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## ІННОВАЦІЙНІ ТА ФІНАНСОВІ АСПЕКТИ УПРАВЛІННЯ ОРГАНІЗАЦІЯМИ. ФІНАНСОВО-ЕКОНОМІЧНА БЕЗПЕКА

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### DILEMMAS OF INNOVATIVENESS MEASUREMENT OF COMPANIES

*The aim of the following article to present the problems in measuring innovativeness of companies, which is the basis for assessment of the level innovativeness of countries and regions. In the article a thesis is presented, that measuring instruments of innovativeness of companies are constantly evolving and the measurement of innovativeness of companies is achieved with the help of wide range of indicators reflecting the complexity of innovative processes, factors which condition innovativeness of companies, and the effects of innovative activity. To reach this goal, cooperation between science and business as well as spreading the knowledge of the significance of innovations is necessary.*

*Key words: innovativeness of companies, measuring instruments of innovativeness of companies, problems in measuring innovativeness of companies.*

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### ДИЛЕМИ ВИМІРЮВАННЯ ІННОВАЦІЙНОСТІ ПІДПРИЄМСТВ

*Метою даної статті є представлення проблем вимірювання інноваційності бізнесу, що є основою визначення інноваційного рівня розвитку країн та регіонів. У статті також представлено тезу про те, що засоби вимірювання інновацій підприємств еволюціонують, а рівень інноваційності підприємств визначається за допомогою широкої гами показників, що відображають суму інноваційних процесів, показників, які обумовлюють інновації підприємств і ефекти інноваційної діяльності.*

*Ключові слова: бізнес-інновації, засоби вимірювання інноваційності підприємств, проблеми виміру інновацій у бізнесі.*

#### Introduction

Innovativeness, on account of its paramount importance for the development of companies, regions and countries, has become the goal of the world, EU and domestic economy and stays in the centre of interest of the science and business world. Among numerous definitions of innovativeness, the most frequently it is understood as the capability of companies (regions, countries) to generate, absorb, implement and diffuse innovations. Such approach means that innovations can be the result of work of the companies themselves. However, they can be absorbed from outside in the form of e.g. purchase of new solutions, licences, know-how. Moreover, the above definition indicates that nowadays innovations are more and more frequently the effect of cooperation of numerous companies and require the exchange of knowledge, experience, and other material and non-material resources between companies [3, 4].

The increasing role of innovativeness implies the need for quantification on various levels: company, region and country. Since the beginning of the previous century, there has been a constant search for measuring instruments of innovativeness which would be the most accurate in reflecting the complexity of innovative processes [5, 6]. This article focuses on the measuring instruments of the level of innovativeness of companies, which is the basis for assessment of the level of innovativeness of regions and countries.

#### Measuring instruments and problems in measuring of the level of innovativeness of companies

Criteria used for measuring the level of innovativeness of companies can be aggregated into three basic groups: (1) expenditure of companies on innovative activity, (2) effects of innovative activity and (3) indicators characterising innovative processes. Among the expenses on innovative activity, expenditures on research and development activity, purchase of technologies, tools, software, training and education of employees should be distinguished. The most commonly used measuring instruments of effects include: the selling value of new and perfected products, the share of high technology products in export, the share of novelty in the total sale, the amount of profits from the sale of innovative products, the number of pending patents, the number of registered industrial designs, utility models, trademarks, the number of publications and quotations.

Despite equating innovativeness with ability to introduce innovativeness, in research practice, while assessing innovativeness of companies, what is taken into account is, first of all, the effects of innovative activity, including the number of implemented product, process, marketing and organisation innovations. In addition, there is information regarding the level of novelty of implemented innovations: newness in the scale of a region, a country, the world. In empirical research measuring instrument of innovativeness of companies is relatively commonly used in the form of share of income from the sale of innovation in the total sale, as well as the number of pending patents. Obviously, having a patent does not always indicate implementing the innovation. However, it is related with the development of intellectual property.

Currently, innovations are the effect of cooperation of many subjects, exchange of information, possessed resources. That is why, apart from enumerated above indicators of “in” and “out” for measuring the level of innovativeness of companies, measuring instruments are used which characterise the processes of innovativeness, including cooperation of companies with other subjects during realisation of innovative enterprises, especially affiliation to clusters.

E. Milbergs and N. Vonortas listed four generations of indicators of innovativeness corresponding with individual concepts of innovation model [7]:

- indicators of first generation (1950's-1960's) referring to linear model and expenditures especially on research and development activity,
- indicators of second generation (1970's-1980's) based on connected models, supplementing the expenditures with indirect results, including the number of patents, scientific publications, the number of new products and processes,
- indicators of third generation (90's.) based on research results and public statistics data (system model),
- combined indicators of fourth generation (years after 2000) including knowledge, networking and conditions for innovations, which not only describe the system of innovation but also anticipate the development possibilities. Works on the indicators of fourth generation are still in progress.

Consulting companies develop their own rankings of the most innovative companies based on extended methodologies of measurement of innovativeness. Every year, Boston Consulting Group publishes its own ranking. In 2016 the positions of the most innovative companies were taken by: Apple, Google, Tesla, Microsoft and Amazon [9].

The methodology of measuring of the level of innovativeness of companies is presented in detail in Oslo Manual prepared by OECD and Eurostat [8]. Within public statistics, since 1993, initially every four years, nowadays biennially, Community Innovation Survey (CIS) has been conducted, which is used for assessment of innovativeness of companies and is the basis for measuring the innovativeness of countries (Research conducted according to Oslo Manual methodology. It is conducted in companies employing more than 9 people and it includes the countries of the European Union, Switzerland, Turkey, Australia, Russia, New Zealand, Latin American countries, South Korea, Republic of South Africa). Based on the CIS survey results, the share of innovative companies in total number of companies is calculated, as well as the percentage of companies implementing individual types of innovations, the amount of expenditures on innovations, the percentage of companies which establish innovative cooperation with other subjects, and a number of other indicators. Public surveys were initially conducted among industrial companies and referred only to technological innovations (product and process innovations). Currently, the surveys are extended by service sector, and apart from technological innovations, organisational and marketing innovations are taken into account.

In Poland, within the international research program Community Innovation Survey, all industrial companies with 50 or more employees and a representative sample of industrial companies with 10-49 employees (reports PNT-02) and service providing companies with more than 9 employees (reports PNT-02/u) [2].

According to Oslo methodology, Central Statistical Office (GUS) distinguishes companies conducting innovative activity and companies innovatively active. Innovative activity of companies is a very broad notion and signifies the engagement of companies in science, technical, organisational, financial and commercial activities, whose aim is to implement innovations. The actions do not need to be characterised by innovativeness, although they are necessary for implementing innovativeness. Innovative activity includes, among others, research and development activity which is not directly connected with creating a specific innovation. Therefore, innovative activity of a company needs to be of the following nature: (1) activity ended in implementing an innovation, (2) activity during realisation, (3) activity ceased before implementing an innovation. On the other hand, according to GUS definition, innovative company in the scope of product and process innovations can be called a company which during the examined three years introduced into the market at least one product or process innovation (new or significantly improved product or new or significantly improved process).

However, a company can be considered innovatively active if in the examined period it introduced at least one product or process innovation or realised at least one innovative project, which was interrupted or ceased, or it is continued [2].

According to Oslo Manual a company is innovative if in the examined period it introduce a product, process, organisational or marketing innovation. Unfortunately, considerable part of entrepreneurs associates innovations with technological changes and do not take into account marketing and organisational innovations. As a result, the research on innovativeness of companies is affected by an error, and actual innovativeness of Polish companies is higher than it appears from the research conducted by GUS.

Generally, research on innovativeness of companies belongs to the group of difficult research. The respondents should be chosen from higher management, directors, presidents and owners of the companies. The mentioned people have suitable knowledge of the processes taking place in the company.

Entrepreneurs reluctantly share information on the expenditures on research and development, and until 2015 tax regulations additionally stimulated companies not to reveal their expenditures [1]. There are also problems in estimating the amount of some expenditures on innovative activity. What is also important, is the subjectivism of assessment of examined features (including e.g. the level of novelty of an innovation) by the entrepreneurs.

While assessing the level of organisational innovativeness it is recommended to confront the received results with self-assessment of the level of innovativeness of companies done by the entrepreneurs. Another problem arises at this point – the respondents are often incapable of doing such self-assessment. The results of the research conducted by the author using the Computer Assisted Telephone Interview (CATI) method on the sample of 265 small, medium and big companies from the Kuyavian-Pomeranian Voivodeship show that 20,3% of respondents lack the knowledge of the level of innovativeness of companies where they take executive positions and gave the “I cannot assess the level of innovativeness of the company” response. The situation in companies from the Silesian Voivodeship looks only slightly better. From the group of 259 of the examined companies, 17,7% of respondents were not able to self-assess the level of innovativeness of their companies. It indicates that part of the executive staff does not appreciate the significance of innovativeness in building competitive advantage and lacks sufficient knowledge of the significance of innovation in economic development. There is a constant need to increase the managers’ innovative awareness, whereas conducting research on large representative samples of companies allows for decreasing the measurement errors.

### Summary

Measurement of innovativeness of companies is conducted with numerous measuring instruments reflecting expenditures of companies on innovative activity, complex innovative processes, and results from innovative activity. There is no one perfect indicator reflecting innovativeness of companies, and using every measuring instrument is affected by an error. Simultaneously, along with evolution of innovative process models, instruments used for measuring the level of innovativeness of companies are changed and developed.

Deficiencies of measurement of innovativeness of companies result also from subjectivism of entrepreneurs’ assessment, as well as their reluctance to reveal some of the data. Of great importance are the difficulties in assessing parts of expenditures on innovations. Significant part of surveyed entrepreneurs is unable to self-assess the level of innovativeness of companies, which requires broadening the knowledge of significance of innovation.

The mentioned problems related to measuring innovativeness do not change the fact that there is the need to search for instruments of measuring innovativeness which reflect the complexity of relations between factor which determine innovativeness, complicated innovative processes, and diversity of effects of innovative activity. To reach this goal, cooperation between science and business as well as spreading the knowledge of the significance of innovations are necessary.

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