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Main Concepts of Technology Analysis in the Light of the Literature on the Subject

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Abstract

The main aim of this article is to identify and present the relevant concepts and methods of technology analysis. On the basis of the bibliometric analysis of scientific articles, research subareas related to the technology analysis were selected. Relationships between earlier executed researches in this field were determined. Taking into account the obtained map of relationships, the possibility of the use of technology analysis was indicated. Also, methods used to analyse the current state of technology and concepts used for the prospective technology analysis were identified. Then, the concepts of predicting the technology development were discussed and compared. The conclusions from the conducted study can be used as the basis for determining the critical directions for the development of research areas related to the technology analysis.

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Keywords: technology analysis; forecasting; foresight; technology assessment; Future-oriented Technology Analysis

1. Introduction

Innovative technologies increasingly determine the competitive advantage of enterprises. They are also the basis of the modern manufacturing processes, making meeting the needs of the society possible. Awareness of the need to develop the technology became widespread, as evidenced by international and national programs supporting the development of technology, research institutes and R&D. In the situation of an increasing demand for innovative technologies and broad technologies' trading market, the use of specific methods allowing the effective technology analysis seems necessary.

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In both the domestic and foreign literature, no clear definition of technology analysis was given. It was noted that most commonly the technology analysis is understood as a study/examination of technologies, taking into account economic, technical, social and environmental factors. Both single technology and technology groups can be analysed. The purpose of the technology analysis, among other things, is to characterize and examine the used technologies, design their potential and determine their direction of development [1]. The technology analysis enables the identification of the strengths and weaknesses of the enterprise technological activities, designation of capabilities to increase competitive advantage by enterprises through the appropriate utilization of the used technologies, as well as identification of the available technologies that the company could employ, in order to improve their products and processes.

2. Identification of the research subareas related to the technology analysis

In order to identify the subareas and to establish relationships between the hitherto conducted studies on the technology analysis, an extensive bibliometric analysis was carried out. Initially, the dynamics of change of the number of publications in the studied period was evaluated. Then, to identify areas of research for the analysis of the technology the co-word analysis and cluster analysis method was used. A review of publications in the Scopus base was made. The choice of the bibliographic database was dictated by its extensiveness and availability. The database search was performed using the term "technology analysis" contained in the keywords, titles and summaries.

Over the last thirty years (from 1985 to 2015) 954 publications indexed in the Scopus were created, including 494 articles, 455 conference publications (conference paper) and 5 books containing the phrase "technology analysis" in the searched fields. The number of publications in the Scopus database related to the technology analysis is illustrated in Fig. 1. Analysing the figure, it can be observed that initially – for the first twenty years – interest in this issue was not significant. Until 2005, annually no more than 20 articles in this field were published. Only since 2005 the interest in the issues connected to the technology analysis clearly rises, which is reflected in the number of publications in the Scopus base.

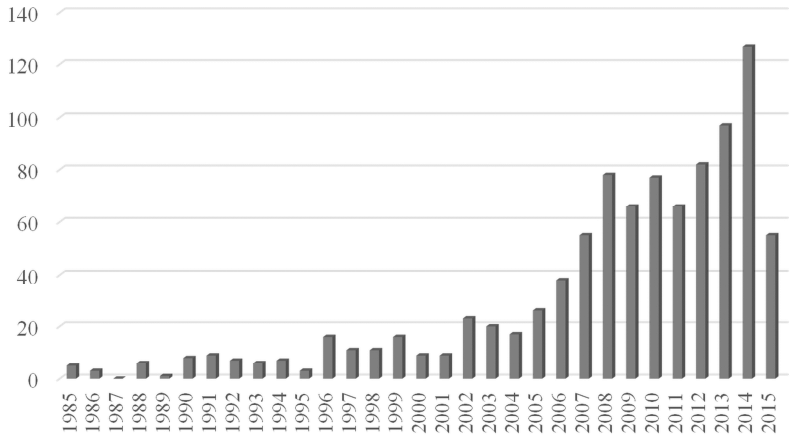

Fig. 1. The number of publications on the analysis technology in the Scopus database in the years 1985-2015.

The largest number of publications on the technology analysis has been published in such magazines as "Advanced Materials Research" (35 articles), "Applied Mechanics and Materials" (34 articles), "Proceedings of SPIE the International Society for Optical Engineering" (18 articles) and "Technological Forecasting and Social Change" (16 articles) and "Technology Analysis and Strategic Management" (11 articles).

The identified publications were analysed in terms of subject area (Fig. 2). More than half of the identified publications relates to the field of engineering. Often they mention the problem of identification, modification and maintenance of the enterprise core – profitable – technologies. Other articles related to such disciplines as medicine, biochemistry, genetics and biology, physics and astronomy, mathematics.