

Financial Factors Influencing the Development of Product Innovations in Polish Small and Medium Enterprises

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Abstract:

The development of product innovations in small and medium enterprises is determined mainly by their financial capabilities. These enterprises usually encounter financial problems when it comes to the introduction of product innovations. Therefore, managers should manage the company's finances in the way that will enable them using all available means to solve these problems. This means that they ought to use external financial resources to a greater extent (not only in the form of loans). The article focuses on the financial conditions for the development of product innovations in small and medium enterprises, while other forms of innovation are omitted. Product innovations are given the highest priority by mentioned companies. The analysis covered the years 2010-2017. The case study allowed to present changes in this most important form of activity for enterprises in the SME sector during the analyzed period¹. In the article there were used data published by GUS, NBP, PARP, Eurostat. The article presents the following thesis:

The innovative activity of Polish enterprises takes mainly the character of product innovations, which often require large financial outlays. Two hypotheses were used to verify the thesis: HPT1: The increase in the outlays of enterprises on technical progress and on research and development works (R&D) leads to the development of product innovations. HPT2: The companies' own resources are the main source of financing for product investments. Due to the greater capacity of large companies to spend on R&D, they are more active in product innovation than small companies, whose financial resources are significantly limited. Broader implementation of product innovations in SMEs requires wider access to finance and greater involvement of many participants. In order to be able to take advantage of all possible opportunities to renew the production programme, the company should ensure appropriate internal and external integration in the management of the process.

Keywords: product innovations, research and development (R & D), financing.

1. Introduction

In the article I focused on product innovations, which are mainly determined by the enterprises' outlays on research and development (R&D). Maintaining economic and financial balance in the long term requires the company to be constantly active in implementing product innovations. This systematic renewal of the production programme has a strategic dimension and should be correlated with the life-cycle phases of existing products. This has a significant impact on the profit formation. This is particularly important because small and medium enterprises in Poland mostly use their own financial resources for this purpose. Therefore, the development of product innovations in such conditions requires a systematic approach to research and development (R&D) field.

The organisational culture of enterprises and constant mobilisation of financial resources is an important basis for potential product innovations [6, pp. 167-173], [9]. It is important, firstly, that these companies do not limit themselves to own resources, but also make greater use of external financial resources (not only in the form of loans). Secondly, they should not use only internal sources of innovation, but ought to also be more active in searching for external sources in their innovation strategies. Innovation in introducing new products/services is a process involving numerous participants, therefore it requires a high degree of integration inside and outside the enterprise.

2. Product Innovations as a Basic Form of Innovative Activity of Small and Medium Enterprises

In economic literature, the concept of innovation refers to any change and introduction of novelty or idea. There are many definitions of innovation. The first of them focused on the technical aspect of innovation, the essence of which, according to authors such as Joseph Schumpeter, is a significant change in the function of production, consisting in a different than before combination, i.e. merging factors of production [36, p. 104]. Also for the authors of the first edition of the Oslo Manual, this technical aspect of innovation was the most important. In subsequent editions of the Manual, this innovation formula was extended beyond its technical aspect and such types of innovation as process, organisational and marketing innovations were identified [31].

Peter Ferdinand Drucker also gives a more general definition of innovation, pointing out that it is a special tool for entrepreneurs, which is used to turn a change into an opportunity to start a new business or to provide new services. According to Drucker, it is important that the work is properly organised. In order to avoid randomness and to ensure rationality and regularity in innovation matters, it is necessary to manage this process in such a way as to make use of all possible opportunities [4, p. 129]. Also Genrich Altshuller represents the wide approach to innovation [1]. He believes that '...innovation is a complex phenomenon involving a set of skills, a distinct way of organising, synthesizing and expressing knowledge, perceiving the world and creating new ideas, perspectives, reactions and products' [1, p. 21].

Currently, the definition proposed by the OECD is widely used, which specifies '...innovation as the introduction of new or significantly improved goods (goods or services), processes, marketing and organizational methods, changes in relations with the environment or work organization' [31].

Product innovations are mainly determined by the outlays of enterprises on technical progress and on research and development (R&D). The same is also true for process innovations. However, in organisational and marketing innovations this relation is no longer so unambiguous and obvious.

According to the Oslo Manual 2005 '... a product innovation is the implementation of a good or service that is new or significantly improved in terms of its functional characteristics or intended uses'. [31] This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics [31].

Product innovations may exploit new knowledge or technology or be based on new applications or combinations of existing knowledge and technology. Although design is an integral

part of the development and implementation of product innovations, its slight changes alone cannot be considered as innovations. They must significantly change the functional characteristics (technical parameters) or the use of the products. Otherwise these changes can be considered as marketing innovations. Marketing innovations also occur when a company uses a season change to make major design changes as part of its new marketing strategy.

It should be stressed that the sale of goods which are innovations from the point of view of an industrial enterprise is not an innovation for companies dealing with their trade, transport and warehousing. In the case of these companies we deal with innovations-products only when they start to sell, transport or store products from a new line of goods, i.e. types of goods that these companies did not deal with before, and introducing them means offering a new service [27, p. 169], [31].

Process innovations mean the implementation of a new or significantly improved production or delivery method. Significant changes in production can occur in technology, hardware and software. Process innovations may be aimed at reducing the unit costs of production or supply, improving quality, producing or supplying new or substantially improved products.

Marketing innovations occur when a company introduces significant changes in a product, its price, promotion and distribution (4P). Changes in marketing instruments and activities mean the introduction of a new marketing method, provided these are the first uses of the company concerned. Marketing innovations are to lead to the opening of new markets or a new positioning of the company's product on the market to increase sales.

Organisational innovation means the implementation of a new organisational method within the company's operating rules, in the organisation of the workplace or in relations with the environment. The aim of organisational innovation may be to achieve better results by reducing administrative costs or transaction costs, increasing the level of work satisfaction (and thus work efficiency).

It should be stressed that organisational change does not necessarily mean only a response to a technical change, but may be a necessary precondition for a technical innovation. Organisational innovations are not only a factor supporting innovation in products and processes, but can also have a significant impact on the efficiency of companies. The aim is to improve the quality and productivity of work and the company's ability to learn and use new knowledge and new technologies.

Every product innovation has its source. They can be internal and external. We can also adopt a different criterion of division distinguishing product innovations in terms of demand and supply [23, p. 48].

Internal (endogenous) sources of innovation are those inside the company; they include, among others, the work of our own research and development department, creative and talented employees, management staff and pro-innovative organisational culture. External sources are based on information collected from the market environment of customers, suppliers, competitors. These include primarily: research cooperation with research and development institutions, results of work of domestic and foreign research and development units, purchase of licenses and know-how, and joint scientific undertakings.

Only the use of both internal and external sources of innovation by entrepreneurs allows the integration of internal and external knowledge, which creates the conditions for optimal use of many product innovation paths. Many specialists, including Henry Chesbrough – the creator of the open innovation model – express the view that sources of innovation cannot be limited only to R&D departments in an enterprise, but the whole environment of the company should be taken into account [3, p. 17].

Such a broad approach to the roots of innovation was used by Drucker to identify demand and supply sources [4]. First of them include unexpected changes in the market or industry. The importance of the customer as an active participant in the innovation process through the search for new product concepts should be highlighted here. We are talking then about innovations 'drawn by the market'. Numerous research studies provide strong arguments indicating that the active

participation of customers in the development of an innovation strategy allows for the implementation of better new products.²

In both the financial perspective 2007-2013 and 2014-2020, the European Union has set itself the goal of developing the R&D sector and creating conditions for rapid development of innovation and competitiveness of enterprises. This has been identified as a priority which requires, as the new Europe 2020 plan states, an increase in R&D spending to at least 3% of EU GDP [15].

On 7 June 2018, the European Commission launched the new ‘Horizon Europe’ programme, which is based on the success of the ‘Horizon 2020’ programme. EUR 100 billion was allocated to it for the years 2021–2027 [20]. The Innovative Economy Operational Programme has been replaced by the Smart Growth Operational Programme [15].³

One of the effects of using EU funds, apart from the development of R&D activity directly in enterprises, is the creation of modern infrastructure contributing to effective technology transfer between the scientific sector and business, cooperation within the supply chain (clusters), as well as the development of modern technological thought (e.g. Technology Parks – PT, Technology Transfer Centres – CTT, Clusters).⁴

3. Shaping of Enterprises’ Expenditure on R&D and Effects in the Form of Implemented Product Innovations in Poland

The development of product innovations in enterprises is evidenced mainly by their activity in the R&D sphere, which is not directly related to the creation of a specific innovation, but is inscribed in the DNA of the enterprise.

Analysing only the enterprise sector, it should be stressed that the main source of financing R&D activities by enterprises are their own resources and resources from the state budget. In particular, the following sectors develop in the context of R&D activity: automotive, aviation, electronics, telecommunications, IT, biotechnology and biochemistry, medical and pharmaceutical engineering, robotics and nanotechnology construction. The development of outlays of enterprises on R&D activity in relation to total outlays and in relation to GDP in % in the years 2010-2017 is presented in Table 1.

Table 1 Shaping of enterprise expenditures on R&D activity in relation to total expenditures and in relation to GDP in % in the years 2010-2017

Specification	Years							
	2010	2011	2012	2013	2014	2015	2016	2017
Total internal expenditure on research and development (in millions of PLN)	10 733	11 679	14 353	14 424	16 168	18 061	17 943	20 578
% increase/decrease in relation to the previous year	+8.5	+8.8	+22.8	+0.01	+12.1	+11.7	-0.07	+14.7
Enterprises’ expenditure (in millions of PLN)	2 770	3 520	5 354	5 611	8 892	10 836	11 663	13 520
% share in total	25.8	30.1	37.3	38.9	55.0	60.0	65.0	65.8
% increase/decrease	+8.2	+27	+52.1	+4.8	+58.5	+21.7	+7.6	+15.9

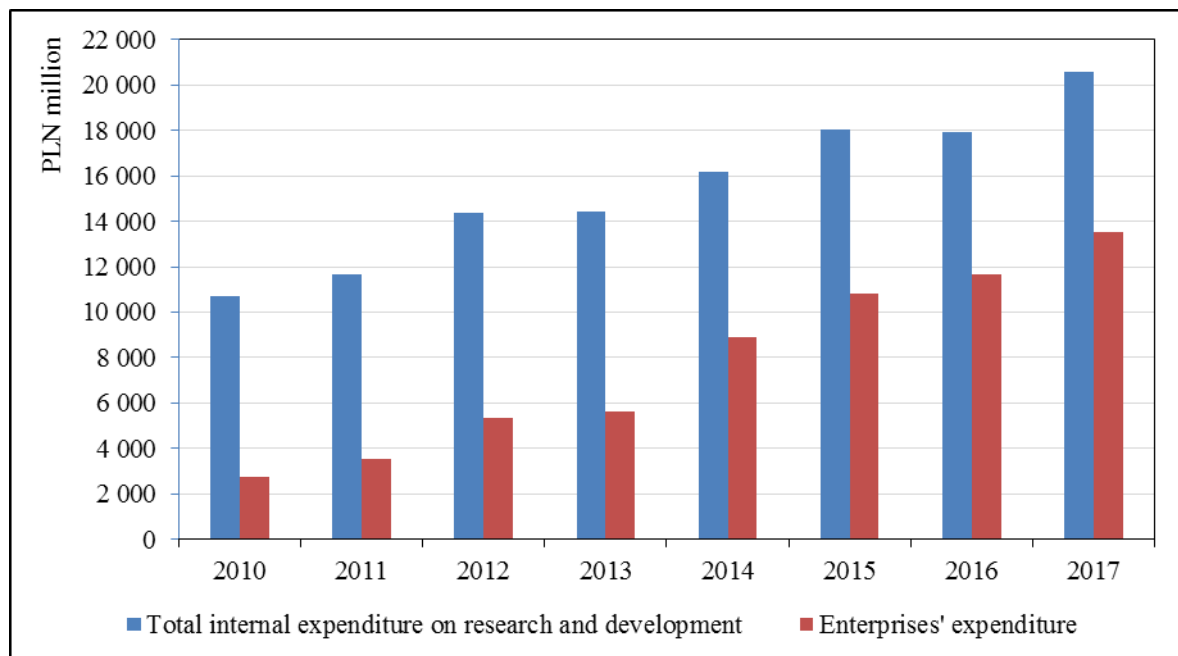
in relation to the previous year								
Internal R&D expenditure to GDP ratio in %	0.72	0.75	0.88	0.87	0.94	1.00	0.97	1.03

Source: Own study based on data from [11], [12], [13], [18], [22]

In the analysed period internal expenditures of enterprises on R&D activity increased from 0.72% of GDP to 1% of GDP.⁵ However, they are still insufficient, although the average annual growth rate of internal R&D expenditures of enterprises in 2010-2017 amounted to 26.8%.

Chart 1 shows the development of R&D expenditures of enterprises in relation to total expenditures in the years 2010-2017 (in PLN million).

Chart 1 Shaping of enterprise expenditures on R&D activity in relation to total expenditures in 2010-2017 (in PLN million)



Source: Own study based on data from [11], [12], [13], [18], [22].

Expenditures on R&D in Poland are systematically growing and it is assumed that in 2020 they will constitute 1.7% of GDP. The large increase in R&D expenditures assumed for 2020 still leaves our country on a distant position in relation to not only the leaders, but also those countries with average expenditures.⁶

The figures for the purchase of licences, R&D, automation measures and foreign licences are presented in Table 2.

Table 2 Number of enterprises that purchased licenses, research and development works, automation measures from Poland and the European Union and number of foreign licenses in 2010-2016.

Specification	Years 2010 – 2016							Change 2010-2016 (%)
	2010	2011	2012	2013	2014	2015	2016	

Number of enterprises purchased licenses: from Poland	1244	712	878	675	889	724	911	-27
	318	230	259	239	233	215	217	-32
Number of enterprises purchased research and development from Poland	464	327	399	367	429	318	421	-9
	133	83	114	109	117	113	95	-28
Number of enterprises that have purchased automation measures from Poland	896	709	821	634	715	519	640	-28
	599	478	593	489	440	383	363	-39

Source: Own study based on data from [11], [12], [13]

In 2010-2016, very unfavorable indicators were noted in relation to purchases: licenses (-27 and -32%), research and development works (-9% and -28%) and automation measures (-28% and 39%). However, it should be stressed, that the number of entities involved in R&D is systematically increasing in Poland. Thus, in 2017 there was an increase by almost 5%, and the number of R&D personnel increased by almost 12% [13].

Table 3 presents the percentage share of companies that introduced product innovations in the years 2011-2013 and 2014-2016 in particular groups.

Table 3 Share of companies that introduced product innovations in the years 2011-2013 and in the years 2014-2016 in particular groups

Specification	Companies that have introduced product innovations	
	Years	years
	2011 - 2013	2014 - 2016
	%	%
<i>Industrial companie, in which:</i>	11.0	12.4
Number of employees: 10-49	6.1	7.1
Number of employees: 50-249	21.1	21.9
Number of employees: 250 and more	42.7	44.2
<i>Service sector companies, in which:</i>	5.8	6.4
Number of employees: 10-49	4.6	5.4
Number of employees: 50-249	10.4	11.6
Number of employees: 250 and more	27.0	24.2

Source: [17, p. 4]

In the years 2014-2016, compared to the period 2011-2013, an increase of 1.4% in product innovations in industrial and service enterprises was recorded - 0.6%. There is no doubt that a greater development of product innovations in Polish enterprises requires further and even more dynamic spending on R&D [38]. It should be emphasized that large companies, both industrial and service ones, due to greater possibilities of financing R&D showed greater innovative activity compared to small ones. The share in the group of large industrial enterprises that introduced product innovations in 2011-2013 was 42.7%, and small 6.1%, and in 2014-2016 respectively 44.2% and 7.1%. In the case of service companies, these differences were smaller and amounted to 27.0% and 4.6% in 2011-2013, and 24.2 and 5.4% in 2014-2016.

Chart 2 shows the % share of companies that introduced product innovations in 2011-2013 and 2014-2016.

Chart 2 Product innovations in industrial and service enterprises.



Source: own study based on: [7]

4. How to Overcome the Financial Barrier to Ensure the Right Development of Product Innovation for Companies?

Expenditures on innovative activity in Poland amount to 0.94% of GDP with the OECD average – 2.4% of GDP [19]. Such low expenditures on innovative activity are mainly the result of difficulties encountered by our companies in mobilizing more funds for this purpose. These are mainly own funds of enterprises (over 70%), and a much smaller share are bank loans (only about 6.7%) and funds obtained from abroad (about 2%). In such a situation, financial barriers will in most cases arise for companies that are interested in introducing product innovations. Therefore, the company's finances should be managed in such a way as to make greater use of available external funds to solve these problems. Companies should make greater use of external financial resources (not only in the form of loans). Moreover, in their innovation strategies, managers should always refer to the life-cycle phases of existing products, as this has a significant impact on profit development. It is important at what point in time a company launches a new product on the market. If this process is delayed and the existing products are in a declining market, the company may have financial difficulties in a relatively short period of time. Once the sales growth rate has slowed down, the company should be prepared to launch a new product on the market. Systematic renewal of production is therefore essential for the development of profit and long-term economic equilibrium of the company. Stopping the process of renewing the production program also leads to an increase in the spread between the desired amount of profit and the decreasing amount of profit that can be achieved when selling existing products. In maintaining a long-term economic and financial balance in the company, it is also important whether it optimally uses the various forms of foreign capital available, including aid funds. The idea is for enterprises to use not only bank loans but, to a greater extent, such forms of financing as: leasing, franchise, loans from loan funds, loan securities in the

capital market or in the form of shares (New connect market, venture capital funds, business angels).

Comprehensive state aid is very important in reducing the financial barrier for small and medium enterprises in the development of product innovations. Such companies can benefit from it within the framework of the common European policy under the conditions set out in the Europe Agreement. Multiannual support programmes implemented by the EU are an element of the long-term development strategy.

Enterprises may receive support also through the Polish Agency for Enterprise Development. That help can be in the form of subsidies for co-financing of training, consulting, information and investment services. Companies may also benefit from the assistance of local governments, state administration bodies, administrative bodies and non-governmental organisations.

It should be emphasised that in Poland the support in the form of state aid for enterprises is insufficient. It is presented differently in particular groups of the SME sector. Research conducted by the Polish Economic Institute in March 2019 indicates that 62% of large enterprises, 50% of medium enterprises, 31% of small enterprises and only 22% of microenterprises use state aid [29]. The most frequently indicated forms of assistance were: grants, tax exemptions and loans or preferential loans.

5. Summary

The product innovation development in Polish enterprises is connected to the scale of expenditure on R&D. It should be emphasized that large companies, both industrial and service ones, due to greater possibilities at financing from their own resources (they dominate), manifested greater innovative activity in comparison with small ones. Therefore, wider access of enterprises to various sources of financing innovation can be an important factor in improving the situation of small and medium enterprises in this area.

In the group of large industrial enterprises, the share of those who introduced product innovations in the years 2011-2013 was 42.7%, and in the group of small enterprises - 6.1%, and in the years 2014-2016 respectively 44.2% and 7.1%.

In the examined period there was an increase in the dynamics of internal outlays of enterprises on R&D activity and there was a significant improvement in the percentage of the relation to GDP from 0.72 to approx. 1. However, these outlays of enterprises are still insufficient, although their average annual growth rate in 2010-2017 was 26.8%.⁷

It is also important that companies not only use internal sources of innovation, but demonstrate greater activity in searching for external sources. Meanwhile, between 2010 and 2016, very unfavourable indicators were recorded in relation to purchases of: licences (-27 and -32%), R&D (-9% and -28%) and automation measures (-28% and 39%).

Therefore, these forms of activity require greater integration inside and outside the company. We must always remember that preparation of an innovative strategy requires a number of research and cognitive activities aimed at determining such parameters as market absorption, demand for a given product, cost estimate and risk assessment. Mentioned strategy should be market-oriented, so it ought to focus on customer needs and demand as the forces stimulating these innovations. Numerous research studies provide strong arguments indicating that the active participation of customers in the development of an innovation strategy allows for the implementation of better new products (new product development) [10]. This also involves the proper use of entities such as technology and rationalisation clubs as well as technology agencies, which provide legal, technical and organisational assistance to inventors and rationalisers. Entrepreneurship incubators also provide production space and technical and office services to start-up companies.

References

1. Altshuller, G. *Creativite as an exact science*, 2007.
2. Arak, P. (ed.). *Ukryta innowacyjność polskich przedsiębiorstw. Raport na podstawie publikacji DELab UW pt. „Innowacyjność polskich przedsiębiorstw. Działalność badawczo-rozwojowa i współpraca nauki z biznesem”*, Warszawa: Polska Rada Biznesu i DELab UW, 2016.
3. Chesbrough, H. *Open innovation: nowy tryb rozkazujący do tworzenia i korzystania z technologii*, Boston: Harvard Business School Press, 2003.
4. Drucker, P. F. *Innowacje i przedsiębiorczość*, Warszawa: PWE, 1992.
5. Drucker, P. F. *Managing Yourself*, *Harvard Business Review* 2004/1, 2004.
6. Dyer, J., Gregersen, H., and C. M. Christensen. *The Innovator's DNA. Mastering the Five Skills of Disruptive Innovators*, Boston: Harvard Business Review Press, 2011.
7. eGospodarka.pl › Wiadomości › Gospodarka › Raporty i prognozy › Działalność innowacyjna przedsiębiorstw 2014-2016, GUS, 2017, accessed 30th December 2019.
8. Falk, M. Effects of foreign Ownership on Innovation Activities: Empirical evidence for 12 European Countries, *National Institute Economic Review* 204, 2008.
9. fDi Intelligence, *Global greenfield investment trends*, 2017.
10. Fuchs, C., and M. Schreier. Customer Empowerment in New Product Development, *Journal of Product Innovation Management* 28 (1), 2011, pp. 17-32.
11. Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie, *Science and technology in Poland in 2010, Informacje i Opracowania Statystyczne*, Warszawa, 2012. <https://szczecin.stat.gov.pl/publikacje-i-foldery/nauka-technika/nauka-i-technika-w-2010-r-3,8.html>, accessed 30th December 2019.
12. Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie, *Science and technology in Poland in 2016, Analizy statystyczne*, Warszawa, Szczecin 2018. <https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/nauka-i-technika/nauka-i-technika-w-2016-roku,1,13.html>, accessed 30th December 2019.
13. Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie, *Science and technology in Poland in 2017, Analizy statystyczne*, Warszawa, Szczecin: 2019. <https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/nauka-i-technika/nauka-i-technika-w-2017-roku,1,14.html>, accessed 30th December 2019.
14. Gradzewicz, M., Stażka-Gawrysiak, A., Rubaszek, M., and J. Growiec. *Potencjał innowacyjny gospodarki: uwarunkowania, determinanty, perspektywy NBP*, Warszawa, 2016.
15. Gwizda, M., Leśniewski, Ł., Mazurek, B., Zaleska, A., and G. Rebekowicz. *Rynek B+R w Polsce, 2012, Wsparcie działalności badawczo-rozwojowej przedsiębiorstw. Program wsparcia inwestycji o istotnym znaczeniu dla gospodarki polskiej na lata 2011-2020.*, Warszawa: Polska Agencja Informacji i Inwestycji Zagranicznych S.A, 2012.
16. <http://ec.europa.eu/enterprise/innovation-union/pdf/state-of-the-union/2014files/ius-2014>, accessed 30th December 2019.
17. http://www.paih.gov.pl/files/?id_plik=19228, accessed 30th December 2019.
18. <https://businessinsider.com.pl/finanse/raport-dnb-i-deloiite-o>, accessed 30th December 2019.
19. <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>, accessed 30th December 2019.
20. https://ec.europa.eu/info/designing-next-research-and-innovation-framework-programme/what-shapes-next-framework-programme_en, accessed 30th December 2019.
21. https://www.nbp.pl/aktualnosci/wiadomosci.../20160530_Raport_innowacyjność.pdf, accessed 30th December 2019.
22. <https://www.nbp.pl/home.aspx?f=/publikacje/zib/zib.html>, accessed 30th December 2019.
23. Karasek, A. Źródła innowacji w polskich przedsiębiorstwach – Wyniki Badań, *Studia Ekonomiczne* No 183, 2015.
24. Komisja Europejska. *Innovation Union Scoreboard*, 2015
25. Kowalski, A. M. Kooperacja w ramach klastrów jako czynnik zwiększania innowacyjności i konkurencyjności regionów, *Gospodarka Narodowa* 5, 2010.

26. Morali-Markut M. *Polska innowacyjność na tle rynków Europy i świata* In P. Arak (ed.), *Ukryta innowacyjność polskich przedsiębiorstw. Raport na podstawie publikacji DELab UW* pt. „Innowacyjność polskich przedsiębiorstw. Działalność badawczo-rozwojowa i współpraca nauki z biznesem”, Polska Rada Biznesu, UW, Warszawa, 2016.
27. Niedbalska, G. Statystyka nauki i techniki – nowe idee, projekty i wyzwania, *Nauka i Szkolnictwo Wyższe* 1/31, 2008.
28. Nowak, P. *Poziom innowacyjności polskiej gospodarki na tle krajów UE*, „Prace Komisji Geografii Przemysłu”, Warszawa-Kraków: Wyd. Uniwersytet Pedagogiczny w Krakowie, 2012.
29. *PIE: Z pomocy publicznej korzysta 34% przedsiębiorstw w Polsce*, <https://www.money.pl/gielda/pie-z-pomocy-publicznej-korzysta-34-przedsiębiorstw-w-polsce-6361427082872449a.html>, 30th December 2019.
30. Podedworny, H., and M. Żymel. *Venture capital – kapitał wysokiego ryzyka w finansowaniu małych i średnich przedsiębiorstw w Polsce*, Białystok, 2000.
31. Podręcznik Oslo *Pomiar działalności naukowej i technicznej. Zasady gromadzenia i interpretacji danych dotyczących innowacji*, Warszawa: Wyd. MSWiN – polskie wydanie III, 2008.
32. Polski Instytut Ekonomiczny. *Tygodnik Gospodarczy PIE*, 10/2019, http://pie.net.pl/wp-content/uploads/2019/03/Tygodnik-Gospodarczy-PIE_10-2019.pdf., 30th December 2019.
33. Radauer, A. *Nev Economy, Bericht im Rahmen des Branchenmonitor*, Wien: Osterreichischen Institut fur Gewerbe- und Handelsforschung, 2002.
34. Results of the research *Finansowanie działalności przez MŚP w Polsce* - carried out by Keralla Research on behalf of NFG, Warszawa 30.4.2018.
35. Romanowska, M. Determinanty innowacyjności polskich przedsiębiorstw, *Przegląd Organizacji* 2016/2, 2016.
36. Schumpeter, T. A. *Teoria rozwoju gospodarczego*, Warszawa: PWN, 1960.
37. Ślusarczyk, S. *Aktywność marketingowa małych i średnich przedsiębiorstw*, wyd. II, Warszawa: Poltext, 2010.
38. Sopińska, A., and P. Wachowiak. Innowacyjność przedsiębiorstw działających w Polsce, *Przegląd Organizacji* 5, 2016.
39. Stern, S., Porter, M., and J. Furman. The determinants of National Capacity, *National Bureau of Economics Research* 7876, 2000.
40. Wilson, K., and F. Silva. Policies for Seed and Early Stage Finance: Findings from the 2012 OECD Financing Questionnaire, *OECD Science, Technology and Industry Policy Papers* 9, OECD Publishing, 2013, <http://dx.doi.org/10.1787/5k3xqsf00j33-en>, 30th December 2019.
41. Zadurska-Lichota, P. (ed.). *Innowacyjna przedsiębiorczość w Polsce. Odkryty i ukryty potencjał polskiej innowacyjności*, Radom: Wyd. Naukowe Instytutu Technologii Eksploatacyjnej – PIB w Radomiu, 2015.

Notes

1. For the purpose of this paper, large companies have also been included in the study in order to extend the comparative base.
2. Christoph Fuchs from Rotterdam School of Management, Erasmus University and Martin Schreier from Bocconi University presented the results of their research on this subject in the article “Customer empowerment in new product development” in *the Journal of Product Innovation Management* [10].
3. The development of innovation with the use of European funds is based on several key pillars, including first of all: supporting the establishment of research and development centres and investments of entrepreneurs in innovative solutions and modern technologies; expanding the research base of scientific entities and improving qualifications of scientific staff as well as creating business environment institutions [17].

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4. The number of business environment centres in Poland has been growing dynamically since 1990. Currently there are 54 Technology Parks, 69 Technology Transfer Centres and 182 Technology Clusters and Cluster Initiatives in Poland.
 5. In fact, this indicator may be slightly higher as many companies tend to include R&D expenditure in their profit and loss account and do not report it separately [26, pp. 8-12].
 6. Much higher indicators were already achieved in 2010 by countries such as South Korea - 3.74% of GDP, the USA - 2.88% of GDP, Germany - 2.82% of GDP, Finland - 3.87% of GDP, Great Britain - 1.77% of GDP. The KPMG survey shows that 57 percent of medium and large companies operating in Poland conduct or commission research and development (R&D).
 7. Outlays on R&D in Poland are steadily increasing and it is assumed that they will constitute 1.7% of GDP in 2020. The large increase in R&D expenditure assumed for 2020 still leaves our country in a distant position in relation not only to the leaders, but also to those countries with average expenditure.