

THE IMPACT OF SELECTED FACTORS ON THE LEVEL OF INNOVATION IN EU COUNTRIES

*KATARZYNA BROŻEK

Kazimierz Pulaski University of Technology and Humanities in Radom, Chrobrego 31, 26-600 Radom, Poland
email: *k.brozek@uthrad.pl*

Abstract: The main point of the article is to extend the definition and multifaceted examination of the importance of chosen determinants of development in EU nations. The main method of analysis was critical analysis of literature, statistical data examination and the Pearson's correlation. Whole correlation results were plus/positive so studied factors have a consistent direction. As a result, GDP may increase as investment in innovation grows.

Keywords: Analysis, European Union, Innovation

Introduction

There are numerous meanings of the subject in the writing, so it is imperative to locate their shared belief. While investigating the meanings of innovation, it is advantageous to display the importance of the word itself, which is gotten from Latin. Innovatio or innovare implies curiosities or recently presented things.

In the main years of working, the term innovation was found in the macroeconomic setting. It was investigated how innovative advancement influences the improvement of the economy. After some time, experts have moved far from seeing innovation in macroeconomic terms, and microeconomic investigation has started, where innovative improvement has been seen as a procedure.

1 Methodology

The article uses three main research methods. The first was related to the critical analysis of the literature on the subject. At this stage presented, the most important issues related to innovation. For this purpose, it was decided to present the research of the most important scholars of such issues as J. Schumpeter, R. Johnston or P. Drucker. Moreover, the analysis allowed to illustrate not only the essence, but also the function and role of innovation in shaping the economy.

Another method used in the work was the analysis of statistical data related to selected innovation coefficients of EU countries. This study refers to two periods of 2012-2014 and 2015-2016. Thanks to this approach, one can get to know a wider picture of innovation, by distinguishing short periods, shows their character. The statistics were taken from Eurostat, which updates its database on an ongoing basis.

The third method was to examine the correlation between individual macroeconomic indicators and selected elements related to innovation. This will allow us to observe the impact of innovation on such elements of the economy as GDP.

2 Theoretical way to deal with innovation

2.1 The quintessence and meanings of innovation

The investigation of the issue of characterizing innovation is as following: among outside creators it is important to include: J. Schumpeter (Schumpeter, 1964), F. Machlup (Machlup, 1962), P. Kotler (Kotler, 1994), R.W. Griffin (Griffin 2005), S. Jobs (Gallo, 2011), P.R. Whitfield (Whitfield, 1979), R. Johnston (Johnston, 1966), S. Shane (Shane, 2003), P. Drucker (Drucker, 1992; Drucker 2004), Ch. Freeman (Freeman 1994), E. Helpman (Helpman and Grossman, 1993), M.E. Porter (Porter, 1990). Interestingly, among Polish creators taking up this matter, one can recognize, among others: Z. Pietrasinski (Pietrasinski, 1971), W. Grudzewski and I. Hejduk (Grudzewski and Hejduk, 2000), A. Pomykalski

(Pomykalski, 2001), Z. Madej (Janusz and Koziol, 2007), A. Jasiński (Jasiński, 2006) and M. Goławska (Goławska, 2004).

The idea of innovation was presented by the Austrian financial analyst Joseph Schumpeter at the beginning of the twentieth century. His definition is the establishment on which alternate terms are based, yet it is amazingly adaptable and current in the present day. The maker constructed the innovation in the following way (Wolak-Tuzimek, 2016):

- introduction of new merchandise that buyers have not yet known or some kind of new product;
- introducing another technique for generating a product that has not yet been used or tested in the specific business;
- opening up another market, i.e. a market where a given kind of industry of the applicable nation was not already presented, paying little mind to whether the market existed previously or not;
- gaining another wellspring of crude materials or semi-completed items, paying little mind to whether the source has already existed or must be made;
- conducting another business of an industry, for example, making an imposing business model or breaking it (Schumpeter, 1960).

Schumpeter's hypothesis can be condensed as the presentation of new techniques. Regularly, they were identified with innovation, yet the use of imitation, i.e. the scattering, usage and utilization of new techniques, was crucial. Innovation can likewise be viewed as a monetarily effective exploitation of new thoughts (Porter, 1990). The large number of various perspectives for innovations made F. Machlup to search for different solutions. He said that in these circumstances, we ought to have the capacity to adapt without using the word "innovation" in the event that we can discover more clear words (Machlup, 1962). P. Kotler expressed that innovation alludes to any product, administration or thought which is seen by somebody as new. The thought can exist for quite a while, yet it is an innovation for the individual who sees it as new (Kotler, 1994). R.W. Griffin said that innovation ought to be presented by an organization as an exertion meant for growing new items/services or making a radical new usage of items/services that as of now exist in the market (Griffin, 2005).

For S. Jobs innovation does not allude just to technology, it likewise manages with ideas that are helpful in taking care of issues. The establisher of Apple thought there was no framework that could make innovation. He said that a man who compels themselves to imagine something innovative is "like somebody who's not cool trying to be cool. It's painful to watch..." (Gallo, 2011). S. Jobs made seven principles which could quicken making procedure of innovation:

- Do what you adore – let your heart and passion take control;
- Put a scratch in the universe – pull in other individuals who need to make stunning things;
- Make connections – get a wide ordeal and associate facts;
- Say no to 1 000 things – straightforwardness is an indication of modernity;
- Create madly extraordinary encounters – make profound, enduring emotions;
- Master the message – the dispatch of an item ought to be a type of art;
- Sell dreams, not items – make items that will enable individuals to satisfy their dreams (Gallo, 2011).

P.R. Whitfield has a fascinating method for characterizing development as he indicated the procedure of complex work that depends on discovering answers for issues. The impact of this is the improvement of curiosity (Whitfield, 1979).

Analysts likewise had an alternate assessment on whether development can be considered at the season of presenting a new

item, as Schumpeter and his impersonation are concerned, or advancement and additionally any further change of an existing item. The representative of the second standard was without a doubt R. Johnston (Johnston 1966).

Thus, in the western world, scientists in Poland have been thinking about how to characterize development. The primary works started in the 1960s. The examination was restricted to the technical setting in view of the specificity of the market in a communist state where the economy was halfway arranged.

Z. Pietrasinski, who said "innovations are deliberately introduced by human beings or by cybernetic systems designed by them, which are substituting previous states of things that are positively assessed in the light of certain criteria and which also create a progress" (Pietrasinski, 1971). Schumpeter's impression of innovation was likewise shared by W. Grudzewski and I. Hejduk, for whom development, each movement, or item, which is new, subjectively not the same as existing products was an innovation (Grudzewski and Hejduk, 2000). A. Pomykalski, then again, was inclining toward the Johnston's model, where advancement is a piece of change of given arrangement or an item (Pomykalski, 2001). Z. Madej trusted that innovation must not generally convey a positive load, influencing the improvement of the organization (Janusz and Kozioł, 2007). Consequently, his perception was past the system of the ideas that were introduced in the above cases. He made a definition that is fairly deviation of the old state of mind.

Looking at all the above condensed introduction of the term innovation is Table 1, which consists of the most famous specialists in innovation hypothesis and the catchphrases that are incorporated into their definitions. It can be seen that the premise of the greater part of the dissected definitions is "curiosity" and "item" - (they occurred seven times), it turns into the principle determinant of presenting the innovation in the enterprise. It is also very significant that among the eleven chosen scientists of this issue, considerably less incessant (4 times) "service" has showed up, and "improvement" just 3 times. By chance, such terms as "good", "idea", "imitation", "failure", "progress" and "commodity" were scattered.

Table 1. Keywords of the term innovation by selected authorities of economic sciences

Creator	Keywords
J. Schumpeter	novelty, product, commodity, imitation
F. Machlup	rejection of the word innovation
Oslo Manual	novelty, improvement, product, process
P. Kotler	novelty, good, service, idea, product
R.W. Griffin	development, novelty, product, service, use
S. Jobs	idea, lack of innovation system creation
P.R. Whitfield	workflow, problem resolution, novelty
R. Johnston	product improvement
W. Grudzewski, I. Hejduk	novelty, product, service, distinction from existing forms
Z. Madej	novelty, improvement, failure
Z. Pietrasinski	positive changes in products, services; progress

Source: Own analysis based on the literature of the subject.

2.2 The aspect and significance of innovation in the company

As of now, the pace of changes occurring in developed nations has prompted the development of postmodern economy, economy of network and, specifically, information based economy. These terms may have unique, maybe specific, implications, and every one of them can be comprehended in an variety of different ways, creating a view of the essence of the today's economic structure. The main object of attention of the developed nations economy is the expansion in the share of the services area in hiring and arrangement of GDP (supposed servitization of the economy). In addition, in the depicted structure, the crucial factor of economic development of the nation and the companies working in that matter are: information and innovations. So their part in the factor of building the financial structure of the nation is extremely valuable. It can likewise be noticed that the formal and casual relations of all the individuals working in the monetary space are critical.

The part of innovation being developed, not simply of companies but rather of the economy altogether, is undeniable, and numerous analysts can demonstrate that. For creators of Global Competitiveness Report 2016-2017, innovation is a piece of the twelve mainstays of financial rivalry (Schwab, 2016).

Realization of new items/forms that will be endorsed by consumers can generate expanded profits for sales, while the usage of process innovation can decrease the costs of production. In the present forcefully focused market, businesses must work on an abnormal state of innovation (Marakova et al., 2016), which will make them recognizable among other monetary administrators and enable them to remain on the market.

The main part of innovation is to raise the value of the business (Wolak-Tuzimek et al., 2015) that prompts its development. It ought to be borne as a main priority that the value of a financial substance ought to be related to what the organization can accomplish later on (Kuc and Paszkowski, 2007), that is the reason long-term arranging and development administration must be set up.

3 Results

The effect on the level of innovation can be impacted by elements, for example, GDP, PCT patent applications, SMEs implementing commodity or process developments, or outlay on innovative work. The connection between these components is examined beneath. There were attempts to present correlations between innovation indicators and selected macroeconomic measures in research. In particular, it focuses on two periods, the first is 2012-2014, and the second is 2015-2016.

Table 2 shows these aspects on the example of EU member states in 2012-2014. The largest average number of patents applied in Germany was 21.4 thousand and 9,000 in France, the lowest in Malta 5.19 and Cyprus 6.16. In Poland, the average for 2012-2014 was approximately 547. When it comes to innovative new products for the market, the highest percentage was recorded in Ireland 22.2 and in Austria 21.9. The lowest percentage share was recorded in Estonia 1.1 and Romania 1.3. Unfortunately, also Poland was in the group of countries whose index was one of the lowest and it was only 5.2%.

Table 2. Selected indicators of product innovation and macroeconomic measures for the EU-28 in 2012-2014

Country	The number of patents applied	Innovative new products for the market (in %)	Innovative new products for companies (in %)	GDP (in million EUR)	Expenditure on R & D (in million EUR)
Austria	1912.56	21.9	8.9	323357.93	9652.97
Belgium	1528.65	22	9.8	393339.00	9524.58
Bulgaria	40.36	5.7	5.2	42240.30	286.79
Croatia	17.48	8.2	10.6	43466.20	341.51
Cyprus	6.16	14.9	8	18384.20	83.75
Czech Republic	250.82	13.5	11.6	158611.97	2988.20
Denmark	1351.46	10.7	13.7	259517.73	7714.80
Estonia	25.28	1.1	9.9	18861.10	331.16
Finland	1658.61	20.4	14.2	202868.33	6676.03
France	9000.66	18.5	9.2	2114049.7	47306.08
Germany	21370.77	13.3	21.1	2836143.3	81098.01
Greece	107.93	15	8.4	183266.27	1430.67
Hungary	215.23	7	4.9	101840.73	1367.09
Ireland	324.38	22.2	13.4	183040.47	2822.81
Italy	4289.89	15.5	9.2	1613230.3	21258.88
Latvia	47.15	6.3	2.2	22839.50	149.69
Lithuania	40.70	8.9	12	34980.10	335.87
Luxembourg	64.50	18.4	10.3	46878.13	598.98
Malta	5.19	8.1	11.5	7741.20	59.78
Netherlands	3409.36	19	13.5	653640.00	12842.17
Poland	546.56	5.2	4.3	398359.90	3576.72
Portugal	119.25	14.5	13.9	170582.13	2270.28
Romania	86.21	1.3	2.3	142707.47	592.37
Slovakia	47.14	7.5	5	74273.27	621.91
Slovenia	129.90	17.5	7.7	36417.33	917.85
Spain	1514.71	5.7	5.5	1034139.0	13074.72
Sweden	3234.77	18.4	12.9	430594.63	13969.79
United Kingdom	5377.64	10.8	16	2124956.3	35087.50

Source: Own study based on (Eurostat, 2017).

When analyzing the level of new product innovations for enterprises, it ought to be noticed that the pioneer in the

positioning was Germany 21.1% and Great Britain 16%. The most minimal recorded nations in this regard were Latvia 2.2% and Hungary 4.9%. As on account of inventive new products for the market, Poland acquired the second last place in examination with the level of 4.3%.

Thinking about the level of GDP, it can be expressed that the most elevated esteems were acquired in such nations as: Germany (more than 2.83 trillion EUR) and the United Kingdom and France, whose esteem added up to: EUR 2.12 trillion and EUR 2.11 trillion individually. Table 3 introduces the aftereffects of the connection coefficient amongst GDP and individual advancement markers.

Table 3. Results of the correlation coefficient between GDP and individual innovation indicators in the EU-28 countries in 2012-2014

Number of patents applied and GDP	0.88
Innovative new products for the market (in %) and GDP	0.15
Innovative new products for enterprises (in %) and GDP	0.46

Source: Own calculations based on statistical data.

Pearson's connection coefficient with respect to the connection between the quantity of licenses submitted and the GDP of a given nation was $r = 0.88$. Connection is in this way positive, and the relationship is extremely solid. On account of the connection between an imaginative products new to the market and GDP, at that point $r = 0.15$, which demonstrates that the relationship is sure/positive and the relationship is extremely feeble. With respect to the connection between an inventive new products for endeavors and GDP, it added up to $r = 0.46$; which implies it is certain/positive and the relationship is reasonably solid. Figure 1 completes the examination, as the dissemination between the information was appeared.

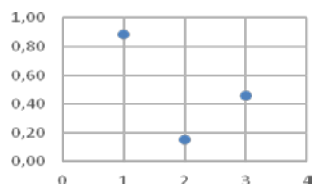


Figure 1. Correlation between GDP and individual innovation indicators in the EU-28 countries in 2012-2014

In the following stage, resulting conditions were analyzed, yet this time they were identified with R and D consumption. This additionally analyzed the quality of the connection between use on innovative work and chose three markers of advancement. It ought to be noticed that comparably as in the past investigation, every single positive aftereffect of the relationship coefficient were acquired, along these lines in each dissected case a positive connection happened. The proportion of the principal inspected reliance (i.e. between consumption on R and D and the quantity of licenses submitted) was $r = 0.98$; the relationship is in this manner extremely solid. The examination of the connection between uses on R and D and creative new products for the market was portrayed by a relationship coefficient of: $r = 0.21$, in this way there was an extremely frail relationship. The last considered reliance was the one between consumption on R and D and imaginative new products for endeavors. The connection coefficient was at the level $r = 0.55$, in this manner the connection between these highlights is solid. The investigation of the examination is exhibited in Table 4 and Figure 2, which displays the spread between the information inspected.

Table 4. Results of the correlation coefficient between expenditures on R & D and individual innovation indicators in the EU-28 countries in 2012-2014

Number of patents applied and R & D expenditure	0.98
Innovative new products for the market (in %) and expenditure on R & D	0.21
Innovative new products for enterprises (in %) and R & D expenses	0.55

Source: Own calculations based on statistical data.

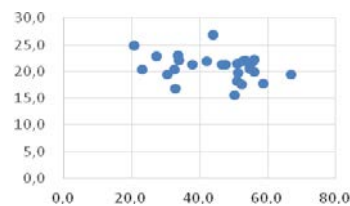


Figure 2. Correlation between expenditure on R & D and individual innovation indicators in the EU-28 in 2012-2014

The above examination recommends that for each situation, alongside the expansion, be it GDP or consumption on R and D, there is an expansion in all advancement coefficients contemplated. In any case, it ought to be recollected that for each situation the connections between specific components are not solid. As a rule, the improvement of advancement might be identified with the monetary circumstance of a given nation. In this way, the financial factor might be imperative, however its supplement ought to be, for instance, the information and experience of human capital. One might say that the thought and responsibility of representatives together with the suitable money related commitment are a fitting impetus for the rise of new products/forms. The next period in the analysis will be the years 2015-2016. Table 5 demonstrates these perspectives on the case of EU Member States in 2015-2016. The most elevated normal number of presenting products or process advancements enlisted in Belgium, it was 0.789% and in Finland 0.714%, while the least in Romania 0.000% and Poland 0.030%. As far as patent applications, the most astounding rate was recorded in Sweden at 1.000 PPS and in Finland at 0.977 PPS. The most reduced rate was recorded in Romania 0.170 PPS and Slovakia 0.244 PPS. Unluckily, Poland fell in the group of nations whose record was one of the lowest and amounted to only 0.249 PPS.

When analyzing the level of R & D expenditure in the business sector, it should be noted that the leader in the ranking was Sweden at 0.854% of GDP and Austria at 0.846% of GDP. The lowest recorded countries in this respect were Cyprus with 0.022% of GDP and Romania with 0.063% of GDP. Poland, as in the case of patent applications, came in second to last with 0.170% of GDP.

Considering the GDP level, the highest values were obtained in countries such as Germany (over € 3.09 trillion) and Great Britain and France, whose values were €2.49 trillion and €2.21 trillion, respectively. Table 6 presents the results of the correlation coefficient between GDP and individual innovation indicators.

Table 5. Selected indicators of product innovation and macroeconomic measures for the EU-28 in 2015-2016

Country	SMEs introducing product or process innovations (percentage of SMEs)	PCT patent applications per billion GDP (in PPS)	R&D expenditure in the business sector (percentage of GDP)	R&D expenditure in the public sector (percentage of GDP)	GDP (in million EUR)
Austria	0.622	0.738	0.846	0.815	348895.05
Belgium	0.789	0.612	0.684	0.597	416741.8
Bulgaria	0.045	0.253	0.231	0.115	46707.55
Croatia	0.275	0.255	0.152	0.289	45403.3
Cyprus	0.453	0.282	0.022	0.171	17932.25
Czech Republic	0.448	0.345	0.416	0.798	172518.8
Denmark	0.530	0.830	0.728	1.000	274633.4
Estonia	0.314	0.380	0.250	0.709	20723
Finland	0.714	0.977	0.797	0.916	212598
France	0.521	0.678	0.562	0.658	2211550
Germany	0.712	0.842	0.759	0.871	3093850
Greece	0.479	0.245	0.108	0.479	175255.65
Hungary	0.049	0.383	0.381	0.227	112226.85
Ireland	0.681	0.522	0.420	0.244	268802.25
Italy	0.564	0.488	0.286	0.457	1666337.65
Latvia	0.045	0.260	0.067	0.339	24639.9
Lithuania	0.307	0.292	0.108	0.653	38047.45
Luxembourg	0.665	0.438	0.258	0.513	52553.35
Malta	0.414	0.350	0.144	0.227	9608.8
Netherlands	0.710	0.806	0.432	0.821	693049
Poland	0.030	0.249	0.170	0.406	428017.45
Portugal	0.669	0.282	0.227	0.569	182494.3
Romania	0.000	0.170	0.063	0.104	164945.9
Slovakia	0.125	0.244	0.118	0.608	80025.2
Slovenia	0.397	0.598	0.686	0.423	39627.35
Spain	0.157	0.415	0.244	0.468	1099260
Sweden	0.669	1.000	0.854	0.955	457107.7
United Kingdom	0.432	0.607	0.426	0.446	2497636.55

Source: Own study based on (Eurostat, 2017).

Table 6. Results of the correlation coefficient between GDP and individual innovation rates in the EU-28 countries in 2015-2016

GDP and R&D expenditure in the public sector (percentage of GDP)	0.24
GDP and R&D expenditure in the public business (percentage of GDP)	0.33
GDP and PCT patent applications per billion GDP (in PPS)	0.42
GDP and SMEs introducing product or process innovations (percentage of SMEs)	0.27

Source: Own calculations based on statistics.

Pearson's correlation coefficient for the relationship between the country's GDP and R&D expenditure in the public sector was $r = 0.24$. Correlation is therefore plus / positive, and the relationship is very weak. In the case of the relationship between GDP and R&D expenditure in the public sector, $r = 0.33$, which proves that the correlation is plus / positive and the relationship is very weak. As for the correlation between the GDP and PCT patent applications per billion GDP, it was $r = 0.42$; which means that it is plus / positive, and the relationship moderately strong. In the last case correlation coefficient for the relationship between the GDP and SMEs introducing product or process innovations was $r = 0.27$. Correlation is plus / positive, and the relationship is very weak. Figure 3 is a supplement to the analysis because the scattering between the examined data is shown.

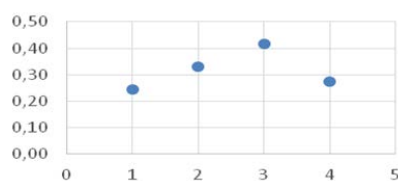


Figure 3. The relationship between GDP and individual innovation rates in the EU-28 countries in 2015-2016

In the following stage, facilitate conditions were explored, however this time they concerned PCT patent applications. The quality of the connection between PCT patent applications per billion GDP and R and D consumption were likewise analyzed. It ought to be noticed that, as in past examination, all positive connection coefficients were acquired, so that in each investigated case a positive relationship was gotten. The coefficient of the principal tried relationship (i.e. between PCT patent applications per billion GDP and R and D consumption in people in general division) was $r = 0.73$; so the relationship is extremely solid. The examination of the connection between

PCT patent applications per billion GDP and R and D consumption in business area was portrayed by a relationship coefficient of: $r = 0.91$, and subsequently an exceptionally solid relationship. The examination is point by point in Table 7 and Figure 4, which demonstrates the dissipating between the studied information.

Table 7. Results of the correlation coefficient between PCT patent applications per billion GDP (in PPS) and R & D expenditure in EU-28 countries in 2015-2016

PCT patent applications per billion GDP (in PPS) and R & D expenditure in the public sector (percentage of GDP)	0.73
PCT patent applications per billion GDP (in PPS) and R & D expenditure in the business sector (percentage of GDP)	0.91

Source: Own calculations based on statistics.

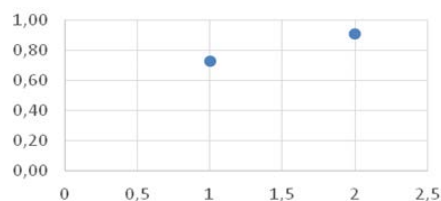


Figure 4. The relationship between PCT patent applications per billion GDP (in PPS) and R & D expenditure in EU-28 countries in 2015-2016

In the following stage, advance conditions were examined, yet this time they concerned SMEs presenting products or process developments. The quality of the connection between SMEs presenting products or process developments and the two chose R and D markers were additionally inspected. It ought to be noticed that, as in past examination, all positive connection coefficients were gotten, so that in each investigated case a positive relationship was acquired. The coefficient of the main tried relationship (i.e. SMEs presenting products or process developments and R and D consumption in people in general segment) was $r = 0.58$; so the relationship is solid. The examination of the connection between SMEs presenting products or process developments and R&D use in the business part was portrayed by a relationship coefficient of: $r = 0.62$, and consequently a solid relationship. Nitty-gritty of the investigation is in Table 8 and Figure 5, which demonstrates the scrambling between the overviewed information.

Table 8. Results of the correlation coefficient between SMEs introducing product or process innovations (percentage of SMEs) and R & D expenditure in EU-28 countries in 2015-2016

SMEs introducing product or process innovations (percentage of SMEs) and R & D expenditure in the public sector (percentage of GDP)	0.58
SMEs introducing product or process innovations (percentage of SMEs) and R & D expenditure in the business sector (percentage of GDP)	0.62

Source: Own calculations based on statistics.



Figure 5. The relationship between SMEs introducing product or process innovations (percentage of SMEs) and R & D expenditure in EU-28 countries in 2015-2016

The above analysis suggests that in every case, together with increasing GDP or PCT patent applications, there is an increase in all tested innovation ratios. However, it should be borne in mind that in each case the relationships between the individual elements are strong. In many cases, the development of innovation may be linked to the economic situation of a particular country. Therefore, the economic factor may be significant, but its complement should be, for example, the knowledge and experience of human capital. It can be stated that

this idea and the involvement of employees together with adequate financial contribution are the appropriate catalyst for the formation of new products / processes.

4 Discussion

Developments are available in each part of life today. They mirror the dynamic changes occurring on the planet. One can get the feeling that each progressive products or each next idea is identified with advancement, and subsequently the importance has to some degree been deteriorated. This word is regularly utilized by advertising organizations, which in the powerfully creating markets are endeavoring to overwhelm the opposition.

Comparative analysis of selected determinants of innovation in EU countries has been started with three indicators of innovation, namely: R & D expenditure, PCT patent applications and SMEs introducing product or process innovations. The research was limited to two periods (i.e. 2012-2014 and 2015-2016) and the innovation rates were reported by twenty-eight EU countries. The expressed motivation behind the discourses was accomplished by applying factual examination, with specific accentuation on the Pearson's connection coefficient. The examination was separated into three stages. The primary concentrated on showing the quality of the connection amongst GDP and (independently) the three chose markers of advancement. Then again, the second piece of the investigation was to decide the size of reliance between PCT patent applications and R and D uses in the general population and business part. The third phase of the examination was to show the quality of the connection between SMEs presenting commodity or process advancements and R and D consumptions in general society and business part.

Correlation analysis enabled us to distinguish the most critical development determinant of all the overviewed ones. The most grounded connection was with the quantity of PCT patent applications. For both in the primary case, while inspecting the connection record between the quantity of PCT patent applications and R and D use in general society and business division, were examined, relationship coefficients demonstrating an extremely solid relationship between's the tried factors were acquired. There was a positive connection, so the two highlights developed or reduced a similar way.

Tolerably solid relationship delineated SMEs presenting products or process developments and R and D consumption in general society and business part. Then again, the most reduced connection coefficient comes about were acquired when contrasting R and D use in general society part and GDP and SMEs presenting products or process advancements and GDP. So there was an exceptionally powerless association between these highlights. Along these lines, based on the acquired outcomes, it can be expressed that the inventive products new for the market are the minimum vital determinants.

The above investigation exhibits that the nation's GDP isn't a solid factor improving advancement as it is appeared to the overall population cognizance. Clearly, as the Gross Domestic Product develops, the file of advancement is developing, however their effect isn't as expansive.

In any case, it is critical for SMEs which are presenting imaginative products or procedures and patent applications to have budgetary help from open associations or government. It will include more specialists and give extraordinary equipment to inquire about focuses and research centers that will enable specialists to plan and execute new thoughts and products.

The proposed investigation does not debilitate the totality of the inspected matter, but rather it means that the rightness to proceed further and expand the exploration in this field.

Literature:

1. Drucker, P.F.: *Innowacje i przedsiębiorczość. Praktyka i zasady*. Warsaw: PWE, 1992. ISBN 83-20808-70-7.
2. Drucker, P.F.: *Natchnienie i fart czyli innowacja i przedsiębiorczość*. Warsaw: Studio Emka, 2004. ISBN 83-88931-49-0.
3. Eurostat, <http://ec.europa.eu>, last accessed 2017/04/02.
4. Freeman, Ch.: *The Economics of Technical Changes*. In: Cambridge Journal of Economics 1994 no. 18, pp. 463-514.
5. Gallo, C.: *The innovation secret of Steve Jobs*. New York: The McGraw-Hill Companies, 2011. ISBN 0071074333.
6. Goławska, M.: *Koncepcja innowacyjności*. In: Marketing i Rynek 2004 no. 11, pp. 37-41.
7. Griffin, R.W.: *Podstawy zarządzania organizacjami*. Warsaw: PWN, 2005. ISBN 83-01-12019-3.
8. Grudzewski, W., Hejduk, I.: *Przedsiębiorstwo przeszłości*. Warsaw: Difin, 2000.
9. Helpman, E., Grossman G.: *Innovation and growth in the global economy*. Cambridge: MIT Press, 1993. ISBN 9780262071369.
10. Janasz, W., Koziół, K.: *Determinanty działalności innowacyjnej przedsiębiorstw*. Warsaw: PWE, 2007. ISBN 83-208-1658-0.
11. Jasiński, A.: *Innowacje i transfer techniki w procesie transformacji*. Warsaw: Difin, 2006. ISBN 83-7251-587-5.
12. Johnston, R.: *Technical Progress and Innovation*. In: Oxford Press 1966 no. 18, pp. 158-176.
13. Kotler, P.: *Marketing. Analiza, planowanie, wdrażanie i kontrola*. Warsaw: Gebethner i Ska, 1994. ISBN 83-85205-42-X.
14. Kuc, B., Paszkowski, J.: *Organizacja - wartości - zarządzanie*. In: Zarządzanie wartością organizacji. Białystok: Wydawnictwo Wyższa Szkoła Finansów i Zarządzania w Białymstoku, 2007.
15. Machlup, F.: *The Production and Distribution of Knowledge in the United States*. New Jersey: Princeton, 1962. ISBN 0691003564.
16. Marakova, V., Dyr, T., Wolak-Tuzimek, A.: *Factors of Tourism's Competitiveness in the European Union Countries*. In: Ekonomika i Management 2016 no. 3, pp. 92-109.
17. Pietrasiński, Z.: *Ogólne i psychologiczne zagadnienia innowacji*. Warsaw: PWN, 1971. ISBN 83-207-0002-7.
18. Pomykałski, A.: *Zarządzanie innowacjami*. Warsaw-Lodz: PWN, 2001. ISBN 83-01-13480-1.
19. Porter, M.E.: *The Competitive Advantage of Nations*. London: The Macmillan Press Ltd., 1990. ISBN 0029253616.
20. Schumpeter, J.: *Teoria rozwoju gospodarczego*. Warsaw: PWN, 1960.
21. Schumpeter, J.: *Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York: McGraw Hill, 1964. ISBN 9781578985562.
22. Schwab, K.: *The Global Competitiveness Report 2016-2017*. Geneva: World Economic Forum, 2016.
23. Shane, S.: *A General Theory of Entrepreneurship. The Individual-Opportunity Nexus*. UK: Edward Elgar Publishing Limited, 2003. ISBN 1-8437-6382-6.
24. Whitfield, P.R.: *Innowacje w przemyśle*. Warsaw: PWN, 1979.
25. Wolak-Tuzimek, A., Duda, J., Sołoma, A., Lament, M.: *Zarządzanie małym i średnim przedsiębiorstwem. Wybrane problemy*. Radom: Instytut Naukowo-Wydawniczy Spatium, 2015. ISBN 978-83-62805-57-0.
26. Wolak-Tuzimek, A.: *Innovative Activities of Small and Medium-Sized Enterprises in Poland*. In: The 10th International Days of Statistics and Economics. Prague: Melandrium, 2016. ISBN 978-80-87990-10-0.

Primary Paper Section: A

Secondary Paper Section: AH, BB