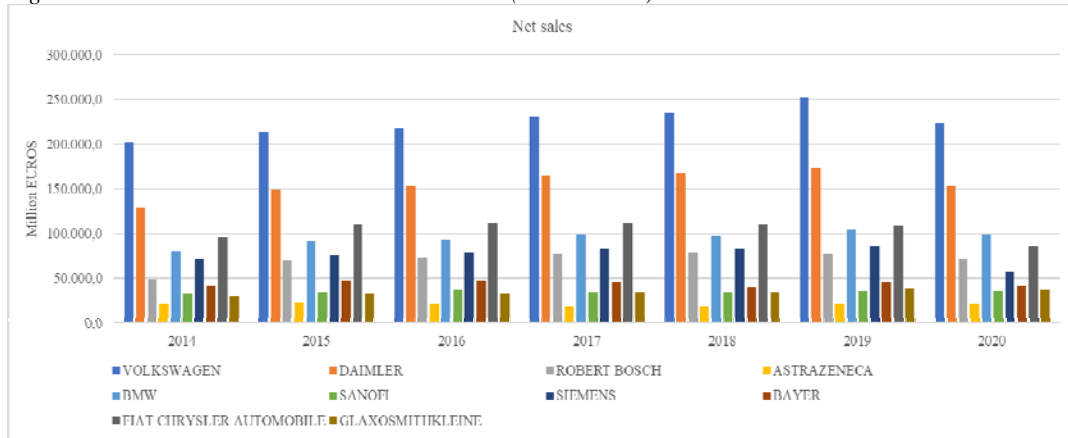
Figure no. 1. Funds allocated to R&D activities in 2014-2020 (million EUR)



Source: Author's compilation

As it can be observed, the fundings allocated for research and development activities showed mainly an upward trend for all companies until 2018, for some even in 2019, but in 2020, with the SARS Cov-2 pandemic outburst, the amounts were decreased, with the exception of Bayer, which increased the amount allocated by 36.9%, due to the search for a vaccine to eradicate the pandemic.

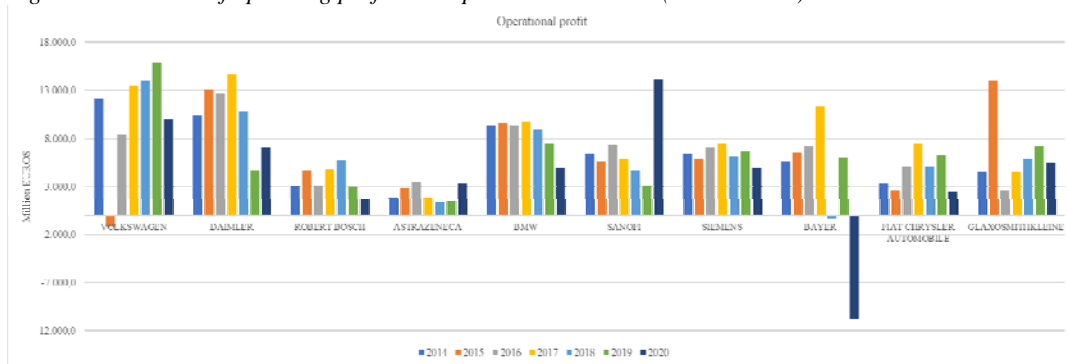
Figure no. 2. Sales value between 2014 and 2020 (million EUR)



Source: Author's compilation

As expected, in 2020, with two exceptions, all producers suffered decreases in turnover, some of them very large: Siemens had the largest decrease in sales, 34.2%, followed by Fiat Chrysler with 21.1%, Volkswagen with 11.8%, Daimler with 10.7%, Bayer with 8.1%, Robert Bosch with 8%, BMW with 5% and Sanofi with a small decrease of 0.2% and the other two drug manufacturers had, sales increases, AstraZeneca of 9.2% and GlaxoSmithKline of 1%.

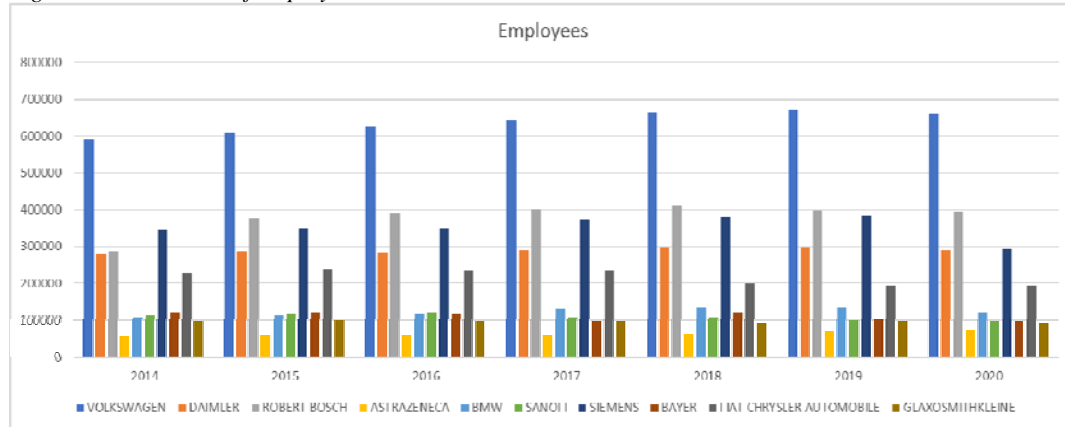
Figure no. 3. Value of operating profit in the period 2014 - 2020 (million EUR)



Source: Author's compilation

The outlook on the operational profit is not good either. During the period under review, in addition to the fact that all the manufacturers had fluctuations, Bayer's profit was negative in 2020, probably due to the social protection measures taken by the German manufacturer for its employees (teleworking conditions, inactivity due to the pandemic, etc.).

Figure no. 4. Number of employees between 2014 and 2020



Source: Author's compilation

Regarding the number of employees, it is worth noting that while some manufacturers reached their "peak" in 2017 (Fiat Chrysler Automobile), 2018 (Robert Bosch, BMW, etc.) or 2019 (Volkswagen), unfortunately, in 2020 all of them have reduced their number of employees due to the pandemic. As it is known, 2020 was a year of global recession, which led to a global decrease in the number of employees.

5. Conclusions

Following the economic crisis of 2007-2008, national economies had recovered and were on an upward trend so that the achievements generated by R&D were also present in everyday life.

At the same time, the welfare level of the population was increasingly visible, and the conditions for the creation of a truly healthy middle class, which could capture more and more of the lower-class population in the years to come were established. The conditions were created for a knowledge-based, digitalized, and computerized society. (Rus, 2013, p. 945)

However, the SARS Cov-2 outbreak required a reset of the world's economy, in some countries starting from a very low base, with enormous expenditure, primarily to protect the population both from the outbreak and from the economic crisis, which has not yet been tackled to any great extent. To all this is the Ukrainian war added its own contribution, not allowing the world economy to recover any faster. (McManus and Baeta Neves, 2021, p. 822)

Let's be optimistic that the war will pass and the forthcoming study on research and development funding in the post-pandemic era will have some encouraging information for us.

6. References

- Aivaz K.A., 2021. Correlations Between Infrastructure, Medical Staff and Financial Indicators of Companies Operating in the Field of Health and Social Care Services. The Case of Constanta County, Romania, *Under the pressure of digitalization: challenges and solutions at organizational and industrial levels, first edition*. Bologna: Filodiritto Publisher, pp. 17-25.
- Micu, A., Capatana, A., Micu, A. E., Geru, M., Aivaz, K.A., Munteanu, M.C., 2021. New Challenge in the digital economy: Neuromarketing applied to social media. *Economic Computation and Economic Cybernetics Studies and Research*, 55(4), p. 133-148, [online] Available at: https://www.researchgate.net/publication/357237449_A_New_Challenge_in_Digital_Economy_Neuromarketing_Applied_to_Social_Media.
- Rus, M.-I., 2013. "The Knowledge Triangle" in a Knowledge-Based Society. *Annals of Faculty of Economics*, 1 (1), pp. 942-947
- Rus, M.-I., 2016. The Impact of financing the research and development activities worldwide. Comparative study. *Discourse as a form of Multiculturalism in Literature and Communication*, pp. 187-192
- McManus, C., Baeta Neves, A.A., 2021. Funding research in Brazil. *Scientometrics*, 126, pp. 801–823 <https://doi.org/10.1007/s11192-020-03762-5>

- Bloch, C., Sørensen, M. P., 2015. The size of research funding: Trends and implications. *Science and Public Policy*, Volume 42, Issue 1, pp. 30–43, <https://doi.org/10.1093/scipol/scu019>
- European Commission, 2015. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2015/>> [Accessed 15 December 2022]
- European Commission, 2016. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2016/>> [Accessed 15 December 2022]
- European Commission, 2017. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2017/>> [Accessed 15 December 2022]
- European Commission, 2018. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2018/>> [Accessed 15 December 2022]
- European Commission, 2019. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2019/>> [Accessed 15 December 2022]
- European Commission, 2020. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2020/>> [Accessed 15 December 2022]
- European Commission, 2021. *EU R&D Scoreboard*, [online] Available at: <<http://ec.europa.eu/assets/jrc/eu-scoreboard-2021/>> [Accessed 15 December 2022]

APPENDIX

Fundings earmarked for research and development activities in 2014-2020 (million EUR)

	2014	2015	2016	2017	2018	2019	2020
VOLKSWAGEN	13.120,0	13.612,0	13.672,0	13.135,0	13.640,0	14.306,0	13.885,0
DAIMLER	5.650,0	6.529,0	7.536,0	8.663,0	9.041,0	9.630,0	8.441,0
ROBERT BOSCH	5.042,0	5.202,0	5.587,0	5.934,0	6.189,0	6.229,0	6.044,0
ASTRAZENECA	4.164,4	5.217,2	5.358,1	4.512,6	4.631,4	4.795,3	4.896,1
BMW	4.566,0	5.169,0	5.164,0	6.108,0	6.890,0	6.419,0	6.279,0
SANOFI	4.812,0	5.246,0	5.156,0	5.450,0	5.890,0	6.015,0	5.527,0
SIEMENS	4.377,0	4.820,0	5.056,0	5.538,0	5.909,0	6.086,0	5.020,0
BAYER	3.689,0	4.436,0	4.774,0	5.162,0	5.109,0	5.628,0	7.704,0
FIAT CHRYSLER AUTOMOBILE	3.665,0	4.108,0	4.219,0	4.282,0	3.683,0	4.194,0	3.866,0
GLAXOSMITHKLEINE	4.002,0	4.214,2	3.952,8	4.351,0	4.141,3	5.068,0	5.034,0

Sales value between 2014 - 2020 (million EUR)

	2014	2015	2016	2017	2018	2019	2020
VOLKSWAGEN	202.458,0	213.292,0	217.267,0	230.682,0	235.849,0	252.632,0	222.884,0
DAIMLER	129.872,0	149.467,0	153.261,0	164.330,0	167.362,0	172.745,0	154.309,0
ROBERT BOSCH	48.951,0	70.607,0	73.129,0	78.066,0	78.465,0	77.721,0	71.494,0
ASTRAZENECA	21.493,3	22.695,0	21.821,5	18.731,8	19.292,6	21.705,5	21.691,0
BMW	80.401,0	92.175,0	94.163,0	98.678,0	97.480,0	104.210,0	98.990,0
SANOFI	33.770,0	34.542,0	36.529,0	35.055,0	34.463,0	36.126,0	36.041,0
SIEMENS	71.920,0	75.636,0	79.644,0	83.049,0	83.044,0	86.849,0	57.139,0
BAYER	42.239,0	47.271,0	47.537,0	46.072,0	39.586,0	46.287,0	42.550,0
FIAT CHRYSLER AUTOMOBILE	96.090,0	110.595,0	111.018,0	110.934,0	110.412,0	109.844,0	86.676,0
GLAXOSMITHKLEINE	29.575,6	32.563,2	32.548,2	34.008,0	34.173,6	39.425,2	37.291,9

Value of operating profit between 2014 - 2020 (million EUR)

	2014	2015	2016	2017	2018	2019	2020
VOLKSWAGEN	12.139,0	-1.228,0	8.344,0	13.458,0	13.982,0	15.861,0	9.962,0
DAIMLER	10.342,0	13.088,0	12.702,0	14.631,0	10.873,0	4.680,0	7.086,0
ROBERT BOSCH	3.032,0	4.663,0	3.125,0	4.824,0	5.741,0	2.903,0	1.657,0
ASTRAZENECA	1.760,2	2.818,0	3.522,4	1.786,0	1.318,8	1.515,0	3.346,9
BMW	9.290,0	9.623,0	9.327,0	9.764,0	8.975,0	7.403,0	4.877,0
SANOFI	6.446,0	5.571,0	7.347,0	5.803,0	4.767,0	3.125,0	14.141,0
SIEMENS	6.373,0	5.809,0	7.141,0	7.516,0	6.083,0	6.742,0	4.991,0
BAYER	5.571,0	6.578,0	7.237,0	11.366,0	-361,0	5.960,0	-10.821,0
FIAT CHRYSLER AUTOMOBILE	3.343,0	2.625,0	5.109,0	7.554,0	5.032,0	6.323,0	2.418,0
GLAXOSMITHKLEINE	4.601,0	13.996,9	2.525,5	4.609,0	5.868,8	7.198,5	5.520,7

Number of employees between 2014 – 2020

	2014	2015	2016	2017	2018	2019	2020
VOLKSWAGEN	592.586	610.076	626.700	642.300	664.500	671.205	662.575
DAIMLER	279.972	284.015	282.500	289.321	298.683	298.655	288.481
ROBERT BOSCH	286.084	374.778	389.300	402.166	409.881	398.150	395.000
ASTRAZENECA	57.500	61.500	59.700	61.000	64.400	70.600	76.100
BMW	105.743	111.905	115.800	129.932	134.682	133.778	120.726
SANOFI	113.496	115.631	121.800	106.566	104.226	100.409	99.412
SIEMENS	344.400	348.000	351.000	372.000	379.000	385.000	293.000
BAYER	118.900	116.800	115.200	99.820	116.998	103.824	99.538
FIAT CHRYSLER AUTOMOBILE	228.690	238.162	234.500	235.915	198.545	191.752	191.705
GLAXOSMITHKLEINE	98.702	101.192	99.300	98.462	95.490	99.437	94.066