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Characterisation of R&D Performing Enterprises

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Abstract

In the R&D and innovation related literature, the term "R&D performing enterprise" is not a definitive one. Various terms are used and numerous classifications have been developed based on institutional sectors, ownership, affiliation, main economic activity, size, geographical location, R&D capability and intensity, R&D regularity and other characteristics. The aim of this study was, firstly, to summarise the current state of understanding of R&D performing organisations; and, secondly, to establish a theoretical framework for the author's PhD project investigating factors affecting long-term survival and growth of small and medium-sized R&D performing enterprises.

Keywords: R&D performing enterprise, R&D services, knowledge-intensive business services, KIBS, T-KIBS.

Introduction

Need for cost and time-savings, lack of in-house resources, globalisation and increased speed to market are a few factors that are causing more and more enterprises to review efficiency of their business processes, including their R&D organisation and spending. This has caused changes in the R&D market leading to an increasing number and diversity of organisations performing R&D activities.

In the R&D and innovation related literature, the term "R&D performing enterprise" is not a definitive one. Therefore, the aim of this study was to summarise the current state of understanding of R&D performing organisations and to establish a theoretical framework for the author's PhD project investigating factors affecting long-term survival and growth of small and medium-sized R&D performing enterprises.

Understanding the complexity of the R&D market is of importance for both public and private sector organisations, but especially for the governments, who should ensure that their programmes and policies do not hinder or penalise industry's preferences as between outsourcing or in-house solutions, and provide equal opportunities for all R&D performers in accessing public funding.

Methodology of Research

This study is based on the qualitative content analysis of literature overview. EBSCO, Science Direct and Web of Science data basis were used to conduct the literature overview. English language articles published in peer-reviewed journals were reviewed. Search terms "R&D performing enterprise", "R&D performing firm", "R&D performing organisation", "R&D enterprise", "Science-based firm", "R&D service firm" were used.

Findings/Results

In general, two main groups of R&D performing enterprises can be differentiated. Firstly, enterprises which conduct their own R&D activities either in-house or externally, and do it in different forms such as subcontracting, resourcing, collaboration and cooperation. Secondly, enterprises who are R&D service

providers. There are also companies who can be regarded as hybrid structures synthesising the elements of both - carrying out own R&D activities and offering R&D services to the third parties.

The first group of R&D performing enterprises are frequently named as science-based businesses, science-based entrepreneurial firms, R&D based firms, science and technology based firms, R&D performers, R&D performing firms. The attempt to create value from newly established or as-yet unproven scientific principles (Lubik, et.all, 2016; Miozzo, et.all., 2011), transformation of scientific knowledge into basic or application specific technologies (Fontes, 2005), exploitation of scientific discoveries for the development of new or improved products, operations, methods or systems (OECD, 2015) are key drivers of R&D activities of these enterprises.

R&D performing enterprises can be found in both manufacturing and service sectors, with the last one receiving growing interest by the research community and R&D and innovation policies (Chang, 2012; Jankowski, 2001). They are of different sizes – micro, small, medium sized and large, and institutionally can belong to business, government, higher education, private non-profit and rest of the world sectors (OECD, 2015).

R&D performing enterprises are also grouped based on R&D capabilities (Vedovello, 1998; Arundel, 2008); R&D intensity (Vedovello, 1998; Jankowski, 2001; Peneder, 2003; Archibugi, 2001) and regularity - performing R&D on a continuous basis and performing R&D intermittently (Huang, 2011). R&D intensity, measured by enterprise's R&D expenditure, is the most common metric used to evaluate a firm's strategic commitment and dependence on a programme of R&D to achieve its business goals (Jankowski, 2001).

The growing tendency towards outsourcing research and innovation has created a new category of R&D performing organisations, in the literature referred to as knowledge intensive business services (KIBS). R&D services are defined as a subset of new technology based KIBS or T-KIBS (Chiesa, et.all., 2004; Probert, et.all., 2013), also called Contract Research Organisations (Gallaher, et.all. 2006) and Research and Technology Organisations (OECD, 2015), which are contracted by third parties to carry out bespoke R&D projects, thus contributing to the development of client sectors. These companies are characterised by professional knowledge or expertise related to a specific technical or function domain, intensive use of information technology, supply of a combination of codified and tacit knowledge (Probert, et.al., 2013). They perform R&D for either manufacturing or service industries.

Conclusions

The current R&D sector consists of high diversity of R&D performing enterprises which are studied along many dimensions, for example, institutional sectors (business enterprises, government, higher education, private not-profit), ownership (private, public, joint ventures), affiliation (domestic, foreign, private, public), main economic activity, size, R&D capability and intensity, R&D regularity and other characteristics.

In her PhD project, the author will further study knowledge intensive business services (KIBS), and, more specifically, factors affecting long-term survival and growth of **privately- owned small and medium-sized business enterprises providing R&D services**.

References

Archibugi, D. (2001). Pavitt's Taxonomy Sixteen Years On: A Review Article. *Economics of Innovation and New Technology, 2001,* 10 (5): 415-425, DOI: http://doi.org/10.1080/10438590100000016

Arundel, A., Bordoy, C., Kanerva, M. (2008). Neglected innovators: How do innovative firms that do not perform R&D innovate. *Maastricht University. Working Papers, 2008,* Retrieved from http://pub.maastrichtuniversity.nl/413b75a4-8774-4fa2-80ee-51e8d357d117

Bhaskaran, S. (2006). Incremental Innovation and Business Performance: Small and Medium-Size Food Enterprises in a Concentrated Industry Environment. *Journal of Small Business Management, 2006,* 44: 64–80. DOI: http://doi.org/10.1111/j.1540-627X.2006.00154.x

Bonardo, D., Paleari, S., Vismara, S. (2009). The M&A dynamics of European science-based entrepreneurial firms. *The Journal of Technology Transfer, 2009,* Vol. 35, Issue 1, DOI: http://doi.org/10.1007/s10961-009-9109-3

Carayannis, E.G. & Rakhmatullin, R. J. (2014). The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond. *Journal of the Knowledge Economy, 2014,* 5: 212. DOI: http://doi.org/10.1007/s13132-014-0185-8

Chang, Y., Linton, J.D., Chen, M. (2012). Service regime: An empirical analysis of innovation patterns in service firms. *Technological Forecasting and Social Change, 2012,* Vol. 79, Issue 9, DOI: http://doi.org/10.1016/j.techfore.2012.05.017

Chiesa, V., Manzini, R. and Pizzurno, E. (2004). The externalisation of R&D activities and the growing market of product development services. *R&D Management, 2004*, 34: 65–75. DOI: http://doi.org/10.1111/j.1467-9310.2004.00323.x

De Jong, JP. J, Marsili, O. (2006). The fruit flies of innovations: A taxonomy of innovative small firms. *Research Policy, 2006,* Vol. 35, Issue 2, DOI: http://doi.org/10.1016/j.respol.2005.09.007

Eureka Secretariat (2016). *Eurostars. Eligibility guidelines for application.* Retrieved from https://www.eurostars-eureka.eu/content/eurostars-eligibility-guidelines

Fontes, M. (2005). The process of transformation of scientific and technological knowledge into economic value conducted by biotechnology spin-offs. *Technovation, 2005,* Vol. 25, Issue 4, DOI: http://doi.org/10.1016/j.technovation.2003.08.004

Gallaher, M.P. & Petrusa, J.E. (2006). Innovation in the U.S. Service Sector. *The Journal of Technology Transfer, 2006,* 31: 611. DOI: http://doi.org/10.1007/s10961-006-0018-4

Godin, B. (2006). Concept of R&D. Research and development: how the "D" got into R&D. *Science and Public Policy, 2006,* Vol.33, No.1., DOI: https://doi.org/10.3152/147154306781779190

Huang, C., Arundel, A., Hollanders H. (2011). How Firms Innovate: R&D, Non-R&D, and Technology Adoption. Maastricht Economic and social Research and training centre on Innovation and Technology, UNU-MERIT Working Papers, #2010-027, ISSN 1871-9872. Retrieved from http://www.merit.unu.edu/publications/working-papers/abstract/?id=3931

Jankowski, J.E. (2001). Measurement and Growth of R&D Within the Service Economy. *The Journal of Technology Transfer, 2001,* 26: 323. DOI: http://doi.org/10.1023/A:1011174517721

Lubik, S., Garnsey, E. (2016). Early Business Model Evolution in Science-based Ventures: The Case of Advanced Material. *Long Range Planning, 2016,* Vol. 49, Issue 3, DOI: http://doi.org/10.1016/j.lrp.2015.03.001

Miozzo, M., DiVito, L., Desyllas, P. (2016). When do Acquirers Invest in the R&D Assets of Acquired Science-based Firms in Cross-border Acquisitions? The Role of Technology and Capabilities Similarity and Complementarity. *Long Range Planning, 2016,* Vol. 49, Issue 2, DOI: http://doi.org/10.1016/j.lrp.2015.07.002

Moray, N., Clarysse, B. (2005). Institutional change and resource endowments to science-based entrepreneurial firms. *Research Policy, 2005,* Vol. 34, Issue 7, DOI: http://doi.org/10.1016/j.respol.2005.05.016

OECD (2015). *Frascati Manual 2015. Guidelines for Collecting and Reporting Data on Research and Experimental Development*. Retrieved from http://www.oecd.org/publications/frascati-manual-2015-9789264239012-en.htm

O'Mahony, Vecch, M. (2009). R&D, Knowledge Spillovers and Company Productivity Performance. *Research Policy, 2009,* Vol. 38, Issue 1, DOI: http://doi.org/10.1016/j.respol.2008.09.003

Peneder, M. (2010). Technological Regimes and the Variety of Innovation Behaviour Creating Integrated Taxonomies of Firms and Sectors. *Research Policy, 2010,* Vol. 39, Issue 3, DOI: http://doi.org/10.1016/j.respol.2010.01.010

Peneder, M. (2003). Industry classifications: aim, scope and techniques. *Journal of Industry, Competition and Trade, 2003,* 3: 109. DOI: http://doi.org/10.1023/A:1025434721292

Probert, J., Connell, D., Mina, A. (2013). R&D service firms: The hidden engine of the high-tech economy? *Research Policy, 2016,* Vol. 42, Issue 6-7, DOI: http://doi.org/10.1016/j.respol.2013.03.004

Vanacker, T., Heughebaert, A., Manigart, S. (2013). Path-Dependent Evolution Versus Intentional Management of Investment Ties in Science-Based Entrepreneurial Firms. *Entrepreneurship Theory and Practice, 2014,* Vol.38, Issue 3, DOI: http://doi.org/10.1111/etap.12007

Van de Poel, I. (2003). The transformation of technological regimes. *Research Policy, 2003,* Vol. 32, Issue 1, DOI: http://doi.org/10.1016/S0048-7333(01)00195-0

Vedovello, C. (1998). Firms' R&D Activity and Intensity and the University-Enterprise Partnerships. *Technological Forecasting and Social Change, 1998,* Vol.58, Issue 3, DOI: http://doi.org/10.1016/S0040-1625(98)00019-5