

THE IMPACT OF THE INNOVATIVE ACTIVITY ON THE DEVELOPMENT OF THE BUSINESS ORGANIZATIONS

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Abstract

The purpose of each business organization is to make profit by leveraging its advantages, so most of them focus on the activities which ensure the future development. The growth strategies of the big companies should be established around the research & development activity which grounds the possibilities of increasing the competitiveness. These companies invest annually huge amounts of money in order to discover new products, new ways of doing business and to meet the challenges of the competition. Innovation has become the common goal of all economic entities, being the way for a company to achieve something, either we refer to a product or to a service or even a process, compared with what is already on the market or in society. In this context it is essential to analyze the performance of the innovative activity and the manner in which its results will be reflected on the development of the business organizations.

Key words: *innovation; patents; development; research and development; competitive advantage;*

JEL Classification: *M16, A31, A32,*

I. INTRODUCTION

The change has become the only constant in a society in unrelenting development. The high standards will entail an increase in the competitiveness between firms as regards the quality of the offered products, which brings multiple benefits to consumers. Certainly, not only the technology is changing, but also the needs and what is quite interesting is that more of the customers' needs aren't totally theirs, being induced by the abundance of characteristic of the products offered by the market.

Globalization has increased not only the exchanges based on products, but also on the culture, knowledge, ideas, what has bring out new opportunities, both in terms of commodity market and access to the human resource well prepared and less expensive. This is probably one of the disadvantages of the abundance of a certain category of resources meaning that high accessibility, significantly reduces their value. This is the reason for which several multinational companies relocate their activities in the regions in which they have access to cheap quality resources which bring many benefits.

The business organizations are trying to identify the most creative ideas for the use of the resources that they have. So in order to achieve this they assign significant amounts of money for activities that not only satisfy the needs, but especially to "produce" new needs. The alert rhythm of technology development influences many entities from the market to form teams with elite members in order to find ways to increase their performance. Thus the human capital becomes the most valuable resource of any organizations because of its role in achieving its objectives by using knowledge and skills. We believe that the foundations of the society's future development is given by education and research and development activities, but also regarding the efficiency principals of the use of each company's resources, or even each people goods.

The innovative activity is a vital element for the development of any business organization, beside their domain of activity. Therefor the investments in research and development have become the starting point for the companies which aim to increase on long-term. Large multinationals assign a special attention to the activities which favors the identification of a way to be different from its competitors. This fact makes us to ask ourselves how do we measure the level of innovation of a company besides other organization and which are the factors which take part to the development of innovation. From this point of view we believe that it is necessary an analysis in order to find out how innovation can be measured and especially the connections between this and the activity of research and development.

The purpose of this study is to identify the way by which the growth of the investment in research and development will contribute to the increase of the number of patents registered by the business organizations. The analysis was accomplished at the level of the 8 companies from different areas, but who hold favorable positions at world level: IBM, Samsung, Intel, Microsoft, Apple, General Motors, Johnson & Johnson and Pfizer. The selection of these companies was emphasized by the high level of the expenditure on research-development, but also by the number of patents registered in the period 2010-2015, appointed to the study.

The analyzed variables were the number of patents registered in the Intellectual Property Owners Organization and the budgets allocated to research and development by the eight analyzed companies. With

these variables we have tested the hypothesis of the existence of certain correlation between the analyzed indicators using SPSS for Windows.

II. THE ANALYSIS OF THE BASE OF THE INNOVATIVE ACTIVITY AT THE LEVEL OF THE BUSINESS ORGANIZATIONS

The motivation of the development of the innovative activity lies in its impact on the future progress of a business organization. We consider that such actions as those that have as their ultimate objective achieving innovation, should be developed at the level of all the institutions which are involved in the proper evolve of certain operations local level, and also national and global level. Each of us is responsible for the future development of the world in which we live and this fact should help us to take the appropriate decisions in the efficient use of all our resources, in everything we do.

Those from 3M have declared that their purpose is to have a constant flow of products. Their strategy is to remain on the market with a product around 4 years, period during which they are working to obtain new products. This way, at the time when the competitors of the company come on the market with the same product it already has a new generation of products. (Peters and Waterman, 2011, p.216). What we notice in this case is that this company aims to be always one step ahead of its competitors because it is aware of the quality of the work carried out in its research departments, maintaining its competitive advantage.

Certain situations, when the development strategy of a firm is focused on increasing its competitive advantage besides its competitors, determines us to remember that when a business organization wants to maintain its advantage in a specific market it will always be focused on the continuous improvement of its portfolio of products and services (Burciu and Kicsi, 2015, p.12). "The competition requires continues innovation" (Toffler, 1995, p.181) which highlights, probably, one of the most positive aspects of the various offers on a market, namely the increasing of innovative activity, but also the improvement of existing products and services by increasing their quality.

Alvin Toffler argues that it is necessary to be focused on finding new instruments for research, new methods for the understanding of the environment, but especially we must ensure ourselves that the institutions of the society support the emergence of new inventions (Toffler, 1970, pp. 428-429). Thus he has predicted in a certain way the needs of the new society which was set up in the era of the third wave, the knowledge-based society. In this new era the knowledge becomes the most valuable asset of a business organization. The new knowledge are those which supports the discovering of new inventions, new innovations regarding the product/service, technology, marketing, but also the level of management (Burciu and Kicsi 2016, p.9), all these being the base of the future progress.

Self-knowing and knowledge of the competition become vital for the victory in the "war" of the world market (Cleary, p.38). It is confirmed that the only option which companies have in achieving the level of performance appointed is to establish clear strategies in order to reach a high level of knowledge of the business environment but also of the advantages that they hold, but also the ones that want to create them.

A body ensures its stability by gathering information, by participating at different activities and by initiating different actions in order to ensure a certain stability (Ho, 1996). This situation may be extended at the level of the business organizations that always have activities of research and development in order to maintain that stability conferred by the advantages which they obtain for having a favorable positions on the market. "Has someone approached too close of the global sun of knowledge?" (Beaud and Dostaler, 2000, p.223), certainly, the answer to this question is a negation, which emphasizes, in a certain way, the direction which should be followed by the business organizations that want to contribute to the growth of this knowledge society.

Certainly the basis of innovation lies in research and development and knowledge, a fact which highlights the place held by the investments in research and development in the progress of the society. Research and development have become indispensable elements to the growth and to the development, given the fact that the reached result is innovation, but mostly by the fact that they help to identify more efficient alternatives to carry on the economic activity and not only. It is known that there are sectors of the economy where the level of the function of research and development is very well defined, like the electronics sector, the automotive but also at the pharmaceutical sector Galan (2016, p.249).

A new approach regarding to the measuring of the value of a company shows that beyond the material aspects, the value of a company should be examined in the light of certain elements as the research-development, the level of satisfaction of the employees, but also the degree of customer satisfaction (Buckingham and Coffman, 2004, p.21). Globalization has brought a series of benefits for the big companies regarding the innovative activity by increasing access to human capital, so they become "research global companies" (Friedman, 2007, p.201). This connection to the global resources, used properly, can influence the position on the market of a company. Canton (2010) argues that the business decision makers and not only, must be prepared to face future challenges, but especially to identify the necessary tools for this. The only way that seems to be viable is the directing of their resource to specific activities in the field of research and to identify the necessary instruments for solving the existing problems, but also for those who will occur at a certain moment.

The big companies show a major interest for such activities, which justify their position at world level. Thus, in the table below are highlighted the budgets allocated by the analyzed companies, which are

representative for the topic studied, for research-development, showing at the same time the evolution of these investments in the period 2010-2015.

Table no. 1 The research-development budget for the analyzed companies

Company	Field of activity	The research-development budget (billion USD)						The average value
		2010	2011	2012	2013	2014	2015	
IBM	Computing & Electronics	5.2	6.2	6.3	6.3	6	5.8	5.97
Samsung	Computing & Electronics	14.1	13.4	10.4	9	7.9	6	10.13
Intel	Computing & Electronics	11.5	10.5	10.1	8.4	6.6	5.7	8.80
Microsoft	Software & internet	11.4	10.4	10.1	8.4	6.6	5.7	8.77
Apple	Computing & Electronics	8.07	6.4	4.48	3.38	2.43	1.78	4.36
General Motors	Automotive	7.4	7.2	7.4	8.1	7	6.96	7.34
Johnson & Johnson	Healthcare	8.5	8.2	7.7	7.5	6.8	7	7.62
Pfizer	Healthcare	8.4	6.7	7.9	9.1	9.4	7.8	8.22

Source: Processed by the author after: <http://www.strategyand.pwc.com/global/home/what-we-think/innovation1000/top-20-rd-spenders>

According to the data in the table above we can observe that the most significant investments in research and development are at the level of Samsung and Intel Company, in the field of consumer electronics, being followed by Microsoft. We mention that these companies occupy positions of a major importance in the specific branch of their activity, being famous thanks to their innovative products, released every year.

In the EU R&D Scoreboard (2014) it was realized a ranking of the sectors of the economy regarding the intensity of the research and development expenditure. Therefore it was established that there are sectors with high research and development activity like healthcare, technology hardware & equipment, software and computer science; sectors with medium-high research and development activity like automotive, chemical industry; sectors with medium-low research and development activity (Food and beverages industry) and sectors with low intensity of the research and development activity (transport, mining). Given this ranking we can state that the analyzed companies have activity in sectors with high intensity of research and development activity, being a factor that increases their progress.

III. THE ANALYSIS OF BUSINESS ORGANIZATION INNOVATION

The big companies are in a race against the clock regarding the discovering of the best ideas which will lead to new technology and new products. Although the product portfolio of organizations seems to be vast and apparently nothing new may not be added they continue to look for new solutions. For example the American company 3M has over 50,000 products and annually at least 100 more are added of their offer (Peters and Waterman, 2011, p. 336).

The innovation is analyzed in terms of creativity and new ideas (Thomas and Miller, 2011, p.6), which emphasizes the fact that the results of innovation allow solving a problem by given new solutions for the old problems. “The innovators are the top of a company” (Nicola and Stoian, 2016, p.602), their role is to support progress, economic growth and to ensure the wellbeing of the people. In the knowledge society the intangibles goods have a higher value than the tangibles ones, which means that we assist at the increasing of the activities of firms that are focused on service, beside the firms that have productive activity.

The new ideas contribute to the creation of better contexts for the activities for the recipients of the results of those ideas. Regarding to the measuring of the innovation at business level, we state that each company has its own analyses methods to study the level reached in this direction, being important the number of implemented ideas, the number of new products, new ways of solving different problems. We can observe that the level of innovation of a company can be controlled by its managers and its human capital, so its performance can always be improved.

Regarding the innovation, it is very important to take into consideration the fact the way that a company innovates establishes what it innovates, so the reached results aren't random, don't depend of luck. It is obviously that innovations isn't a machine that you plug in in order to work so you can use it as long as you need it (Davila, 2006, p.37). The innovations is a result of a long work which needs financial and material resources, but mostly human resources and a specific feature is that the results may not be as favorable as assumed and won't bring any money.

The innovativeness could be analyzed by the impact of new ideas transformed in products, in doing certain operations. It is also interesting that innovativeness is influenced by domains of applicability of the new innovation. Therefore we can assume that technological innovation has a great impact in increasing firm's productivity because new inventions improve the production, but innovation in marketing or management

highlights a specific way of making decisions in companies in order to stimulate creativity that will develop new innovations.

Regarding the business organizations, the innovation can be analyzed in all their activities, how this activities take place and what benefits bring. The innovation in marketing can be observed by the way that are realized the firm’s brochures, catalogues or other promoting materials. On this materials the company has copyrights, so from this point of view the innovativeness of the firm is being perceived, and by the number of applications filled for obtaining the copyright on the material that are published in the name of the firm.

Another method to analyze a company’s innovativeness refers to trademarks, which give individuality to each business organizations. According to World Intellectual Property Organization, the trademarks represent a word, a name a symbol (or a combination of all these) which helps in finding the source of a product, allowing the association between a certain product and symbol, being also protected by copyright. Therefor the innovation’s intensity can be studied by the number of trademarks registered at specific national or international institutions.

Besides copyright and trademarks, the company’s innovation can be analyzed, probably this is the most correct way, by patents. The patents are, according to World Intellectual Property Organization, the rights on an invention that can be a product, a process, which emphasizes a new way of doing certain operations or which gives technical solution for solving a problem.

According to the Organization for Economic Co-operation and Development, there are countries that have intensive productive activity and high specialization so they chose the patents for the highlighting and protection of the innovation, but there are also countries which have a very developed tertiary sector, therefor they chose the trademarks. This situation can easily be applied for business organizations which are product oriented or service oriented.

For this study there were selected business organization with productive activity, therefor we present in the following table the number of patents registered by this companies, during 2010-2015, as result of their innovative activity:

Table no. 2 The number of patents registered by companies selected for this study

Company	Field of activity	Patents						The average value
		2010	2011	2012	2013	2014	2015	
IBM	Computing & Electronics	5866	6148	6457	6788	7481	7440	6696.67
Samsung	Computing & Electronics	4518	4,868	5043	4652	4936	5059	4846.00
Intel	Computing & Electronics	2625	1965	1730	1287	1244	1652	1750.50
Microsoft	Software & internet	2471	2938	2814	2704	2368	3121 ON	2736.00
Apple	Computing & Electronics	1937	2003	1775	1136	676	563	1348.33
General Motors	Automotive	1309	1470	1621	1374	1092	940	1301.00
Johnson & Johnson	Healthcare	1085	1115	1107	1000	780	790	979.50
Pfizer	Healthcare	120	119	107	156	153	264	153.17

Source: Processed by the author using: <https://www.ipo.org/index.php/publications/top-300-patent-owners/>

According to the information presented in table no.2 we can observe that the highest number of patents was registered by IBM, during 2015, the average of the analyzed years being 6696 patents, which gives the first place to this ranking. Another company placed well, given the number of registered patents is Samsung, with an average of 4896 patents. The average of the budget for research and development on IMB is almost half on the one of Samsung. We should take into consideration that Samsung has activity in a larger domain, which may assume highest risks. Although if we analyze the healthcare domain, we will find out that this in sector the investments in research and development are very high, but the number of registered patents is quite small, even though the pharmaceutical companies have probably the biggest budgets for research and development. So you should take into consideration also, that in this domain there are made many tests until a new product appears, because this sort of products have a great impact on people. Therefor we conclude by saying that the resources for research and development in one year do not guarantee results in the next year, the innovative process may take years.

IV. THE RELATIONSHIP BETWEEN THE EXPANSES WITH RESEARCH-DEVELOPMENT AND THE INNOVATIVENESS OF BUSINESS ORGANIZATIONS

The registration of patents by the business organizations is an activity that takes place after the activity of research and development, the number of registered patents being influenced by the evolution of the budgets for research. This aspect determined us to test the hypothesis of the existence of a correlation between the expenditure with research and development, of the selected companies (Independent variable) and the patents registered by these during 2010-2015 (Dependent variable).

As a result of the testing of the stated hypothesis we have been obtained certain series of data which are presented in the table below. The first step was focused on the identification of the level of correlation between the expenditure on research and development and the amount of patents and then was established the determination the number of patents influenced by the budget for research and development.

Table no. 3 The analysis of the coefficient of correlation and determination of the expenditure with research and development and the registered number of patents

Company	The coefficient of correlation	The coefficient of determination
Samsung	0.63	0.397
Intel	0.748	0.56
Apple	0.903	0.815
General Motors	0.501	0.251
Johnson & Johnson	0.891	0.794

Source: Processed by the author using : <https://www.ipo.org/index.php/publications/top-300-patent-owners/> and <http://www.strategyand.pwc.com/global/home/what-we-think/innovation1000/top-20-rd-spenders>

In the above table there have been highlighted the results obtained for 5 of the 8 companies analyzed, with the most intensive innovative activity. The value of the Pearson coefficient (coefficient of correlation) in the case of all companies analyzed determines us to state that the hypothesis established was verified. Furthermore, the coefficients of determination reveals that the number of patents for invention registered is influenced in a proportion of approximately 39 % in the case of the Samsung, 56 % as regards the Intel, 81% at the level of the Apple, 25 % in the case of General Motors and 79% at the level of the Johnson & Johnson, by the research and development expenditure. At the same time we have to mention that regarding the Pearson coefficient, the values are close to 1, which indicates a connection strong enough between the expenditure with research and development and the registered number of patents.

As regards the results of the research it is necessary to mention that they are obtained in long periods of time in relation to the specific nature of the work carried out, which determines us to say that the level of innovativeness of a company has to be analyzed by several components. The results obtained are valid, but we consider that it is necessary a more complex analysis of the elements that allows the quantification of innovation.

In a study carried out by PWC is presented a ranking of the most innovative companies at the level of the year 2015. The data provided by this report contributed to the achievement of the following table:

Table no. 4 The most innovative companies of the year 2015

The position	The Company	Headquarters	Field of activity	Expenditure on R&D (billion USD)
1	Apple	United States	Computing and electronics	4.36
2	Google	United States	Software and the internet	9.8
3	Tesla Motors	United States	Automotive	0.5
4	Samsung	South Korea	Computing and electronics	10.13
5	Amazon	United States	Software and the internet	9.3
6	3M	United States	Industrials	1.8
7	General Electric	United States	Industrials	4.2
8	Microsoft	United States	Software and the internet	8.77
9	IBM	United States	Computing and electronics	5.97
10	Toyota	Japan	Automotive	9.2

Source: processed after: <http://www.strategyand.pwc.com/global/home/what-we-think/innovation1000/top-innovators-spenders#/tab-2015>

Given the table above we can observe that the most innovative company is Apple and we also remember that we have identified a strong link between the expenditure with research and development and the number of registered patents at this company. Samsung has made significant investments in the field of research and development, while the average number of patents registered during the studied period is high enough, but the classification carried out by PWC, places it only on fourth place. However the analysis undertaken in this study has shown that in the case of the Samsung the hypothesis was verified.

The establishment of a clear ranking requires a more detailed analysis and identification of new methods of quantification of the innovativeness, in order to complete the obtained results. At the same time the differences

which exists between the report carried out by PWC and analysis carried out by us may be justified by various and different methods of work.

V. CONCLUSIONS

The investment in research and development are certainly one of the factors that promote growth in the knowledge society. The obtained results may be found in new products, new processes, and new services which assumes bringing new innovation on the market. As we have highlighted, the patents represent a way of estimation of the innovation, after the research and development activity. By this study we have emphasized that the number of patents registered by the business organizations is influenced by the budgets for research and development. Therefore we consider that a high level of companies' revenue will increase the number of registered patents.

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