THE INFLUENCE OF INNOVATION ON INCREASING THE COMPETITIVENESS OF INDUSTRIAL ENTERPRISES

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Abstract

The article discusses and analyses some of the existing methods of measuring innovation and competitiveness, as well as the factors for their increasing. However, the lack of methodology of evaluation of the role of the innovations in increasing competitiveness makes it difficult to adopt an approach to analysis and assessment of this influence. Therefore the main goal of the author is to propose a set of methods that involve the use of objective models and appropriate means of analysis and assessment of innovation activity and its influence on industrial enterprises competitiveness.

Keywords: innovation, competitiveness, methods of analysis and assessment, factors and measures of competitiveness.

Introduction

The main goal of this article is, on the basis of the existing methodologies which measure and assess innovations, competitiveness and the factors for their increase, to propose a new complex methodology which involves the use of objective models and appropriate means of analysis and assessment of the interrelation between innovation and competitiveness.

In order to achieve her main goal, the author sets the following tasks: research and assessment of the situation of industrial enterprises and their innovation activity; establishing the level of innovation activity using NSI (National Statistical Institute) data; a selection of analytical-assessment indicators for the statistical categorization of industrial enterprises, making suggestions for stimulating the innovation activity of industrial enterprises as a prerequisite for the increasing of competitiveness.

The topicality of the studied problem is mainly connected with the following: the key importance of the industrial sector for the development of national economy; the great importance of innovation and competitiveness for the economic growth; the leading role of innovation activity for maintaining a high degree of adaptability of the enterprises to the dynamic changes in a highly competitive environment; the role of innovation in increasing competitiveness and building a competitive national economy.

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Analysis, assessment of the current state of innovation and discussion

The obvious relation between innovation and competitiveness necessitates the application of appropriate methods including the use of objective models and the appropriate means of analysis and assessment.

One of the first authors to discuss the role of innovations in the emergence of a new type of competitiveness, a more active one than price competitiveness is Schumpeter (1982, p. 146; 153; 277). The problem of the interrelation between innovations and competitiveness has been delved into by a number of other scholars, including Kraft and Kraftova, (2009, p.53-70), Raizberg (2008, c.35-39), Damyanov, Beluhova (2012, p. 191).

There are methods of assessing the innovation projects which are applied both in literature and in practice. Some authors use the dynamic methods, which are employed for assessing the investment projects, while others evaluate the possible alternatives of process innovations based on the expected economic results. Nedeva (2012, pp. 147-154), Yankova (2011, pp. 129-133). However, these methods are not connected with studying enterprises innovativeness.

It may be claimed that there are certain methods for measuring innovation and competitiveness, but there is no methodology for evaluating the role of innovations in raising competitiveness. This fact raises the question of the choice of a system of indicators for the analysis and assessment of this influence.

When characterizing innovation activity, we most frequently start from classifying the innovations as product, technological and organizational, which suggests assessment should include the following characteristics:

- Implementing products with new features;
- Using new technologies;
- Using new machines and equipment;
- Changes in the organization of production;
- Changes in staff qualifications.

The complex nature of innovation activity and the different aspects of innovation predetermine part of the difficulties connected with its objective measurement. As for the analysis and assessment of the state of the European and national parameters of innovation, there are developed methodologies and considerable regular research is carried out. A system of indicators of Research and Development Activities (RDA) is also maintained together with the site about innovation of the National Statistical Institute (NSI) and Eurostat. The following aspects are essential to conducting the research in this direction: the aggregate innovation index of the European Union
Innovation Scoreboard, which divides the countries in four groups according to the dynamics of innovations compared to the average level of the EU during the last year and gives an assessment based on several groups of indicators and the methodology of knowledge assessment, which includes 80 structural and quality indicators, covering the four economic concepts of knowledge. (http://ec.europa.eu/enterprise/policies).

Another assessment methodology takes into account the dynamics of the factors which influence innovativeness and the necessity of comparability of the data with regard to the selection of the key factors of this type. It uses the index method and includes determining a system of indexes, as follows: „Access to financing“, „Innovation activity“, „Good Practices“, „Internationalization“, „Activity regarding the intellectual property“. Simeonova-Ganeva, Vladimirov and team (2013).

The calculation of these indexes provides an opportunity to assess the innovation activity itself, as well as the factors for its increase. Simultaneously, these indexes also bear a relation to the competitiveness of the enterprises, therefore, they can be used with equal success in the assessment of the competitiveness, too.

The indexes described above allow the implementation of elements of descriptive statistics, frequency allocations, rank criteria for examination of the correlations between the individual factors and creating new adequate models of multiple linear regressions with the basic aim to access the impact of the factors involved in the indexes for innovation (ibid.).

Various methods are also applied in studying competitiveness. According to R. Dimitrova (2014, p. 157) „the problem of creating a measurement toolkit and the selection of methods of analysis and assessment of competitiveness of enterprises has not been adequately answered“. In order to characterize enterprise competitiveness, Mladen Velev suggests the following means of measurement: production competitiveness; labor productivity; financial results; growth of the enterprise; innovativeness; industrial and marketing flexibility; adaptability to the market. Velev (2004 pp. 74-75). It is clear that innovativeness is present as a component of this model. Some authors calculate product competitiveness against product analogues as a ratio between the evaluated product and the basic product, which is used for the comparison of the different parameters – technical (based on the operational parameters of the two products), economic (based on the price – the expenses and consumption of the two products) and finally an integral indicator of competitiveness is arrived at Donchev, Velev, Dimitrov (1998, pp. 267-270). In some methodologies, accounting and statistical bookkeeping indicators are used, as they measure the results of the enterprise activity or the level of the quality of the products. In others, the calculation of the competitiveness of the products is based on predeterminating the
needs of the potential buyers and assessing the degree of satisfaction, which they would get because of the quality of the new product of the enterprise, as compared with competitors’ products and afterwards an indicator is calculated by referring the value of each parameter of the real product to the value of the corresponding parameters of the hypothetical product, and an assessment of the economic parameters is also made. Marinov, Velev, Geraskova (2001, pp. 146-150).

Another possible method of assessing product competitiveness is based on the products’ life cycle in the sphere of consumption in the process of its usage. (ibid. pp. 150-153).

In M. Poter’s view (2000), national competitiveness is largely dependent on the potential of its industry for innovation and the technological development. When competitiveness is assessed, the model of M. Porter’s five forces driving competition is used – a direct competition among existing competitors, a threat of new entrants, the bargaining power of consumers, the bargaining power of suppliers, the impact of substitute products. Porter (2004, p. 59). What is also applied is the chainlike value model for assessment and projection of enterprise competitiveness, as well as a model of competition and key factors for the success of the enterprise, which is built on the basis of the hierarchy of the key factors for achieving a competitive advantage. Marinov, Velev, Geraskova (2001, pp. 155-158).

Some authors consider the quality of the product as the sole and most important indicator of corporate competitiveness. A complex index is also used and it measures the quality and competitiveness or a comparison is made with the best known practices or with the leading competitor.

**Methods of research**

It should be pointed out that the literary sources we have studied do not offer any methodology of studying the influence of innovations on raising competitiveness.

The methodological approach we have adopted to analyse and assess the state and level of the economic activity of the industrial enterprises enables us to compile a suitable measuring toolkit which includes a system of indicators that reveal the economic aspects and the statistical methods for their evaluation. That is why we believe that although it is appropriate and possible to add more indicators, this measuring toolkit is suitable and applicable, because this approach combines the study of the state of the industrial sector in Bulgaria, the level of innovation activity and the role of innovations in raising competitiveness. In this regard, we consider that empirical research should cover the following directions (Figure 1):
Fig. 1. Directions of empirical research

In accordance with the defined goals and tasks of the research in this field, we propose the following algorithm (Figure 2):

Each stage of the conducted research is distinguished by certain specifics regarding the particular approaches, the studied indicators and the methods of analysis and assessment.

In the framework of a questionnaire survey, carried out by the author, 126 industrial enterprises owners and managers from the Blagoevgrad region were interviewed over the period between 2006 and 2013. NSI’s classification was used. (Business Statistics, Multi-Domain Statistics, www.nsi.bg). The general analysis and conclusions that were made regarding the studied problems were based on these data.

The analysis of the assessment demonstrated that according to 27.8% of the interviewees between 40 and 60% of competitiveness is due to the innovations of the enterprises. The rest of the intervals received a lower percentage of affirmative answers – according to 24.6% of the interviewed between 20 and 40% of competitiveness results from innovations; 20.6% think that between 10 and 20% of it is determined by innovations; 15.1% of the respondents consider that between 60 and 80% are determined by the innovations and 11.9% point out that 80 – 100% of competitiveness depends on innovations.

We have applied the following analytical-evaluative indicators in order to statistically characterize the industrial sector and to reveal its state:

- Number and dynamics of industrial enterprises development in Bulgaria for the period under analysis;
- Distribution and dynamics of enterprise development according to the type of the economic activity;
- Distribution of the enterprises according to the economic activity and their size based on the people employed;
- Employment in the industrial sector in general and according to economic activities;
- Distribution of the sector enterprises in terms of regional location - regions to be planned;
- Financial – Economic Indicators: value of the fixed assets; operating expenses; operating income; output; turnover and added value – in general, according to the economic activities, according to the size of the enterprises.

These indicators provide an opportunity to characterize quantitatively the state of the industrial sector in a certain period of time and to establish the dynamics and trends in its development, and the financial indicators are essential for the characterization of the financial situation of the enterprises. The analyses of the financial-economic indicators, made generally for the industrial sector, based on the economic activities and according to the size of the enterprises, provide an opportunity to profile the industrial sector in all its aspects.
When the level of innovation activity of industrial enterprises is to be established, it is recommended to use official statistical information (e.g. from NSI) and to observe and define the values of the following indicators:

- Share of innovative enterprises out of the total number of enterprises in the industrial sector;
- Share of enterprises which have implemented new or improved products, innovative for the market out of the total number of enterprises;
- Share of the turnover, achieved by new or improved products, innovative to the market, out of the total turnover of the enterprises;
- Share of the turnover, achieved by new or improved products, innovative to the enterprise, but not to the market, out of the total turnover of the enterprises;
- Share of enterprises with cooperation in innovation out of the total number of the enterprises with technological innovations;
- Expenses for research and development activities in several sections (by type, sector, statistical region, financial sources, sector enterprises based on economic activities, enterprise size);
- Staff occupied with research and development activities in different sections (by category and gender, sector, statistical region, qualification degree, sector enterprises based on the economic activities, enterprise size, etc.).

In our survey, the analyses and assessment of innovation activity of the enterprises, studied by means of interviewing their managers and owners, are based on the issues defined in the research plan and the indicators emanating from them, as follows: Kalaydzhieva (2015).

- Existence of a strategy and plan for innovations and of an organizational system for innovation processes management;
- Existence of a relationship with other enterprises with a research profile and development of cooperative project solutions with other enterprises;
- Existence of highly qualified staff for the implementation of innovation activity;
- Implemented innovation projects;
- Type of the planned and implemented innovations;
- Number of the enterprises that make expenses related to the Research and Development Activity (R & D) and size of the expenses regarding the innovation activity;
- New products launched and integrated in the market;
- Analyses and assessment carried out in the enterprises regarding the innovation activity and assessment of the level of the innovation in the enterprise.
In order to examine the role of innovations in boosting competitiveness on the basis of statistical information, one can calculate the values of the following indicators revealing business trends in the industry and the level of competitiveness:

- Export expectations – this indicator is important to the analysis, because it shows the position of the enterprises and how their products are accepted on the international markets;
- Competitive domestic market position;
- Competitive EU market position;
- Competitive market position outside the EU.

Some other factors that are related to industrial enterprises competitiveness are: demand on the domestic and international markets, competitive imports, finance and economic environment, etc.

In our opinion the survey should cover the following areas:

- Competitors, market share and competitive advantages;
- Existence of strategies and plans for raising competitiveness;
- Customer analysis;
- Acceptance by customers and success of the new products on the market;
- Assessment of the ability of the enterprise to adapt to the market changes;
- Export, assessment of consumers’ demand for the new products and their success on the market; assessment of the ability of the enterprise to adapt to the market changes;
- Assessment of the level of innovation;
- Assessment of the level of competitiveness;
- Assessment of the role of innovation in increasing competitiveness;
- Assessment of the financial results of the enterprises.

When the role of innovation and innovation activity in raising competitiveness is to be assessed, it should be taken into consideration that innovation activity and competitiveness are a synthetic indicator combining in itself a number of enterprise achievements. Innovativeness is included as one of the many elements (indexes) for assessing competitiveness and the global index of competitiveness. This is the reason why the following two models of the influence of the innovations on competitiveness can be offered. The first one includes all the indexes and their mutual influence. (Figure. 3. Model 1):
Fig. 3. Model 1. Studying the impact of innovation on the competitiveness of industrial enterprises

The second model is oriented towards the assessment of the impact of individual indicators of the enterprise’s innovation activity on the innovation activity.

Fig. 4. Model 2. Influence of the indicators for enterprise activity and the index „Innovation activity“


In order to analyse the situation of the industrial sector, the state of its innovative activity and the role of innovations in the increasing of competitiveness the following statistical methods can be used:

- Grouping statistical data;
- Tabular and graphical method necessary for the graphic presentation of the statistical series;
- Method of comparison for whose effective implementation comparability of the data is provided;
- Determining the relative shares and average levels, comparative analysis of the relative shares of the enterprises of different economic activities, periods of development and location by basic indicators;
- Statistical examination of development and establishing the level of changes and the speed of development by calculating the rates of the growth;
- Statistical examination of the location of the studied phenomena;
- Statistical examination of dependencies.

In order to establish the impact of innovativeness on the increase in competitiveness, the methods of regression and correlation analysis are applied. Scientific literature does not present any methodology for measuring the influence of innovation on competitiveness. Regression and correlation analysis are applied as methods, which enables us to study and measure the relations and dependencies of correlational type and to establish the presence of statistically significant and logical connection between the studied phenomena. For a more detailed account of the methods see Nikolova (2010), Karashtranova (2010), Nikolova, Madgerova, Kyurova (2007), Madgerova, Kyurova (2009).

The methods of analysis and synthesis can also be applied in order to establish the situation and the possibilities for further development of the enterprises, their innovation activity and its impact on competitiveness.

The system of indexes and methods for assessment we have proposed and adopted are the reason to suggest the following algorithm for determining the influence of innovativeness on competitiveness (see Figure. 5).
Defining the purposes of analysis

Selecting levels and sources of analysis

Collecting information

From a survey
Determining the system of indexes
Determining the grade of the system of indexes
Selecting criteria and methods for analysis
Assessing the influence of the innovations on competitiveness

From NSI
Selecting indicators for analysis
Selecting criteria for analysis
Assessing the development of the innovation activity of the industrial enterprises

Directions for increasing the competitiveness of the industrial enterprises based on the innovations


Fig. 5. Flowchart of the algorithm for analyzing the influence of innovativeness on competitiveness
The suggested algorithm examines very important stages of evaluation of the relations between innovations and competitiveness, which are presented in their logical sequence and with all the necessary activities that should be performed at every stage. We believe that this algorithm provides an opportunity for performing an objective and accurate analysis of the influence of innovativeness on competitiveness.

**Conclusion**

The methodology that has been offered will make it possible to assist the qualitative assessment of the innovation activity of the enterprises and their relation to competitiveness.

The proposed methodology and the conducted survey led to the following conclusions and recommendations for the development of innovation activity as a prerequisite for the boost of competitiveness:

1. Attracting new strategical foreign investors and new majority owners.
2. Increasing the share of small and medium-sized enterprises, which are to be technologically and productively connected and cooperated with larger companies in various ways of association, mostly cluster.
3. More intensive undertaking of high technology and scientific products.
4. Strengthening the role of the state in the development of sector strategies and defining priority sectors. It follows that what should be aimed at is the uniqueness of the newly developed products depending on the geographical and climatic peculiarities, as well as the traditions and the anticipated European and world tendencies and priorities.
5. Introducing rapid and essential changes in relation to the human resources and their management in a high-technology economy and the industrial sector, training of highly qualified employees who are fit for the new economy.
6. A necessity to create conditions for the development of the most important factor conditions for competitiveness, such as information technologies, science and technology as a whole, education, infrastructure and logistics.
7. Promoting the scientific research and development activity while tightly binding its results with practice. To do this, it is necessary to apply effectively the model of Triple Xelix, which can provide a close interrelation of research, education and innovations, that is, putting in operation the Knowledge Triangle.
8. Adequate utilisation of European programmes funds, strengthening the role of the investment and innovation fund for attracting investors, creating a guarantee fund.
9. Deducting energy expenses and achieving a better energy effectiveness by implementing innovations in energy saving technologies.
10. Improving the export policy in the industry.
11. Providing an effective innovative management and creating the necessary innovation infrastructure.

The conclusions and recommendations listed above can be of use to managers when they need to make decisions regarding innovation activity and competitiveness of the industrial enterprises.

References