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Technology Transfer Barriers and Challenges Faced by R&D Organisations

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Abstract

The paper presents the definition and classifications of barriers in the field of innovation activity. As opposed to the literature background, the authors propose their own classification of technology transfer barriers comprising the following: (1) technical, (2) organisational-economic, and (3) system barriers. Taking into account the barriers analysed in literature and our own experience in research projects execution and co-operation with industry, the authors present barriers that they met in practice in the period of several years of conducting research and implementation activity. Examples of technology transfer processes hampered by the influence of different types of barriers encountered in practice by a Polish research organisation (Institute for Sustainable Technologies – National Research Institute – ITeE-PIB) in the area of developing innovative technologies have also been illustrated.

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1. Introduction

Transfer of innovations is affected by numerous barriers understood as “any kind of limitations and features that hamper the effective functioning of a technology transfer and research commercialisation system, and, as a result, block interactions between the R&D sector and enterprises, therefore impeding the development of innovative entrepreneurship” [1]. Taking into account the importance of the problem from the scientific and practical points of view, the application of technological innovations is acknowledged as a driver for economic and social development.

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The topic of barriers concerning technology transfer, because of its importance for the economy, is a field of interest for numerous scholars and practitioners. The first studies on barriers to the successful movement of technologies from scientific organisation to industry can be found in the 1950s and 1960s [2], but the majority of early publications on this issue actually date back to the 1970s and 1980s [3–5]. One of the very first researchers to deal with this complex issue was Jung [4], who mainly focused on human and organisational barriers to the successful transfer of technologies. Most authors concentrate on the relation between barriers and the socio-political and economic situation of a given country, and their analyses typically concern only a particular domain [6–8].

The topic has also found wide coverage in Polish literature [1, 9–13]. Polish scholars and practitioners take the specificity of the Polish economy into consideration and analyse the barriers both on the macro – national level and less often on the micro level – namely on the level of an R&D organisation.

2. Research methodology

The genesis of the undertaken research stemmed from the need encountered in practice by R&D organisations involved in the development and implementation of innovations, which arises from the necessity of recognising technology transfer barriers and limiting or overcoming them. These problems have been observed and tackled in practice by the authors of the paper in the course of their many years of experience in conducting research projects, co-operation with industry, and the implementation of research results into practice. The authors were also involved in research projects devoted to the problems of effective support for the processes of technology generation [14], development, and commercialisation.

Taking into account our own practical experience and understanding the importance for the economy of overcoming technology transfer barrier, the authors of the paper conducted in-depth analyses of the literature in the field comprising definitions and classifications of technology transfer barriers, examples of barriers, and ideas how to overcome or limit them. The literature is rich; however, it is mainly focused on indicating barriers and proposing ways of overcoming them on the macro level with less emphasis paid to the ways they can be effectively hampered with reference to concrete operational barriers. A limited number of ideas encountered in literature on how to cope with a particular type of a barrier, particularly at the basic, operational level, is of great importance and help for those dealing with such problems in practice.

Against the conducted literature analyses, the authors of the paper proposed their own classification of barriers and indicated technology transfer barriers encountered in practice. The next step of continuously conducted work consists in developing ideas on how to cope with particular barriers that occur with reference to projects carried out at the Institute for Sustainable Technologies – National Research Institute in Radom, Poland.

3. Classification of barriers

Numerous classifications of barriers are proposed by scholars. In 1974, Mock [3] listed twenty-six barriers to technology transfer, particularly stressing the importance of the following barriers: financial, competence, communication, and market related barriers. Sharif [5] also divides technology transfer barriers into four groups: organisation-ware, information-ware, technique-ware, and human-ware. Mojaveri et al. [7] also use a four-group classification; however, the categories they use are different and include technical, attitudinal, cultural, and market barriers. Creighton et al. [15] indicate two groups of barriers, formal (procedural) and informal (behavioural), whereas Jervis and Sinclair [16] indicate political and institutional ones.

Taking into account the classifications of barriers proposed by other scholars and having in mind the authors' own experience in executing research projects and co-operating with industry, the authors propose their own classification of barriers comprising the following: (1) technical barriers, (2) organisational-economic barriers, and (3) system barriers to technology transfer. Furthermore, the authors want to stress that all the mentioned types of barriers may be observed at different levels: strategic, tactical, and operational ones [17].

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