



7th International Conference on Engineering, Project, and Production Management

Decision Support System in the Area of Generating Innovative Research Projects of the Future

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Abstract

The paper presents examples of attempts undertaken by scholars and practitioners to combine the foresight methodology with other tools aimed at supporting the decision-making processes. Against this background, the paper describes the author's proposal of a system combining the foresight methodology, technology assessment, and intellectual capital measurement. The system is aimed at generating research projects of the future, characterised by a high innovativeness level and a significant commercial potential, to be executed at R&D organisations and at enterprises, for which a necessary potential is available.

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Peer-review under responsibility of the organizing committee of EPPM2016

Keywords: decision making; foresight; innovation; intellectual capital measurement; technology assessment

1. Introduction

The determining and shaping of R&D priorities of the future seems to become more and more indispensable for effective investment in science and new technologies. Along the increased cost of scientific and technological development, the role of innovations grew [1–3] and new models for their implementation were developed, which led to the emergence of the need for the application of tools for the early identification of change tendencies and the indication of possible opportunities the science and technology development may bring. Therefore, both R&D organisations and enterprises should be equipped with the appropriate tools supporting the identification of the directions of the future development of the advanced technologies, because they would help them increase the level

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of their competitiveness and innovation performance. Foresight constitutes a very effective tool ensuring the achievement of such objectives.

2. Research methodology

The genesis of the undertaken research consists in the need for effective support for the decision-making processes concerning the generation of innovative research projects of the future. The undertaken research is based on the author's knowledge and practical experience in the fields of applying foresight methods, analysing research potential, and conducting technology assessment. First, the author carried out the analysis of foresight exercises with respect to the methods applied for the needs of effective support for decision-making processes. The search comprised theoretical solutions described by scholars in foresight-related literature and examples of their application in practice. Next, taking into account the current approach of searching for improved or new foresight methods, the author analysed the literature with respect to combining foresight methods with methods applied in other research fields. Again, the author searched for existing approaches and new ideas developed both by scholars in theory and applied in practice. One of the approaches consists in combining foresight with technology assessment (TA). The author looked for such examples and analysed a wide range of TA methods.

The next stage of the analyses comprised methods applied within foresight exercises for the assessment of the existing and future R&D potential. Having in mind the drawbacks of the methods currently applied in foresight exercises, the author proposed to apply IC (intellectual capital) measurement. The proposal was made after an in-depth analysis of examples of applying IC measurement in enterprises, at universities, and at research organisations, and an analysis of the possibilities of incorporating IC measurement methods in foresight exercises for the needs of assessing the research organisation potential.

Against the conducted literature analysis and taking into account own experience, the author proposed an original system supporting the process of the generation of research projects of the future in the field of technical innovations. The system combines technology foresight, intellectual capital measurement, and technology assessment methods.

3. State of the art

Faced with global changes, R&D institutions and enterprises need to be more future-oriented [1], and what helps them to enhance the decision-making process is the use of foresight methodologies and tools [4] which, to some extent, helps the organisations to anticipate possible opportunities and challenges and then to cope with them, with anticipating changes being strategically a far better situation than reacting to them [5].

Foresight methodology is used for the exploration, creation and verification of possible and desired visions of the future to support the decision-making process. In practice, it is frequently used for the generation of research directions of the future. Scholars and practitioners indicate that foresight is a tool commonly used by policy makers and managers to support individual, institutional, and global decision-making processes, and those concerning innovation [1, 6–8]. In reality, many enterprises employ foresight in strategic management [9]. However, some authors notice [1] that foresight tools remain very traditional and need to be modified to be more effective and to meet the requirements of the modern economy. The search for improved or new foresight methods stems from socio-economic changes [10, 11] and new non-linear innovation models [12] that require a more participatory and systemic approach to foresight itself [13]. New foresight methods and tools, particularly those focused on the notion of quality [14], are a must nowadays [15].

One of the foresight approaches postulates combining foresight methodology with methods like technology assessment (TA), [16, 17] or evaluation. Though these methods usually overlap and supplement one another, scientists still treat them as entirely separate notions [18], even though, in industrial practice, these three concepts have already been combined [18], particularly as far as strategies aimed at the assessment of new and commercially attractive technologies are concerned [19].

Generally, the integration of foresight, technology assessment and evaluation methods is still not a common practice; however, it is met with growing interest by decision-makers. Few examples of their practical application include, e.g., the German “Technology at the Threshold of the 21st Century” [20] foresight project in which technology assessment was used, the British foresight project concerning the use of asbestos in civil engineering [21], which employed technology assessment and evaluation methods, or the Polish regional foresight project [22] within

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