

Mechanisms of an Ubiquitous Power-Source in the Knowledge-based Economy: Innovation and Competitive Advantage in Companies

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Abstract

Innovation is seen as an impetus for the competitiveness of products and processes, a basic principle of organizations in the knowledge-based economy. Being globally present in (re)defining the vision of an organization, placing a new product on the market, academic research projects, public policies or transfer of new technologies, innovation is no longer just a matter of competitive advantage, but a matter of survival. The aim of current paper is to demonstrate the global spread of innovation by examination and comparison of a variety of innovation measurement scales issued during 2019, concluding that a significant number of states, including Finland, Germany, Sweden, Denmark and Luxembourg are ranked consistently among the most competitive and innovative countries. Given the very low values for countries such as Romania, we conclude that they can only learn from the examples of good practices regarding the financing of innovative projects and companies.

Key words: innovation, innovative company, competitive advantage, entrepreneurship, start-up
J.E.L. classification: L26, O31

1. Introduction

It is well known that innovation is at the heart of human progress, both economically and socially. Unlimited human ingenuity, along with the ability to build on previous accomplishments have pushed the boundaries of everything we know, experience, and relate to each other in society. Despite a multitude of challenges, the human condition has reached unprecedented levels of improvements in health, literacy, education, poverty reduction and environmental sustainability. An excellent example is the explosion of information and communication technology development in recent decades that has allowed individuals to stay in constant contact, collaborate or exchange information, regardless of spatial or temporal limitations. Innovation has also contributed to significant leaps in labor productivity, enabling people to enjoy more free time and stimulating the emergence of entertainment and leisure industries. Although both technological and non-technological innovation factors have contributed to long-term economic growth and managed to extract national economies from recessions and crises, there have been considerable debates about the role of innovation in societal issues, such as maintaining employment levels.

Particular emphasis is placed on innovation as a boost for the competitiveness of products and processes, as a distinct feature of emerging companies and as a basic principle of organizations in the knowledge-based economy, as defined in the Lisbon Strategy. It is also a well-known fact that innovation has a great deal in common with the ability of companies to cope with rapid changes in the external environment. Given this, we could easily say that innovation is not just about highly specialized technology, the most competitive sectors of the economy or the most developed nations around the world. On the contrary, innovation is now present globally, from (re)defining the vision of an organization or introducing a new product to the market, from academic research projects to public policies and regulations for transfer of new technologies. It would not be wrong to approach innovation as an ubiquitous concept in any organization that strives to gain competitive advantage in a constantly changing economy.

It is therefore no longer an option, but a necessity to consider all the potential factors that lead organizations to performance in the digital age, at a time when technology plays such an important role in leading successful businesses and human resources are constrained to acquire new skills relevant to the global market. The survival of a company is no longer strictly limited to the manufacture of new products, as competitors have already put them into use, and financial resources may be lacking for such costly investments. The performance of the organization considers lately causal factors such as creativity, speed of action, preparedness for change, ability to adjust to market requirements, agility and much more. In this context, understanding the mechanisms of the virtuous power of innovation offers interesting challenges for scientists and researchers in multiple fields and especially in economics.

2. Theoretical background on innovation

Innovation remains a constant key concept in academic literature and has been in the attention of researchers for over 70 years since Schumpeter's work. Therefore, labeling innovation as just another fashionable concept has no justification for the large literature that developed after Schumpeter's initial work. However, the perceived importance of innovation, especially in economics, management and organizational studies, seems to have increased, given the widespread attention in the academic literature in recent decades. Numerous publications have appeared in academic journals covering a wide range of topics including technology development, product innovation, new product / service development, research and development, innovation dissemination, organizational innovation and innovation indicators. Despite all the valuable contributions in the literature, one thing is becoming increasingly clear, namely that there is a lack of an overview of what innovation is and what researchers study exactly: a simple concept, an approach, a process, a dimension of the economy or society, an independent science or discipline, etc. The variety in the innovation literature is enormous, making it difficult and sometimes confusing, especially for those new to the field who are trying to find out what are the important or interesting topics related to innovation.

Over the years, innovation has been examined through a multitude of theoretical perspectives in an effort to define, clarify and conceptualize it. First, Schumpeter defined innovation in 1934 in various ways, such as the introduction of new products, methods, procedures, a new market, or a new structure in an organization, which means a new combination of available resources (Croitoru, 2012). He introduced for the first time the concept of change, which involves innovation, in the sense of inserting something new into the known environment. This includes rearranging jobs, roles and structures. It also involves redevelopment systems, since the process of change itself is an innovation (Cole, 1997). Van de Ven (1986) states that an innovation is a new idea, but that it can be a recombination of old ideas. As long as the idea is perceived as new to the people involved, it is an "innovation", even if for others it may seem an "imitation" of something that already exists elsewhere. But what if innovation remains in this case only at the idea stage? Then there is no distinct change and it is not fair to say that we are facing an innovation in the true sense of the concept.

Westland (2008) highlights an important aspect of perceived innovation when it considers that an innovation is a product or service with a package of features that is, as a whole, new to the market or that is marketed in a new way, which creates new uses and attracts new consumer groups. Therefore, when we talk about product innovation, for example, not only the members of the organization, but also the consumers are the ones who perceive the change as new. Westland thus opens the way beyond this very general definition and emphasizes that different professions perceive innovation in different ways and that each profession tends to define innovation with reference to familiarity. Thus, regardless of innovation, it should be perceived as new, at least at a level of perception, be it organizational, local or global.

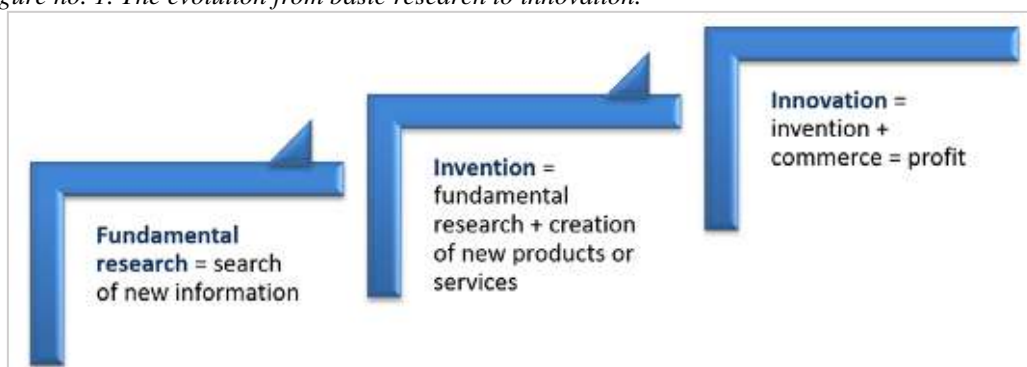
Holbrook and Hughes (2000) focused their attention on local innovation, naming it market innovation. They argue that what is new to the firm, i.e. the organizational level in our work, should not be considered innovation, because in many cases it is exactly the opposite, namely restoring the stability of an economy destabilized by innovators. Instead, the market with potential

customers and competitors of the company is the environment in which innovation takes place and where, therefore, innovation can be studied. As far as we are concerned, however, we do not agree with this view, because, as we have already stated, innovation is no longer an option, but is absolutely necessary in every competitive and sustainable organization. Therefore, the first entity to perceive innovation should be the organization itself. Another problem is at the level of global perception, which means that innovation should be something new (for example, a new product) in a global context. However, examining the emergence of new products, one might observe that only a small percentage of all new products are new worldwide, respectively about 10% according to surveys (Wind and Mahajan, 1997).

Companies are constantly evolving and changing to ensure their sustainability. Therefore, innovation cannot be just an idea, but should go beyond this status of mere idea and turn into palpable innovation: a new product, a new structure, a new process, etc. Knight (1967) denotes that innovation is the adoption of change that is new to an organization and to the relevant environment. Damanpour (1991) also refers to innovation adoption which includes the generation, development and implementation of new ideas and behavior. The researcher refers to innovation as a means of changing the organization, either in response to changes in its internal or external environment, or as a preventive action taken to influence the environment. Both Knight and Damanpour include the term "adoption" in their definition to suggest that the organization has gone beyond the design of a new idea and has begun to apply it.

So far, discussions about innovation and its definitions have focused on the phenomenon of novelty, which is necessary but not enough for conceptualizing innovation. It is important to understand how innovation evolves and what important aspects are included in this evolution. Schoen *et al.* (2005) present the steps leading to innovation, as illustrated in Figure no. 1.

Figure no. 1. The evolution from basic research to innovation.



Source: own elaboration after Schoen *et al.* (2005).

Basic or fundamental research is a long-term investment in the creation of general knowledge, which does not take into account commercial applications and therefore has less predictable practical consequences (Henard and Mcfadyen, 2005; Schoen *et al.*, 2005). The invention, in turn, uses the created knowledge or new combinations of existing knowledge to create new products and processes (Grant, 2005). In other words, it is applied research, which, unlike basic research, has an immediate practical basis, and probably shows more profitability (Henard and Mcfadyen, 2005). Grant (2005) denotes that innovation can be the result of a single invention or can combine several inventions, but the most important aspect that turns the invention into an innovation is the business model used to market the product. Moreover, this business model must be successful, including producing a positive change in the company's profitability; otherwise there is no innovation, only invention (Hamel, 2000).

Holbrook and Hughes (2000) suggest that innovation should not be analyzed in discrepancy with the competitive environment in which the organization exists, because innovation takes place in a competitive environment. Therefore, innovation must be seen first at the organizational level and then in the competitive environment, which turns innovation into a tool that ensures market dominance over competitors in the field. In conclusion, Table no. 1 provides an overview of the important features that are related to the definition of innovation in the opinion of several researchers.

Table no. 1. Characteristics of innovation

Characteristic	Explanation
Novelty	The precondition for innovation to take place is the development of new ideas or the recombination of old ideas, new knowledge, new processes or organizational structures or the recombination of existing processes and structures.
Perception	Innovation must be perceived as at least new on one level: organizational (members / employees of the organization), local (local markets) or global (the entire global environment).
Adoption	Innovation starts when new ideas or knowledge are implemented in the organization.
Marketing	Business models that "sell" innovation.
Support	Innovation is a tool that should provide a competitive advantage and help the organization cope with the external environment.
Profitability	Innovation must be profitable and lead to positive change.

Source: own elaboration after Van de Ven, 1986; Damanpour, 1991; Henard and Mcfadyen, 2005.

We consider it important to conclude that innovation may include all these characteristics, starting from the development of a new idea that is perceived as new at organizational, local and / or global level. Also, the implementation of the new idea in the company and its marketing in accordance with the external environment of the organization must lead to increasing the profitability of the organization.

Much of the literature views innovation as the process by which new technology is used to develop new products. However, innovation is more complex than this definition manages to express, because it can mean the successful application of a new idea in an organization, no matter where it appears within the organization (Nisula and Kianto, 2013). Regarding the current paper, we share this view that innovation is not limited to the procedure of developing a new product but can also be applied to the development of new processes and strategies, as well as to the creation of new business ideas.

3. Research methodology

As the aim of current paper is to demonstrate the global spread of innovation by examination and comparison of a variety of innovation measurement scales, the best methodology is the analysis method. The methodology proposed for the research involves the analysis of scaling documents at European level, as well as of existing sustainable socio-economic models. The rankings evaluating innovation are presented in the current paper in comparison as follows: Global Innovation Index 2019, Global Competitiveness Report 2019, The European Innovation Scoreboard 2019. Also, documents such as project sheets, financing applications or technical-economic documentation for the projects with innovation components were consulted. Also, for an in depth analysis, an examination of recently introduced innovation policies has been realized as well as some European frameworks in what concerns the innovation at European level or European private innovative initiatives. Conclusions were formulated in what concerns ranking at European level in what concerns innovation scales, of all European states.

4. Innovation measurement scales

Academia, businesses and decision-makers alike recognize that research and innovation policy can be a very useful stimulus for economic development and social welfare, but progress in Europe has been too slow to catch up with those in the US and Japan in in terms of innovation performance. Although the innovation gap is narrowing, Europe is still struggling to keep up with innovation leaders: South Korea, Canada, Australia and Japan are ahead of the EU, according to the 2019 European Innovation Scoreboard 2019 (EC, 2019). Behind this overview there are numerous causes, including the lack of capacity to compete in private spending on research and development for innovation, patent applications, tertiary education and public-private co-publications. At the

same time, while China is still a long way from the full performance of EU innovation, it is steadily rising, as evidenced by increased spending on research and development and the ability to attract highly skilled talent..

In order to put the performance of innovation into perspective and to make some connections between the economies of different states with the specifics of innovation ecosystems, we will analyze and compare several scales used to measure innovation. Within this context, the knowledge gained from transnational studies and evaluations will be used to assess countries that make holistic and systemic efforts in investment and innovation policies, both from a political and financial perspective.

The rankings evaluating innovation are presented in comparison in Table no. 2 and are as follows:

- Global Innovation Index 2019, the result of a collaboration between Cornell University, INSEAD and the World Intellectual Property Organization (WIPO), co-editors, together with their knowledge partners (Cornell University, INSEAD and World Intellectual Property Organization, 2019);
- Global Competitiveness Report 2019 prepared by the World Economic Forum. Regarding this ranking scale, we should mention that, for a greater relevance of the analysis performed, as well as to establish a coherence of comparison, we performed the analysis taking into account only Pillar 12 of this index, namely Innovation Capacity (World Economic Forum, 2019);
- The European Innovation Scoreboard 2019 prepared by the European Commission (EC, 2019).

Table no. 2. Overview of innovation rankings (2019).

Rank	Global Innovation Index	Global Competitiveness Report	European Innovation Scoreboard
1.	Switzerland (67.24)	Germany (86.8)	Sweden (135.8)
2.	Sweden (63.65)	USA (84.1)	Finland (134.0)
3.	USA (61.73)	Switzerland (81,2)	Denmark (129.5)
4.	Netherlands (61.44)	Taiwan (80.2)	Netherlands (124.0)
5.	United Kingdom (61.30)	Sweden (79.1)	Luxembourg (118.7)
6.	Finland (59.83)	Rep. Korea (79.1)	Belgium (117.7)
7.	Denmark (58,44)	Japan (78.3)	United Kingdom (117.5)
8.	Singapore (58.37)	United Kingdom (78.2)	Germany (116.6)
9.	Germany (58.19)	France (77.2)	Austria (114.7)
10.	Israel (57.43)	Netherlands (76.3)	Ireland (108.1)
11.	Rep. Korea (56.55)	Denmark (76.2)	France (102.0)
12.	Ireland (56,10)	Finland (75.8)	Estonia (95.3)
13.	Hong Kong (55.54)	Singapore (75.2)	Portugal (89.7)
14.	China (54.82)	Austria (74.5)	Czech Republic (82.2)
15.	Japan (54.68)	Israel (74.2)	Slovenia (80.5)
16.	France (54.25)	Canada (74)	Cyprus (79.7)
17.	Canada (53.88)	Belgium (71.4)	Malta (78.7)
18.	Luxembourg (53.47)	Australia (69.5)	Italy (78.1)
19.	Norway (51.87)	Luxembourg (68.4)	Spain (77.9)
20.	Iceland (51.53)	Norway (68.0)	Greece (75.0)

Source: author's own elaboration.

Before analyzing the results, the methodological frameworks behind the different approaches to innovation evaluation need some consideration. The differences between the criteria used, the weights allocated, and the methodology applied to assess innovation and competitiveness performance logically lead to the variation of the rankings of innovation and competitiveness analyzed in this paper. These issues are presented in detail in Table no. 3, which compares the

general methodology and approaches used to collect data on innovative and competitive activities of different states.

Table no. 3. Overview of available methodological aspects of innovation rankings.

Rank	Global Innovation Index	Global Competitiveness Report	European Innovation Scoreboard
Purpose	Analysis of innovation performance among 129 national economies.	Focus on the competitiveness of 141 states, but in this paper we took into account only the aspect related to the evaluation of innovation in these states.	Provides a comparative assessment of innovation systems in EU Member States, but also other countries such as Turkey, Ukraine, Norway, Iceland, etc.
Criteria	It is structured around two sub-indices, input and output. They are based, in turn, on 7 pillars: (1) institutions; (2) human capital and research; (3) infrastructure; (4) market sophistication; (5) business refinement; (6) knowledge and technology outputs; (7) creative outputs.	The pillar of innovation brings together indicators such as: (1) labor diversity; (2) the stage of development of clusters; (3) international co-inventions; (4) collaboration with several stakeholders; (5) scientific publications; (6) patent applications; (7) expenditure on research and development; (8) the position of research institutions; (9) buyer sophistication; (10) trademark applications.	The evaluation distinguishes between several types of indicators, such as human resources, research system, innovation-friendly environment, financing and investment support, innovative activities, employment impact, sales impact.
Calculation method	The overall score is the average of the input and output sub-indices, which both have the same weight in the calculation, even if the output sub-index is based on only two pillars.	The calculation of the score is based on aggregate data from the indicator level, mainly qualitative data. The study asks for answers on a scale of 1 to 7, the latter being the best result.	Performance is measured using an indicator obtained from aggregation of 27 ranking indicators from the lowest possible, 0 to the maximum of 1.
Data collection	The indicators used are collected as follows: 37.3% of the data obtained are from 2018, 33.3% are from 2017, 9.3% are from 2016, 4.8% from 2015, and the remaining 5.3% from previous years.	The calculation of innovation performance is based almost entirely on 2019 executive opinion poll.	Eurostat statistics and other international sources are used. The indicators are mainly based on data from 2016-2018.

Source: author's own elaboration.

Among the innovation rankings, the Global Innovation Index and the Global Competitiveness Report stand out for their wide scope in terms of country selection and application of indicators. The Global Competitiveness Report pays relatively close attention to soft data in the form of its opinion poll, while the Global Innovation Index looks at fewer soft data variables. However, the common denominator of all cross-cutting evaluations is that they may not be able to understand the impact of recently introduced innovation policies, as it will take some time for them to be able to influence performance and be evaluated.

Despite differences in exact ranking positions, studies conducted by these international organizations have found many similarities in their conclusions regarding innovation and competitiveness. We can conclude that a significant number of EU Member States, including

Finland, Germany, the Netherlands, Sweden, Denmark and Luxembourg, are consistently ranked among the most competitive countries. All the countries mentioned above reach the top 20, as can be seen in Table no. 2.

When we evaluate the factors that allow a strong competitive performance, there is a significant tendency among the most competitive countries to perform either at the top of the top or well above the average in terms of innovation size. Innovation or competitiveness rankings also place countries such as Finland, Germany, the Netherlands, Sweden, Denmark and Luxembourg among the most innovative countries. In general, common to all these countries is the fact that the achievements of the innovation ranking at national, European or global level also tend to equalize very highly competitive positions.

These statements are further supported by evidence regarding public and private expenditure on research and development: the above-mentioned EU countries with maximum competitiveness in all rankings belong to the group of countries with the highest total expenditure on research and development as a percentage of GDP. However, and this seems more important to us, although funding for research and development has a pro-active effect on innovation, it is only part of the many dimensions of innovation that need to be addressed to support innovative activities. Funding for research and development, whether public or private, requires framework policies, regulations and complementary measures to support innovation that is sufficiently effective to ensure its transformation into real markets.

There is no single way to achieve top innovative performance and each country has its own specifics, but in our opinion, we believe that the European Innovation Scoreboard has found a wide range of features among the most innovative countries. First, in order to achieve a high level of innovative performance, the nation needs to develop a balanced and systemic national innovation, with high performance in terms of several factors. As noted in the European Innovation Scoreboard and the rest of the transnational studies, these include, but are not limited to, national research strengths, public-private partnerships, SME collaboration, R&D spending, patents and the commercialization of technological knowledge that facilitates the transfer of knowledge and rapid use in the market.

Regarding Romania, we find that we are at the bottom of many rankings, even in lower positions than in previous years. Thus, in the report on the Global Innovation Index 2019 Romania is on the 50th place out of 129 economies evaluated, decreasing compared to the previous year by one position, having in the current year the score of 36.76. In the Global Competitiveness Report 2019, Romania is on the 55th place out of 141 with a score of 42.3 on Pillar 12 Innovation capacity considered for this paper. Regarding the European Innovation Scoreboard 2019 Romania is part of the fourth group of innovators, namely the modest one which includes 2 Member States showing a level of performance below 50% of the EU average, respectively Bulgaria and Romania. Romania has an index with a value of 31.4, thus placing us on the last place in the EU. Over time, Romania's performance decreased compared to that of the EU in 2011, but after a sharp decline between 2011 and 2015, performance began to increase after 2015. The innovation-friendly environment and the impact of sales are the strongest innovative dimensions. Broadband Internet and exports of medium and high technology products are the only indicators that are above the EU average, while the size of innovators, firm investment and human resources are the weakest. The lowest scores of indicators in Romania are for lifelong learning, SMEs with product or process innovations, SMEs with marketing innovation or organizational innovations. For all these indicators, Romania has the lowest performance in the EU with an absolute value of 0. Many of the economic indicators in Romania tend to be closely above or below the EU value. However, GDP per capita, the share of employment in services and the number of R&D enterprises per 10 million inhabitants are well below the EU average.

5. Conclusions

The OECD (2015) further predicted that innovation will be a crucial determinant of the global competitiveness of nations. Some countries have been able to take advantage of the opportunities of globalization and new technologies both through the private environment and through effective methods of governance and are expected to grow further in the future. Overall, the successful

implementation of innovation policies and innovative activities has enabled states to make better use of resources by transforming innovative ideas into new products, services, processes and business models, creating better conditions for sustainable growth and competitiveness, quality jobs and addressing the challenges of European society.

The benefits of innovation in a country are expected to lead to the diffusion of new technologies, which contributes to increased knowledge and productivity and therefore also allows for the growth of GDP per capita. According to Ahlstrom (2010), the importance of innovation for society lies in the fact that even the smallest upward changes in growth will make a difference over time.

An increasingly competitive national market, together with the pressure of international competition, emphasizes the importance of organizations to successfully manage actions to improve innovation. Tertiary education, the internet, fast communication, technological progress, etc., these are what force us to constantly improve in order to offer more complex products and services that meet the needs of the market. The conclusions of the literature review, as well as statistics, indicate that innovation is a key factor in the knowledge-based economy and is positively related to superior performance, acting as a mediator between organizational variables and financial performance.

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