Methodological aspects of compiling country’s competitiveness through the aspect of Technology-Intensive Innovative Enterprises Index

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Abstract

The main purpose of this paper is to present a conceptual model explaining relationship between Country competitiveness and technology-intensive innovative enterprises.

Methodological aspects of compiling Country’s competitiveness through the Technology-Intensive Innovative Enterprises Index are presented. Fundamental groups of factors country’s competitiveness of the technology-intensive innovative enterprises aspect were identified. Analysis is based on a systematic approach characterized by identification separating factors of country competitiveness through the aspect of technology-intensive innovative enterprises and determining links between them and their groups. For evaluation of mentioned groups weigh coefficients, was applied a method of questionnaire. The coincidence of the opinions of experts participating in the poll was evaluated using Kendall's coefficient of concordance. Characterizing factors of Country’s competitiveness through the technology-intensive innovative enterprises index were determined and their values were rated. Quantitative and qualitative methods were used to attain more precise evaluative results.

Keywords: Country competitiveness; Technology intensive innovative enterprises; Economic growth; Entrepreneurship; Index.
Introduction

The complex measurement of country’s competitiveness is becoming one of the most important stages in strategic planning as well as presumption of the improvement of national competitiveness. The problems of the complex measurement of competitiveness within the country are analyzed in this case.

In the globalized world, the concept of competitiveness has gained and continues to gain an unprecedented significance in recent years. It is one of the most sophisticated and hard summarized areas of the study. This is determined by discussions on the application of the concept of national competitiveness, the versatility of the concept, the absence of a universally accepted definition, the number of factors of competitiveness, and the complexity of the relations between them. The theories and views of the most famous authors - Porter (1990), Krugman (1994), Cho (1994), Reiljan et. al. (2000), Cho and Moon (2005), Camagni (2002), Turok (2004), Gardiner et. al. (2004), Garelli (2009), Bienkowski (2009), Dunning (2013) - are mostly-focused on the analysis of competitiveness at national level. The authors do not bring to the fore different ways of achieving competitiveness throw the aspect of technology-intensive innovative enterprises.

Changes to the conditions of economic activity has affected globalization, business dynamics, the development of information technologies, and intangible resources. The competitiveness of country is highly dependent on innovation-based economy. Creating innovation was a random process in twentieth century; now it is a purposefully controlled activity. New technologies are a key factor influencing the development of the economy. Companies that use old technologies and do not introduce innovation in their activities cannot compete in the modern market. Innovation is becoming a necessity that determines the success of the company. According to J. A. Schumpeter (1939), innovation is more than a technological phenomenon. Whatever the technological discovery, it will not be regarded as an innovation unless it leads to an increase in net profit. According to McCraw (2006) analysis of Schumpeter’s ideas about innovation – innovation is an obvious progress impulse of the national economy. The economic prosperity of a country depends mainly on the scale of its technical and technological innovation.

The authors of this paper follow the latter definition of technology-intensive innovative enterprise, defining it as an enterprise introducing new or considerably improved products, technologies, system organization, and/or marketing processes, manifesting itself through dynamic capabilities performance. An organisation’s performance is strongly affected by dynamic capabilities. Even in the early proposals of Teece et. al. (1997), it is clear that dynamic capabilities are employed to explain firm-level success and failure, competitive advantage, and private wealth creation. Despite controversy (Zott, 2003, Eisenhardt & Martin, 2000), the majority of research supports the direct impact of dynamic capabilities on establishing new enterprises, facilitating entry into new markets, and the internationalization process as well.

1. Basic concepts and principles, structural parts and their interaction of the evaluation model of country competitiveness through technology-intensive innovative enterprises

Research has made possible to determine base propositions to form a model.

- There is no universal measurement model of country competitiveness that fully involves the poly-aspects of determination of country competitiveness through the aspect of technology-intensive innovative enterprises;
- Country competitiveness through the aspect of technology-intensive innovative enterprises depends not only on the competitiveness of companies and the strategies they use but on the environment of the nation allowing them to become competitive on an international scale.

Country competitiveness through the aspect of technology-intensive innovative enterprises is analysed systematically, characterized as separating factors of country competitiveness through the aspect of technology-intensive innovative enterprises and determining links between them and their groups.

In order to substantiate methodologically and evaluate competitiveness of a country integrally the evaluation model of country competitiveness through the aspect of technology-intensive innovative enterprises will be developed.
2. Determination and grouping of the factors of country competitiveness through the aspect of technology-intensive innovative enterprises

Today's economy is based on knowledge and rapidly changing technologies. Therefore, a substantial impact on the competitiveness of the country is made by technology-intensive innovative enterprises with investments in human resources, research and development, and new technologies.

Following an analysis of competitive models in the scientific literature, these factors and groups of factors were distinguished:

<table>
<thead>
<tr>
<th>Human capital</th>
<th>Networking</th>
<th>Efficiency of policies</th>
<th>Innovative capacity of a country</th>
<th>Innovation level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education system</td>
<td>Membership in networks, clusters</td>
<td>Business freedom</td>
<td>Innovative, technology enterprises</td>
<td>Innovation outputs</td>
</tr>
<tr>
<td>Qualification of population</td>
<td>Mobility of students</td>
<td>Entrepreneurship level</td>
<td>Research infrastructure</td>
<td>Barriers to market</td>
</tr>
<tr>
<td>Education system</td>
<td>Standard of living</td>
<td>Investments in R &amp; D</td>
<td>Country Productivity</td>
<td>International capital flows</td>
</tr>
</tbody>
</table>

Systematic analysis was characterized by identifying factors of country competitiveness through the aspect of technology-intensive innovative enterprises and determining links between them and their groups.

3. Determination weight coefficients of factors’ groups of country competitiveness through the aspect of technology-intensive innovative enterprises
For determination of the importance country’s competitiveness through the aspect of technology-intensive innovative enterprises factors, a method of inter-comparison was applied. Thirty experts were selected for evaluation of country competitiveness factors groups weigh coefficients, activity of which is related with preparation and implementation of country competitiveness strategy in Lithuania. Experts rated the factors according to a five-point scale. The factor having the largest influence was scored 1 point and the least influential scored 5 points. If it was supposed that factors had equal influence on country competitiveness, they were scored using the same points.

Experts were questioned using a questionnaire (received by e-mail) or in person. Experts were questioned on April – May of 2014. Questionnaire data was processed and analyzed using SPSS 20 and Microsoft Excel. The coincidence of the opinions of experts participating in the questionnaire was evaluated using Kendall’s coefficient of concordance.

With reference to data of questionnaires of thirty experts, calculated weight coefficients of fundamental groups of factors country’s competitiveness of the technology-intensive innovative enterprises in Lithuania are presented in Table 2.

Table 2. Weight coefficients of fundamental groups of factors country’s competitiveness of the technology-intensive innovative enterprises in Lithuania

<table>
<thead>
<tr>
<th>Factor of country competitiveness</th>
<th>Weight coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Human capital</td>
<td></td>
</tr>
<tr>
<td>1.1. Education system</td>
<td>0.310</td>
</tr>
<tr>
<td>1.2. Qualification of population</td>
<td>0.690</td>
</tr>
<tr>
<td>2. Networking</td>
<td>0.210</td>
</tr>
<tr>
<td>2.1. Membership in networks, clusters</td>
<td>0.323</td>
</tr>
<tr>
<td>2.2. Mobility of students</td>
<td>0.677</td>
</tr>
<tr>
<td>3. Efficiency of policies</td>
<td></td>
</tr>
<tr>
<td>3.1. Business freedom</td>
<td>0.262</td>
</tr>
<tr>
<td>3.2. Entrepreneurship level</td>
<td>0.420</td>
</tr>
<tr>
<td>3.3. Standard of living</td>
<td>0.318</td>
</tr>
<tr>
<td>4. Innovative capacity of a country</td>
<td></td>
</tr>
<tr>
<td>4.1. Innovative, technology enterprises</td>
<td>0.523</td>
</tr>
<tr>
<td>4.2. Research infrastructure</td>
<td>0.421</td>
</tr>
<tr>
<td>4.3. Investments in R &amp; D</td>
<td>0.553</td>
</tr>
<tr>
<td>4.4. Country Productivity</td>
<td>0.362</td>
</tr>
<tr>
<td>5. Innovation level</td>
<td>0.243</td>
</tr>
<tr>
<td>5.1. Innovation outputs</td>
<td>0.207</td>
</tr>
<tr>
<td>5.2. Barriers to market</td>
<td>0.493</td>
</tr>
<tr>
<td>5.3. International capital flows</td>
<td>0.300</td>
</tr>
</tbody>
</table>

According to the results to common assessment of experts from Lithuania, the biggest influence on efficiency of country’s competitiveness through the aspect of technology-intensive innovative enterprises in Lithuania is exercised by the factors determining innovation level (0.243 points). Less important are the factors determining networking (0.210 points) and efficiency of policies (0.210 points). The least significant are the factors of human capital (0.147 points) and innovative capacity of a country (0.190 points).

Experts’ opinions regarding human capital conditions coincided weakly, though with statistical credibility. The greatest impact to country’s competitiveness through the aspect of technology-intensive innovative enterprises is made by the factors of qualification of population (0.690 points). The factors of education system were evaluated by experts weakly enough (0.310 points).

In the expert’s opinions, mobility of students (0.213 points) and membership in networks, clusters (0.323 points) has less influence on efficiency of country’s competitiveness of the technology-intensive innovative enterprises aspect. Between the factors of networking, the main factor of country competitiveness according to experts’ opinions is mobility of students (0.677 points).

Analyzing factors determining efficiency of policies, the most influential are the factors of entrepreneurship level (0.420 points) and standard of living (0.318 points). The least important factors determining country competitiveness are business freedom (0.262 points).

Analyzing factors determining country’s competitiveness through the aspect of technology-intensive innovative enterprises, the biggest influence to competitiveness efficiency according to experts is made by investments in R&D (0.553 points), innovative, technology enterprises (0.523 points), and less important factors determining country
competitiveness according to experts are research infrastructure (0.421 points) and country productivity (0.362 points).

Experts’ opinions regarding innovation level coincided weakly, though with statistical credibility. The biggest influences on country’s competitiveness through the aspect of technology-intensive innovative enterprises are the factors of barriers to market (0.493 points) and international capital flows (0, 3 points). Factors of innovation outputs (0.207 points) were evaluated by experts as less important.

Expert evaluation has proved the validity of assumption that factors of competitiveness have various impacts to country competitiveness through the aspect of Technology intensive Innovative Enterprises. Calculated weight coefficients of factors will help to analyze index of competitiveness reliability.

4. The determination of factors characterizing the index of country competitiveness through the aspect of technology-intensive innovative enterprises. The determination and rating their values.

The values of factors characterizing the index of country competitiveness through the aspect of technology-intensive innovative enterprises were determined. The factors of country competitiveness through the aspect of technology-intensive innovative enterprises must meet these requirements: relevancy, attainability, reliability, timeliness, and comparability.

57 indicators are intended to evaluate country competitiveness through the aspect of technology-intensive innovative enterprises: 7 indicators determine human capital factors, 8 indicators determine networking, 14 indicators of efficiency of policies, 17 indicators determine factors of innovative capacity of a country, and 12 indicators determine factors of innovation level of a country.

In this stage, factors’ values of competitiveness must be rated either. Country competitiveness through the aspect of technology-intensive innovative enterprises is a complex formation influenced by many factors and measurements. In order to compare different indexes, their values must be rated. Using quantitative and qualitative methods in calculating index of country competitiveness through the aspect of technology-intensive innovative enterprises creates conditions to achieve more precise valuating results.

Conclusions

The method of selection and consolidation into one total compatibility system of the factors of country’s competitiveness through the aspect of technology-intensive innovative enterprises allowed to determine the main factors of country’s competitiveness through the aspect of technology-intensive innovative enterprises and to group them according to their interrelations. The main factors of country’s competitiveness through the technology-intensive innovative enterprises aspect are determined in the formulated model of competitiveness of country’s competitiveness through the aspect of technology-intensive innovative enterprises and these factors are joined into the total compatibility system.

With reference to common assessment of experts from Lithuania the biggest influence on efficiency of country’s competitiveness through the aspect of technology-intensive innovative enterprises in Lithuania is done by the factors determining innovation level. Less important are the factors determining human capital and innovative capacity of a country.

Country’s competitiveness through the aspect of technology-intensive innovative enterprises index will be compiled using the methodological aspects described in this article. This index will support assessment of country’s competitiveness through the aspect of technology-intensive innovative enterprises in the Baltic Sea States. The results of further research will be published in other scientific articles.

Acknowledgements

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References