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IDENTIFYING OPPORTUNITIES TO IMPROVE COMPETITIVENESS THROUGH INNOVATION ILLUSTRATED ON THE EXAMPLE OF HUNGARY

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─Abstract ─

Due to the economic downturn there is an increased need for companies and economies to outperform their competitors and gain sustainable competitive adventage. However, competiveness is a complex concept. There are a number of definitions and methodologies available to define and measure competitiveness.

This study examines the data of a widely referred competitiveness report issued by the World Economic Forum annually. The analysis focuses on how innovation contribute to the overall competitiveness, what are the direct and indirect influencing factors of innovation and how the overall competitiveness may be improved through improving the innovation related indicators. The process is illustrated on the example of Hungary in the context of its' EU and regional competitive position, with the purpose to identify areas of opportunities to improve national competiveness through innovation.

Key Words: c*ompetitiveness, innovation, European Union, Hungary*

JEL Classification: O1, O3

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1. INTRODUCTION

1.1 Competitiveness in context

The term competitiveness is used in a bewildering variety of ways, both in the policy community and in academic research. Some equate competitiveness with the ability to achieve certain overall outcomes, such as a high standard of living and economic growth. Other definitions focus on the ability to achieve specific economic outcomes such as job creation, exports, or FDI. Yet other definitions see competitiveness as defined by specific local conditions such as low wages, stable unit labor costs, a balanced budget, or a ‘competitive’ exchange rate to support a current account surplus. These different views of competitiveness have confused the public and scholarly dialogue, and have obscured the development of an integrated framework to explain causes of cross-country differences in economic performance (Delgalo et al., 2012).

Porter (1990), in his seminal study of competitive advantage, deplores the lack of attention to competitiveness in standard international trade theory and suggests that economic analysis is diminished by this lack. Porter goes on to assert his conviction that the national environment affects the competitive position of firms, and he observes that understanding the role of the nation 'would yield some fundamental insights into the how competitive advantage was created and sustained'. Given the regular use of his ‘diamond’ model as an underpinning for local economic development strategy, the reasoning also applies to cities. (Begg, 1999)

The challenge of defining competitiveness has shifted, especially in advanced countries. The challenges of a decade ago were to restructure, lower cost, and raise quality. Today, continued operational improvement is a given, and companies in many countries are able to acquire and deploy the best current technology. In advanced nations with relatively high labor costs and equal access to global markets, producing standard products using standard methods will not sustain competitive advantage. Instead, advantage must come from the ability to create and then commercialize new products and processes, shifting the technology frontier as fast as their rivals can catch up. Although R&D investments are undertaken in all countries, a small number of geographic locations tend to dominate the process of global innovation in specific sectors and technological areas. For example, though biomedical research takes place

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throughout the world, more than three-fourths of all biotechnology pharmaceutical patents have their origin in a handful of regional clusters in the United States. Overall innovative activity also concentrates in a relatively small, though growing, number of countries (Porter-Stern, 2001).

Although less advanced countries can still improve their productivity by adopting existing technologies or making incremental improvements in other areas, for those that have reached the innovation stage of development, this is no longer sufficient for increasing productivity. Firms in these countries must design and develop cutting-edge products and processes to maintain a competitive edge. This requires an environment that is conducive to innovative activity, supported by both the public and the private sectors. In particular, it means sufficient investment in research and development (R&D), especially by the private sector; the presence of high quality scientific research institutions; extensive collaboration in research between universities and industry; and the protection of intellectual property. Amid the present economic uncertainty, it will be important to resist pressures to cut back on R&D spending — both at the private and public levels — that will be so critical (Sala-I-Martin et al., 2010)

The European Union (EU) stresses the importance of promoting economic, social and territorial cohesion in order to contribute to the success of the new EU strategy Europe 2020 (2010), which puts forward three mutually reinforcing priorities: smart, sustainable and inclusive growth. Smart growth means developing the economy based on knowledge and innovation. Sustainable growth means decoupling economic growth from use of resources, building a resource – efficient, sustainable and competitive economy. Inclusive growth means building a cohesive society in which people are empowered to anticipate and manage change, thus to actively participate in society and economy (Balkyté-Tvaronavicienė, 2010).

1.2 Innovation as a driver of competitiveness

Similarly to the competitiveness, in case of innovation there are also a number of approaches to define the concept. Schumpeter created one of the first definitions. In his interpretation innovation included new products, new methods of production, entering new markets, creating a new organization or market. (Schumpeter, 1934). Based on his theory Dosi phrased his definition (1988): “In an essential sense, innovation concerns the search for, and the discovery,

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experimentation, development, imitation, and adoption of new products, new production processes and new organizational set-ups".

The European Commission defines innovation on in a similar approach: "Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relation. The minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved) to the firm."

The EU puts lots of emphasis on innovation because it faces problems on competitiveness. Although the world class performance of European scientists is recognized, it is also confirmed by the number and quality of publications, however, the results of this knowledge is not transparent in the economies of the EU. Deployment of scientific results in the economy is slow, the number of patents is low, and therefore in many sectors the competitiveness of Japanese or American products are better than Europeans (European Commission, 2004). This phenomenon is even more prevalent in Hungary, where the R&D spend was 1.2% of the GDP in 2010, which is considerable lower than the EU average of 1.9%. The European gap between „science" and „practice" exist here, too. Companies' willingness to innovate is low, the problems of the industries are underrepresented at the R&D institutions, and their researches are not utilized in the industry. A week point of innovation is technology transfer (Borsi –Papanek, 2002, EC, 2004).

It is often debated if the creation or the distribution of the knowledge is more important from the economic development point of view. Mokyr argues that the interrelations of these two factors are important. Therefore successful societies are creative, encourage the broadening its knowledge base and creates the institutional and market conditions to deployment of the new knowledge (Mokyr, 2004).

Lack of financial resources and high costs are often barriers to innovation. However, in addition to financing, other factors could be also critical to the success of innovation. Jaruzelski and Dehoff (2007) examined 1000 large companies with intense R&D activity, and found that the most successful ones are not those who spend the most on innovation. They could not find significant connection between the R&D spend and the financial performance of these

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companies. They highlighted that the most successful ones had a consumer oriented innovation strategy.

2. THE IMPACT OF INNOVATION ON COMPETITIVENESS

2.1 Measuring competitiveness

Measuring competitiveness of countries is a complex task. It needs to be interpreted in comparison with other competing economies. At the same time, progress of competitiveness requires measures in different time periods. There a number of approaches to construct competitiveness measures. These are based on different methodologies, but there are similarities in the key steps of their process: identifying (and grouping) a number of indicators believed to have an impact on competitiveness, collecting data for these indicators (statistical data or specific survey data), creating an overall score for each country and ranking the countries based on the scores. Because of the different methodologies and indicators it is difficult to compare the results of various reports, therefore the most cited data from each report is the final rank of the countries, which could be compared to the rank in other reports, for example, within a set of identified competitors.

To examine the competitiveness of a specific country, the relevant set of competing economies need to be also identified to make the analysis more relevant. It could be a geographic region, an economic and/or political union, the level of development of the economy or a unique feature common in some countries, such as a natural resource (e.g. oil production), which has a large influence on a particular economy.

2.2 Analysis of innovation related measures of Hungary

The purpose of our analysis is to identify the areas of strengths and weaknesses of Hungary in the context of innovation. In our analysis we used the data of the Global Competitiveness Report issued annually by the World Economic Forum. The analysis was performed on the data from the 2012-2013 report (Schwab, 2012), which covers 144 countries, including all EU member states.

The report structures the data hierarchically: the Global Competitiveness Index (GCI) calculated for each country from 3 subindexes (Basic requirements,

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Efficiency enhancers and Innovation and sophistication factors). These subindexes built up by 12 pillars and 111 separate indicators. The report also takes into consideration the level of development of economies. It defines three base categories (factor driven, efficiency driven and innovation driven) and the transition stage between these. These categories influence the weighting of different indicators, pillars and subindexes.

In the report there is one pillar dedicated to innovation, including 8 indicators (highlighted with bold typeface in Table 1). Their weights depend on the development level of the country. In Hungary's case the innovation pillar represents 11.37% weight in the total GCI score. However, we assumed that out of the remaining 103 indicators there are others, which indirectly have an impact on the innovation performance. We identified these in a two-step process. First applied a correlation analysis: we calculated the correlation between each indicators outside the innovation pillar and the innovation pillar. We considered those indicators for further analysis, which showed strong and significant correlation with the innovation pillar ($r>0.75$ and $p<0.01$). 33 indicators met this criteria, which are spread across 5 pillars. We note that high and statistically significant correlation on its own does not necessary mean cause and effect connectivity, however a good indication of the interdependence. Therefore we aimed to group these indicators further with the aim to find those with most impact on the innovation performance.

In order to gain a better focus on the drivers of innovation, we applied factor analysis on these 33 indicators. The analysis was performed on the standard values of the variables. The Kaiser-Meyer-Olkin measure of sampling adequacy provided a value of 0,962, this indicates that the variables are suitable for factor analysis. The extraction method was performed by the principle components method, the extracts were based on the criteria of eigenvalue>1, and Varimax rotation was applied. The analysis resulted 3 factors, out of which the first component explains 75.6% of the variance and includes 17 indicators (Table-1, indicators with normal letters). We considered the variables in this component to be the most important indirect drivers of the innovation score. The total weight represented by these 17 indicators in the GCI score is 18.67% (based on the weights applicable to Hungary in the report's methodology). If we add the weight of the innovation pillar (11.37%), the overall weight of the innovation related indicators (direct and indirect) is 29.97% in the GCI score.

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Table-1: Hungary's rank in the GCI index, its subindexes and the indicators related to innovation based on analysis of data in the Global Competitiveness Report 2012-2013

		Indicators*	Hungary's rank		
			Full sample (144)	EU countries (27)	CE countries (7)
Aggregate scores		Global Competitiveness Index	60	20	3
		Basic requirements	55	19	4
		Efficiency enhancers	52	22	3
		Innovation and sophistication factors	58	21	3
Innovation related indicators	Relative strengths	**Quality of scientific research institutions**	20	10	1
		PCT patents, applications/million pop.	27	16	2
		University-industry collaboration in R&D	37	16	2
		Capacity for innovation	45	16	3
		Availability of scientists and engineers	50	16	2
		Availability of latest technologies	55	20	3
		Extent of marketing	59	21	4
		Local supplier quality	63	23	5
		Firm-level technology absorption	64	20	3
		Production process sophistication	67	24	5
		Nature of competitive advantage	71	22	3
		Value chain breadth	74	24	5
		Quality of management schools	81	21	2
		Availability of research and training service	83	24	5
		Effectiveness of anti-monopoly policy	83	22	5
		Extent of market dominance	91	23	5
		Intellectual property protection	93	17	2
	Relative weaknesses	Degree of customer orientation	103	26	6
		Company spending on R&D	103	26	7
		State of cluster development	104	22	5
		Extent of staff training	110	23	5
		Gov't procurement of advanced tech products	110	21	3
		Buyer sophistication	123	26	6
		Willingness to delegate authority	126	27	7
		Brain drain	129	26	6

* Indicators with bold typeface are the components of the Innovation pillar. All other indicators are selected based on the result of the factor analysis.
Source: The authors' compilation based on data in the Global Competitiveness Report 2012-2013

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According to the report Hungary belongs to the transitional stage between the efficiency driven and innovation driven economies, and takes the 60th place in the ranking of 144 countries based on the GCI score. It is easier to interpret data when we examine them relative to Hungary's more relevant competitive environment. We chose to examine competitiveness relative to the European Union (27 countries) of which it is a member of, and also within its closer geographical region, 7 Central European (CE) countries which are also members of the EU (Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia). Table-1 summarizes Hungary's rank of the GCI, the three subindexes, as well as the innovation related indicators within the overall sample of 144 countries, as well as the EU (27 countries) and CE region (7 countries). The results of these rankings are summarized in Table-1.

3. CONCLUSION

Our research confirmed our initial assumption that innovation is influenced by the economic environment (both micro and macro level) and human factors (quality of education and training, management capabilities, as well as attitudes).

Based on the ranking of the innovation related indicators we conclude that Hungary's strengths relative to its competitors are in the professional knowledge: strong focus and high quality on the research activities, presence of scientists and engineers, co-operation between academic institutions and companies, etc.

One of the transparent weaknesses of Hungary's innovation performance is the shortage of financial resources (both at companies and the government). Another weakness is the ability to manage the innovation process end to end. Whilst Hungary is relatively strong on the research side of the process, it is weaker in the implementation ability. It requires a change of attitudes in a number of areas (customer orientation, management approaches, more focus on business and management education, and wider co-operation across players). These weaknesses often result great Hungarian innovations being utilized abroad, thus losing their potential longer term profitability to contribute to the country's economic performance. In the lack of adequate environment there is also a danger of increasing brain drain, which is already one of the lowest ranked indicators among all the 111 indicators in the report.

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Whilst there are limitations of this methodology, we are confident that it is sufficient to identify the key areas impacting innovation and the relative strengths and weaknesses of the economy of a particular country, in this case Hungary. It is also apparent that improvement of indicators directly or indirectly related to innovation contribute to the improvement of the overall competitiveness of the country (29.97% weight in the overall score). It requires government actions (creating a reliable and innovation friendly economic environment through regulations and incentives), as well as research institutes and companies strengthening their implementation competencies.

It could be subject of further analysis to quantify the impact of improvements by sensitivity analysis. A further research could also compare the results of this study with conclusions based on other widely used competitiveness reports.

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