

The Innovative Activity of the Multinational Companies in the International Business Environment

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Abstract

The analysis of the relationship between the innovative activity within a firm/company and the specificity of the international business environment can follow different research directions, both from a historical perspective and with reference to the current realities encountered in the global economy. We believe that it is obvious the fact that we can intuitively notice a certain conditioning and/or mutual influence between the innovative capacity of a firm and its natural tendency to expand its operations in two or more countries. At the same time, we can notice enough methodological difficulties regarding the attempt to argue more precisely, analytically, including on a statistical basis (in line with those existing at international level), how exactly does the relationship between innovation and the tendency of internationalization of the firm manifest, taking into account the realities existing in the current global competition.

Key words: innovation, internationalization, multinational companies, R&D

J.E.L. classification: F23, M16, O32

1. Introduction

The issue of innovation has now become a major topic of interest not only for business organizations but also for other categories of institutions, including governments and policy makers whereas the innovative capacity of an entity (either country, firm, etc.) directly determines the economic growth, the prosperity and long-term progress of the entity. Therefore, we highlight the fact that the issue of innovation in the global economy can be analyzed both from a macroeconomic perspective (when ranking the main countries of the world is based on a number of indicators showing R & D position, ICT, education, research spending, etc.) and also from a microeconomic perspective.

From the perspective of the current research, we are going to focus our attention and study more closely how the innovation issue is reflected at the microeconomic level and to what extent can we establish a causal relationship between R&D activity and the internationalization trend of a company's operations. Among other issues related to the issue of innovation at company level, questions arise as: how do we determine the innovative capacity of a company by comparison with other firms in the sector and / or related fields? How can be determined innovation dynamics be assessed at firm level?

2. Literature review

It is difficult to establish the causal relationship between the two processes analyzed by us (the issue of innovation and the internationalization of operations) as each company has its own model of evolution, which is influenced by the applied management but also by the competitive advantages held by at a time in industry and /or on the market. Linking innovation and R&D activity to the international knowledge network becomes an essential issue for the progress of a business organization in the context of increasing global competition. From this point of view, it is essential to mention the major influence of the multinational companies on the global R&D

activity, both through the innovative operations at the level of the country of origin and those carried out on the foreign markets (UNCTAD, 2005, p.151).

The challenge that large companies need to face is to manage efficiently their global innovation networks, but above all to identify a balance between the R&D activity at the headquarters and the abroad R&D. The technological change and the innovations that result from R&D have become the foundation for growth, competitiveness and well-being. Thus, the globalization of innovations and R&D further highlights their complexity and importance in setting strategies by decision-makers (Karlsson, 2006, p.13). The innovative firms are constantly implementing and developing series of specific processes in order to create new knowledge that depends on the learning and routine process within the organization. These processes contribute to the differentiation from competitors, but in particular it gives a certain uniqueness to the firm, making it difficult to imitate and is a source of competitive advantage (Mylonopoulos, Tsoukas, 2004, p.210). The importance of these processes are increasing under the conditions of the internationalization of their activity from a double perspective: on the one hand, it increases the access to new knowledge that could improve the current learning process and, on the other hand, the international competitors have access to its specific knowledge.

The studies on innovative business activity have highlighted an increase in high-tech organizations. According to a report published by UNCTAD, depending on the intensity of research and development, the business areas of business organizations can be grouped differently. On one side, there are high technology areas where R&D investment accounts for more than 5% of the turnover (aeronautics, pharmaceuticals, ICT). On the other side, there can be found medium-high-tech areas where the budget allocated to innovative activity amounts to between 1.5-5% of the turnover (auto industry, chemical industry). There are also some industries considered medium-low technology, where research-development accumulates between 0.7-1.5% of the turnover (oil industry) and low-tech areas where spending on research accounts for less than 0.7% of revenue (food industry, textile industry) (UNCTAD, 2005, p. 140).

Taking into account the classification made by UNCTAD and the intensity of research and development specific to certain sectors of activity, we can mention:

- In the IT sector, companies such as Apple, Microsoft and Samsung have invested 5%, 14% and 7.6% of turnover in 2017;
- In the pharmaceutical industry, companies such as Roche, Sanofi and Pfizer have allocated 22% and 15% of R&D revenue in 2017;
- In the automotive industry, companies such as Toyota, Honda and Volkswagen have invested around 4%, 5% and 5.2% in R&D in 2017.

The analyzed companies have internationalized not only the production activity, but also the research and development activity, having centers in the big countries of the world. The studied automotive organizations have expanded their research activity as follows: Honda has centers in the US, Toyota has research and development activity in Belgium, Germany, France, Thailand, Australia, China, USA, and Volkswagen in the US, China and Japan. The pharmaceutical industry has more intense innovation beyond the borders of its home country, expanding as follows: Roche is present in the USA, Denmark, Shanghai and Japan; Sanofi is present with research in China, the US and Germany and Pfizer has a center only in Great Britain. Regarding the innovative activity of IT companies, we can mention that it is much more intense beyond the borders of the country of origin as follows: Apple has centers in China, Indonesia, Sweden and France. Microsoft has research laboratories in China, Australia, Spain, UK, Italy, Denmark, Ireland, and Samsung has a global research and development network in Poland, Russia, UK, China, Japan, USA, India, Indonesia, Israel, Brazil.

Concerning the impact of the innovative work on host countries, Dunning mentions that R&D investment has a positive influence on economic growth and technological progress by facilitating access to new, high performance management technologies (in most cases management positions will be held by people in the country of origin). However, there is a certain difficulty in generalizing the direct or indirect effects of multinational companies on the innovative capacity of the home and host countries (Dunning, 2004, p.86). Some opinions point out that the big companies do not just increase their innovative capacity through greenfield investments in order to create research centers but facilitate access to new technology and a global knowledge network.

Creating specific units for developing innovations contributes to the diffusion of knowledge and technology in host countries (Reddy, 1997, 1833). In the current context, there can be noticed the existence of a relationship between the internationalization of a company's activity, its level of innovation, but also its performance. Innovation is seen as the result of an increased presence in foreign markets and the performance of a firm usually improves when it increases its operations beyond the borders of the country of origin. Moreover, the internationalization contributes directly to the economic growth of a company and indirectly improves the performance through the positive impact on innovative activity (Boermas, Roelfsema, 2016, pp. 285-284).

3. Methodology

Establishing the innovative activity has raised the interest of many institutions and organizations at international level. Therefore, we can mention an internationally well-known index in this area, namely the Global Innovation Index (GII) which highlights different perspectives of the innovation at country/nation level and trying to provide information in order to set policies that promote long-term economic growth, productivity improvement and job creation. Currently, the GII is calculated on the basis of two sub-indices. Therefore, the index has an input on innovation that includes aspects related to the ability of the national economies to support innovative work (institutions, human resources and research, infrastructure, market complexity, and of the business environment) and an output index of innovation that highlights the performance of innovative activity (knowledge and technological developments and creativity). The two components of GII highlight, on the one hand, the general framework provided by states for new innovations (business environment, environmental policies, education system, research and development, information and communication technology, competition, knowledge workers etc.) and on the other hand the results of innovation (creation, impact and diffusion of knowledge, intangible assets, creative goods and services, etc.). The calculation method itself involves an average of the scores of the two sub-indices, and then an average of the obtained results.

The basic principles of the GII reflects actually the situation at the state level, but they could be applied, we believe, including at the company level, using the same principles (putting forward an input for the activity of R&D compared to output from that activity). Thus, on the one hand, when analyzing the innovative capacity at firm level, we include in the input component the funds allocated for research and developed during a number of n years. On the other hand, with respect to the R&D output component at company level for n years, we can include the number of patents registered by that organization. Therefore, the principles underlying the calculation of the GII for the innovation hierarchy from a macroeconomic perspective allows us, in the form of an analogy suggested by us, to propose a calculation method that may prove to be useful in the future to estimate/evaluate the innovative capacity and especially innovation dynamics over the years for a company. Under the conditions described above, we propose the following formula for determining an innovation index at company level:

$$IID = \frac{IDF+IDP}{2}, \text{ unde:}$$

IID – The index of innovation dynamics

IDF – The dynamic of R&D (research and development) funds

IDP – The dynamic of the number of patents

In this study, in essence, we will analyze more through the opportunities and conditions that can be seen between the innovative activity within a firm (innovation being considered this time as a cause or incentive) to the internationalization strategy that the organization would implement. More specifically, the basic idea of our study can be synthesized as follows: the innovative activity within a multinational company is predominantly a cause or a factor favoring the internationalization of operations, even if we cannot quantify exactly how much or what share of innovation generates or leads to internationalization operations.

Based on the technology classifications of high-tech, medium high-tech, medium low-tech and low tech sectors, we conducted an analysis of the internationalization of UNCTAD 100 companies

In the below table we have calculated for each industry (grouping the 100 multinational companies in the UNCTAD top) the following indicators: total assets and foreign assets, total sales volume and share of sales outside the country of origin, total number of employees and the share of the number of employees working abroad in the total number of employees

4. The relationships between innovation and internationalization at the companies from UNCTAD ranking

Using data from UNCTAD reports and given the mentioned methodology, we have determined an index of internationalization for each sector in order to understand how different industries have extended their activity on foreign markets. In the table below, we present the results that we have reached:

Table no. 1 The analysis of the internationalization of the top 100 non-financial companies from UNCTAD ranking on industries given the level of technology

Category	Assets (mil. USD)		Sales (mil. USD)		Employees (mil.)		TNI (%)
	Foreign	% foreign assets	Foreign	% foreign sales	Foreign	% foreign employees	
High-tech industries	2,665,162.69	58.15	1,462,111.30	66.18	3,085,850.74	62.63	62.32
Medium High-tech industries	2,136,488.68	57.55	1,569,761.18	75.86	2,534,633.80	60.66	64.69
Medium Low Tech Industries	1,980,044.52	73.81	1,112,909.14	65.03	683,898.53	59.60	66.15
Low tech in	889,025.32	85.21	395,186.24	84.81	1,216,720.02	83.07	84.36

Source: Author's own calculations based on WIR 2017, The top 100 non-financial MNEs from developed economies, ranked by foreign assets

The results show that the highest value of assets abroad is in the high-tech sector, the same situation being available for the number of employees abroad. Although in absolute value these indicators reach the maximum level for high-tech industries, their share in total assets and total number of employees are lower than those in low-tech and low-tech medium. This aspect entails that the TNI level is the lowest in the high-tech sector and the highest for low-tech industries. From this point of view, we can notice one of the limitations of the TNI calculation methodology because its level does not highlight in the present case the real situation of the industry (the value of the high tech assets is superior to the low-tech sector, which shows that their presence in the foreign markets is much higher).

Regarding the innovative activity of these sectors, we have analyzed the budget for research and development allocated by companies in 2017. Thus, the results obtained have highlighted \$166.33 billion in the high-tech sector, \$ 80.91 billion in the medium-high-tech industry, \$ 6.16 billion in low-tech medium and \$ 4.6 billion in the low-tech. In the below paragraph, we will briefly illustrate the situation regarding the innovative activity and the presence on foreign markets for some of the firms from to the sectors mentioned in the previous paragraph:

a. High-tech industries:

- Oracle had a \$ 6.82 billion budget for R&D in 2017, obtained 753 patents, and achieved an TNI of 48.8%;
- SAP AG had 89.6% of operations abroad in 2017, a budget of \$ 3.21 billion for research and registered 521 patents;
- Novartis obtained 262 patents and allocated \$ 9.6 billion to R&D and had about 68.3% of its activity on the international market;
- Nokia registered 1381 patents, had a budget of \$ 4.7 billion for research and obtained a TNI of 91.1%.

b. Medium high-tech industries:

- Ford had \$ 7.3 billion budgeted for research and registered 1876 patents, with 39.9% of operations going outside the country of origin;
- Volkswagen, on the other hand, allocated \$12.1 billion for innovative work and obtained 207 patents (EPO), while 60% of the activities took place worldwide;
- Medtronic obtained 1,414 patents and allocated \$ 2.2 billion for research, with 89.8% of operations on foreign markets;
- Basf SE obtained 415 patents and allocated \$ 2 billion for R&D and had 63.7% of its activities were on the global market.

c. Medium low-tech industries:

- DowDupont carried out 56% of operations on foreign markets, had a budget of \$ 1.58 billion for research and obtaining 765 patents;
- Royal Dutch Shell, on the other hand, had a budget \$1 billion, with only 74.6% of activities outside the country of origin;
- BP instead had a budget of only \$ 0.4 billion, while 68.3% of the operations took place worldwide.

d. Low tech industries:

- Nestlé carried out 91.8% of its operations worldwide and allocated \$1.7 billion for research and development;
- Unilever carried out 82.3% of its activities in other countries and spent \$ 1 billion;
- Mondelez, on the other hand had 81.8% operations on the world market and spent only 0.4 billion USD for the innovative activity.

The highlighted data emphasizes an intensive innovative activity for high-tech industries, while low-tech industries have a higher level of internationalization of operations as a share of total activity. However, Nokia and SAP AG (high-tech companies) have a high volume of R&D investment as well as a large number of patents, but also over 91% and 89% of operations abroad. Thus, we cannot determine a trend regarding the innovative activity in relation to foreign market operations for each industry, as the business model followed by each company is individualized and influenced by their management.

In order to analyze the situation of the multinational companies on innovation in the context of internationalization of their activity, we have selected some of the top companies from UNCTAD ranking that are globally recognized with important positions in the industry in which they operate.

Table no. 2 The analysis of innovation regarding the non-financial companies from the UNCTAD ranking in the context of the internationalization of their activities

Company	R&D (bil. USD)			Patents			IDI (%)	TNI (%)	
	2016	2017	The index of evolution (%)	2016	2017	The index of evolution (%)		2016	2017
Toyota Motor Corporation	9.47	9.31	-1.69	1540	2015	30.84	14.58	60.2	65.5
Chevron Corporation	0.6	0.48	-20.00	129	150	16.28	-1.86	57.9	60.3
Apple	8.07	10.05	24.54	2101	2225	5.90	15.22	47.9	47
Honda	5.89	6.2	5.26	870	854	-1.84	1.71	77.6	78.2
Siemens	5.04	5.53	9.72	1482	1538	3.78	6.75	65.9	76
NISSAN	4.77	4.4	-7.76	317	357	12.62	2.43	70.1	71
Microsoft	12.05	11.99	-0.50	2558	2601	1.68	0.59	46.7	44.7
Samsung	11.95	12.72	6.44	5504	5810	5.56	6.00	55.1	62
Novartis	9.47	9.57	1.06	247	262	6.07	3.56	67.8	68.3
Sony	4.2	4.01	-4.52	2168	2116	-2.40	-3.46	52	50.6
Sanofi	5.36	5.46	1.87	300	284	-5.33	-1.73	65.4	71.6
Amazon	12.54	16.09	28.31	1662	1960	17.93	23.12	62.7	33.1
Alphabet	12.54	16.09	28.31	3267	3065	-6.18	11.06	33.3	33.9

Source: Author's calculation based on the data from UNCTAD, USPTO, The Study PWC Global Innovation 1000

Given the results obtained, we find that the dynamics of innovation has evolved favorably in the case of companies that have allocated significant amounts for R&D activity and have registered a large number of patents. Companies like Amazon, Apple, Toyota, and Alphabet have achieved the best positions with significant growth in innovation, companies operating in different areas. From the perspective of internationalization, TNI's highest values are for companies like Nissan, Siemens, Sanofi, Honda, and Toyota. Taking into account the specific of the business activity and the technological infrastructure that firms in these sectors need to carry out their operations, we consider that the value of TNI is largely influenced by the high asset values of these companies abroad. This is because it requires extensive investment to create the necessary framework, given that all five companies have as their main activity the production of consumer goods. The intensity of innovative activity will also be influenced by the company's specific activity, which may assume that most of the times an IT company will be more innovative than a company may be in the automotive industry.

If in the case of companies from the productive industries the decision to internationalize is based mainly on the material resources they will have access to, in the case of the ICT sector companies, we mainly discuss the need to have access to highly skilled human resource. The internationalization of innovative activity can also be attributed to the registration of patents in countries other than the country of origin. Thus, Toyota, a Japanese firm, has patents registered at US level (USPTO, data used in the table above), but also at EU level (EPO registered 535 patents in 2017). A similar situation is specific for most of the companies analyzed, indicating their need to protect their innovations in the context of increased presence in foreign markets. Analyzing data on innovation dynamics and internationalization, we can see that there is a series of correlations in their evolution. Thus, on the one hand, when the evolution of the index of innovation shows an increase, the same trend is found in TNI, with few exceptions (in the case of Siemens, Honda, Alphabet) and on the other hand, when the dynamics of innovation reflects a decline, we will find the same situation for the internationalization of activities (in the case of Sony). Although the correlations are not verified for all the companies analyzed, we believe that a broad-based analysis at several companies could highlight the relationship between innovative business activity and the internationalization of their operations to a greater extent. Therefore, from the perspective of our research, it is obvious that the innovative activity within a firm has been and remains an essential factor in all situations where top management aims to maintain or strengthen the competitive position of the organization at some point in time. In the same sense, the internationalization of a company's operations is seen by top-management as a source or factor that directly improves the competitive position of the organization on a given market. As mentioned earlier, the statistical data analyzed and the study of the realities that are defining the global MNC sector lead us to the conclusion that there is a sufficiently clear relationship between the innovative capacity of a firm and its tendency to - and internationalize operations over time. According to our findings in the current literature there is no theoretical model that thoroughly analyzes the relationship between innovation and the internationalization of a firm.

5. Conclusions

A company's innovative capacity will not be entirely influenced by R&D investment, but by the extent to which the top management identifies sources of innovation in the external/internal environment and includes them in its own infrastructure. Therefore, we can state that the relationship between innovation and the internationalization of a company's operations is relatively complex and will be determined by several factors (size of the firm, nature of the field of activity, the qualification of the employees, possibilities of recourse to ICT, demographic changes, etc.).

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