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COMMERCIAL POTENTIAL ORIENTED EVALUATION OF INNOVATIVE PRODUCTS

Key words

Commercial potential, evaluation, procedure of the commercial potential assessment, technical innovations, technology transfer.

Abstract

The paper presents a commercial potential method to be used for the assessment of technical innovations. The method is an element of the evaluation system in the “Innovative Systems of Technical Support for Sustainable Development of Economy” Strategic Research Programme. The tool developed aims at the support of the management processes in the area of technical innovations. The commercial potential method can be used at all stages of the innovation development process, i.e. the concept stage, the development stage, and the final product stage, but also some years after the development of the solution. The use of the commercial potential method can contribute to the improved efficiency and effectiveness of the innovation implementation process.

Introduction

In order to obtain products of high quality, which correspond with the social needs, it is necessary to systematically evaluate them at all stages of their development. The existing instruments, despite their diversity, i.e. funds, capital support instruments, infrastructure instruments, e.g. technological parks, legal

rules [1], do not ensure sufficient support for the implementation and the commercialisation of innovations. The development of scientific research in areas that do not guarantee that the innovation will find commercial application are partly responsible for the unsatisfactory level of the commercialisation of research results [2]. Another reason for this situation is the lack of a verification for the developed solutions (especially at the planning phase of the research), which is a low level of innovativeness or marketability of new products compared to those products that are already available on the market. From the point of view of a researcher, the developed solution can be innovative in comparison to the current achievements of science and technology (cognitive innovativeness), whereas the market innovativeness is related to solutions introduced to the market. A product, which is innovative from the scientific point of view, will not always constitute a market innovation, understood as a new way of fulfilling the needs of future users [3].

The impact of negative factors on the efficiency of the commercialisation process can be limited due to the application of a systematic approach based on the advanced methods of analysis, among which the following can be used: the product commercial potential assessment method and a systematic evaluation of the product market opportunity conducted at the consecutive stages of a product development process (from the concept stage, through industrial implementation and product sustenance) (see Figure 1) [4].

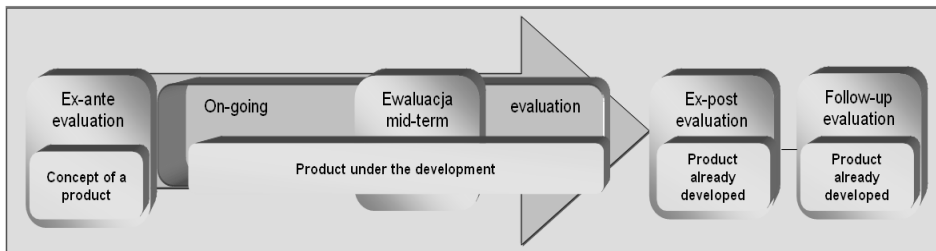


Fig. 1. The assessment of the commercial potential at different stages of the evaluation of a technical innovation

Source: Łopacińska L.: Model procesu ewaluacji strategicznych programów badawczych w obszarze innowacji technicznych (thesis under development), 2012.

Moreover, the results of the commercial potential assessment achieved, at the end of the product development tasks or even some years later (*ex-post*, *follow-up*), can be the basis for the generation of new research projects and the conduction of the *ex-ante* evaluation for new technical innovation ideas.

The evaluation of R&D undertakings, including a complex product assessment at all stages of its development, is of significant importance in the case of strategic research programmes, which require high funding; therefore, it

is necessary to evaluate innovative solutions very precisely, especially with the commercial potential assessment of the solutions taken into account.

The state-of-the-art [5–8] indicated that the methods used in the evaluation of strategic research programmes neglect many significant aspects concerning, i.e., the market demand for the solution and potential benefits the products may bring their producers and users, the areas of product industrial application, competitive products existing on the market, or IPR protection. The evaluation methods of strategic research programmes mostly include direct interviews, statistical analysis, expert panels, workshops, etc. In the opinion of the authors, such methods can be called “standard” methods, since they are used in the evaluation of individual research projects [9]. With regards to the evaluation of the market, technological or economic aspects, intuitive methods and methods applied in strategic management are often used (i.e. scoring, SWOT, portfolio method, benchmarking) due to the lack of advanced methods for the commercial potential assessment [10].

The publications present few examples of commercial potential methods for individual research projects. Integrated subjective expert methods for product commercial potential assessment [11, 12] and the commercial potential assessment based on computer information analysis methods were identified [13, 14].

The methods most frequently used for the assessment of the commercial potential of new technologies include the *Quicklook* and the *In-Depth* [10] methods, developed by the University of Texas at Austin. The first enables a quick assessment of a new solution, and the second one allows for an in-depth analysis of a solution with the chances and threats related to the commercialisation process taken into account [15]. The importance of the commercial potential assessment is highlighted in strategic governmental documents [16–19] and in scientific documents [20–24], which pay attention to the aspect of the effectiveness of the transfer of innovative solutions to the economy. Therefore, this paper presents the problem of increasing the effectiveness of product implementation and commercialisation through its systematic evaluation with the use of, among others, an original method for the assessment of the commercial potential of technical innovations.

1. Assumptions for the commercial potential assessment method

The commercial potential assessment method was developed for the needs of the evaluation of innovative solutions, in which the following categories of products are distinguished: systems, technologies, materials and devices. Once the commonly available definitions of these categories were analysed [25–32], they were then adopted to the needs of the aforementioned original commercial potential assessment method. The following definitions were selected:

- Systems – physical or abstract structures, within which interconnected elements executing primary functions can be distinguished,
- Technologies – product manufacturing processes,
- Materials – raw or processed materials from which products are made,
- Devices – technical objects enabling the execution of a given process or a set of tasks, e.g. energy conversion, mechanical work, data processing etc.

This method enables a detailed assessment of the commercial potential at different stages of a product development process, starting from the concept phase until the implementation and the commercialisation of the product, understood as “*a set of formal, organisational, technical and economic activities related to the access to the IPR of the product or new knowledge, of technical or organisational character*” [33].

2. The procedure of the commercial potential assessment method for novel technical products

The development of the method was a three stage process. The first phase concerned the selection of assessment areas important for the commercial potential of a product. In order to do this, an expert panel method was used. The experts proposed four areas of assessment: technological, market, economic, legal and organisational.

The *technological area* included the criteria linked to technical and technological aspects of products, e.g. the technology readiness level, the product originality level, the product safety level, the possible environmental harm connected with the use of the product, etc.

The *market area* included the criteria enabling the assessment of such information as the market demand for a product, a unique or a mass character of a product, etc. A very important element of the assessment is the analysis of competitive solutions already existing on the market, the market opportunity of new products, and the indication if and to what extent the product is compatible with the needs of the society and what is its availability.

The assessment of the *economic area* is related to the following aspects: funding that is necessary for the development of a product, the cost-effectiveness of production, the dissemination costs, the IPR protection costs, the price of a proposed product in comparison with the price of similar products existing on the market, the level of the income, and the user benefits.

Moreover, within the economic assessment, the authors proposed the conduction of a facultative financial analysis including, i.e., the production costs, current costs, purchase costs, and the benefits coming from the usage of a product.

The *legal and organisational area* includes the criteria related to, i.e., the IPR protection, the possibilities of the imitation of a product by third parties,

and the dependence between the implementation of a product and the changes of legal rules. The significant criteria of this area also include the assessment of the strategies for the introduction of a product to the market and the application for certificates and permissions.

For all assessment areas, 40 criteria, in the form of closed control questions, were proposed.

The second phase of the development of the commercial potential assessment method was the selection of the key criteria with the use of the matrix of direct influences and the MIC-MAC methods. The examples of the key criteria include the following:

- the level of the market demand for a product;
- the potential number of beneficiaries, who will be able to acquire the product;
- the number of areas in which the product can be used;
- the price of a product in comparison with the prices of similar products; and,
- potential user's benefits.

The experts verified the criteria and then established weights for the key as well as the additional criteria. Considering the different impact of the criteria on the commercial potential of a product, the experts assigned weights from 5 to 1. The higher the weight, the greater the role of the criterion for the assessment of a product. Weights 5 and 4 were reserved for the key criteria, whereas weight 1 was the least significant for the criterion. Next, the marks were proposed, depending on the criteria:

- 0–16 scale for the criteria with weights 4–5; and,
- 0–4 scale for the criteria with weights 1–3.

In order to interpret the assessment results, after their transformation into the percentage values (%), the following ranges were accepted:

- 88–100 – very high commercial potential,
- 76–87 – high commercial potential,
- 64–75 – average commercial potential,
- 52–63 – low commercial potential, and
- 40–51 – very low commercial potential.

The higher the result, the lower is the risk of unsuccessful industrial implementation or commercialisation of a product.

It was assumed that the assessment of the commercial potential would be conducted by a team of experts specialising in a given R&D areas, the authors of the evaluation methodology or even marketing specialists and the lawyers, with the use of the IT system developed particularly for this purpose.

The application of the methodology developed allows for the verification of the level of the commercial potential of technical products at different stages of their development. Moreover, the method enables comparative analysis of all

achieved results. Such analyses are an indispensable element of the commercial potential assessment, because the time factor significantly influences the changes in the commercial potential of a product.

Additionally, a systematic evaluation of technical innovations supports the management process of strategic research programmes through the indication of possibilities of further steps related to the product assessed, i.e., on the development of a product, and the continuation or the termination of works in the case of the low or a lack of the commercial potential.

3. IT system

The IT system for the commercial potential assessment of innovative solution was designed. The user interface was designed in form of an Internet application (see Figure 2). The system uses some data, e.g. from the implementation maturity assessment system (SDW) developed in the Institute for Sustainable Technologies – National Research Institute in Radom [34].

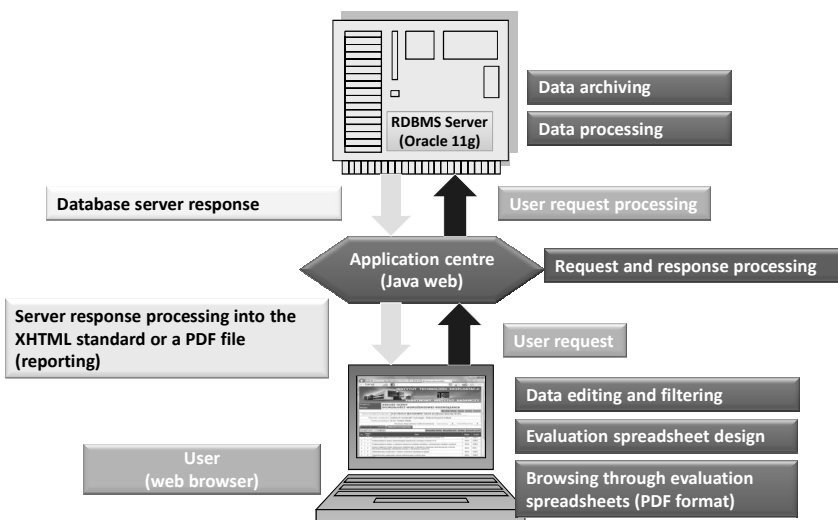


Fig. 2. IT system supporting the conduction of the commercial potential assessment of technical solutions

Source: Authors.

The developed IT system enables the assessment of the commercial potential of innovative technical products. The programme automatically saves the results in its database. After some time, it is possible to assess the product again and to compare the results achieved. The comparative analysis enables verification of whether the commercial potential of a product increases, decreases, or remains the same (see Figure 3).

Przejdź do ...		System Oceny Rozwiązań Innowacyjnych. Moduł oceny potencjału komercyjnego.				
Wymogi		ARKUSZ OCENY PRODUKTU				
		<input type="button" value="Wycofaj zmiany"/> <input type="button" value="Zapisz"/> <input type="button" value="Drukuj"/> <input type="button" value="Powrót"/>				
Nazwa produktu/rozwiązania:	Stanowisko laboratoryjne do badania procesów filtracji					
Rodzaj produktu/rozwiązania:	U3 - Aparatura badawcza i testowa					
Właściele rozwiązania:	Instytut Technologii Eksploatacji - Państwowy Instytut Badawczy					
Osoba prowadząca:	dr inż. Marian Grądkowski					
Potencjał komercyjny:	Liczba punktów	438	Wskaźnik procentowy	33,08%	Zespół oceniający	
<div style="border: 1px solid black; padding: 2px;"> ▼ </div>						
Obszar technologiczny		Obszar rynkowy		Obszar ekonomiczny		
				Obszar prawno-organ.		
Lp.	Kryterium	Ocena		Waga	Wynik	Komentarz
1.	Unikatowość rozwiązania w skali kraju	<input type="checkbox"/> 1 (niska)	4	36	Czy istnieją podobne rozwiązania na rynku	
		<input type="checkbox"/> 4 (średnia)				
		<input checked="" type="checkbox"/> 9 (wysoka)				
		<input type="checkbox"/> 16 (bardzo wysoka)				
2.	Poziom innowacyjności rozwiązania w skali kraju	<input type="checkbox"/> 1 (niski)	4	36	Czy rozwiązanie posiada cechy oryginalne w stosunku do innych istniejących na rynku	
		<input type="checkbox"/> 4 (średni)				
		<input checked="" type="checkbox"/> 9 (wysoki)				
		<input type="checkbox"/> 16 (bardzo wysoki)				
3.	Poziom funkcjonalności rozwiązania w stosunku do rozwiązań analogicznych lub zbliżonych	<input type="checkbox"/> 1 (niższy)	4	36	Jakie funkcje realizuje rozwiązanie w stosunku do innych rozwiązań	
		<input type="checkbox"/> 4 (równorzędny)				
		<input checked="" type="checkbox"/> 9 (wyższy)				
		<input type="checkbox"/> 16 (dominujący)				

Fig. 3. The example of the IT system application for the assessment of the commercial potential of an innovative product

Source: Authors.

The generated assessment sheet can be printed from the database in a report form and can be saved in PDF format.

Conclusions

The developed method for the commercial potential assessment enables the identification of chances and threats within the implementation and the commercialisation of innovative solutions to economy. It is a tool supporting the decision making process for organisations executing strategic research programmes concerning the continuation or the termination of works in the case when the result of the assessment indicates the lack or the low level of the commercial potential. Additionally, the results of the commercial potential assessment can be used for a basis of the *ex-ante* evaluation of new research projects through the indication, which research directions should be continued or given up.

The effectiveness of the commercial potential method was verified with regards to about 150 innovative technical products in “Innovative Systems of Technical Support for Sustainable Development of Economy” Strategic Research Programme.

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Reviewer:

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Ewaluacja rozwiązań innowacyjnych z uwzględnieniem metody oceny potencjału komercyjnego

Słowa kluczowe

Potencjał komercyjny, ewaluacja, algorytm oceny potencjału komercyjnego, innowacje techniczne, transfer technologii.

Streszczenie

W artykule zaprezentowano metodę oceny potencjału komercyjnego innowacyjnych rozwiązań technicznych, stanowiącą element systemu ewaluacji Programu Strategicznego pn. „Innowacyjne systemy wspomaganie technicznego zrównoważonego rozwoju gospodarki”. Opracowane narzędzie wspomaga procesy zarządzania w odniesieniu do innowacji technicznych. Metoda oceny potencjału komercyjnego może być wykorzystana na wszystkich etapach powstawania innowacji, tj. na etapie koncepcji, w trakcie opracowania rozwiązania, w momencie uzyskania gotowego produktu, ale również w kilkuletnim okresie po zakończeniu prac nad rozwiązaniem. Wykorzystanie metody oceny potencjału komercyjnego może przyczynić się do wzrostu innowacyjności i konkurencyjności gospodarki poprzez zwiększenie efektywności i skuteczności wdrożenia rozwiązań innowacyjnych do gospodarki.