

Conceptualising the heterogeneity of research-based spin-offs: A multi-dimensional taxonomy

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Abstract

Research-based spin-offs (RBSOs) have become an important aspect of the technology transfer process. Emanating from what is conventionally a non-commercial environment, RBSOs pose major challenges if they are to realise their potential to meet the objectives of their founders and the parent research organisations (PROs) from which they emerge. An important issue is to understand the heterogeneity of RBSOs. This paper reviews the literature on RBSO typologies to develop a taxonomy of RBSOs. We identify common themes in relation to these typologies in relation to (1) spin-off creation and (2) spin-off development. The dimensions that differentiate between firms are the type of resources, the business model and the institutional link. We identify gaps in current typologies in order to propose avenues for future conceptual and empirical research.

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1. Introduction

There is a growing interest among policymakers and academics in generating wealth from publicly-funded research. Research based spin-offs (RBSOs) have become an important aspect of the technology transfer process (DiGregorio and Shane, 2003; Wright et al.,

2004a,b). RBSOs involve the creation of ventures based on the formal and informal transfer of technology or knowledge generated by public research organisations (Smilor, 1990). This growth in spin-offs has become an international phenomenon (Clarysse et al., 2005) and has stimulated academic and policy debate regarding whether and how RBSOs create wealth (Lambert, 2003). The end result is that policymakers increasingly recognize the need to understand the heterogeneity of RBSOs and the context in which they occur.

Both new high technology ventures (NTBFs) generally and RBSOs face similar difficulties in establishing a market presence and in achieving sustainable returns.

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However, RBSOs also face two fundamentally different problems (Vohora et al., 2004). First, emanating from what is historically a non-commercial environment, RBSOs encounter specific obstacles and challenges since the university environment typically lacks commercial resources. A key concern is whether an institution has academic entrepreneurs with commercial skills to create viable ventures. Second, the venture's ability to develop commercially may be adversely impacted by conflicting objectives of key stakeholders such as the university, the academic entrepreneur, the venture's management team and suppliers of finance. For example, Clarysse et al. (2005) highlight the problems of conflicts between stakeholder objectives with regard to the type of ventures they wish to create and the resources they seek to commit. RBSOs thus pose major challenges if they are to realise their potential to meet the objectives of their founders and the parent research organisations (PROs) from which they emerge.

A key starting point in designing policies and strategies to address these challenges is the need to understand the nature of RBSOs. Traditional pioneering studies of new technology based ventures have identified typologies but have not separately identified RBSOs. For example, Jones-Evans (1995) develops a typology based on previous ownership backgrounds of entrepreneurs and Westhead and Storey (1995) distinguished new high tech ventures on and off science parks. Autio (1997) provides a typology based on science versus engineering based technology ventures in the context of the linkages with their environment. While there is growing recognition of the heterogeneity of high tech ventures, studies have tended to be unidimensional. For instance Mangematin et al. (2002) consider the heterogeneity of trajectories of biotechnology ventures in France in terms of whether their business models involve small, less research intensive projects targeting market niches or research intensive projects targeting broader market types. More recently, as will be shown in greater detail in Section 2, some researchers have started to focus on the specific case of RBSOs and various typologies have emerged, but they also take only a partial view of the RBSO phenomenon. There is, therefore, an important gap in our comprehensive understanding of the diversity of RBSOs.

This paper seeks to address this gap by providing a framework for understanding previous literature. Therefore, it synthesizes and extends existing studies to create a matrix as a tool to identify commonalities among the variety of typologies found in the spin-off literature in order to explain the diversity among RBSOs. We recognize that in order to understand the scope and the nature

of RBSOs there is a need to integrate the different conceptual traditions identified in previous studies. Hence, the paper synthesizes research from the perspectives of innovation, public policy, entrepreneurship, and strategy. Finally, this framework should help to guide future research and to provide policymakers and practitioners with a basis for designing and implementing strategies to facilitate successful spin-offs.

The paper is structured as follows. Section 2 outlines the scope of the literature relevant to this paper and attempts to provide a comprehensive theoretical view on differences among RBSOs. Section 3 discusses the methodology for identifying the relevant papers and maps the existing literature on RBSO typologies. Section 4 discusses the gaps in the literature and identifies opportunities for further research. Section 5 considers implications for practitioners and policymakers and limitations of the study.

2. Methodology and scope of the literature: towards a comprehensive theoretical view on differences between RBSOs

In order to derive a conceptual framework that would enable us to address diversity among RBSOs, we reviewed papers published since 1990 on NTBFs in general in order to identify the main streams of research explaining their diversity.

The decision to review the literature on NTBFs was based on the fact that RBSOs have only recently been specially scrutinized in the academic literature. In addition, RBSOs and NTBFs share several common characteristics. Thus, research on the factors driving variety among NTBFs in general could be relevant to understand RBSOs' characteristics and behaviour.

On the basis of this preliminary review a more precise selection of papers was made, based upon two criteria: we selected papers that either focused on RBSOs as a subpopulation of NTBFs or tried to explain the diversity among the NTBF population. Since the approach adopted in this paper is multi-disciplinary, we searched journals in entrepreneurship, public policy and regional issues, innovation and management for relevant articles. This search generated a list of over fifty publications on NTBFs. From a reading of the papers we identified three main theoretical research traditions. A first category of papers is embedded, explicitly or implicitly, in the resource based view of the firm (Barney et al., 2001; Brush et al., 2001). These papers mainly focus on the resources of the firm as a differentiator and a predictor of competitive advantage. Among these resource-based studies, some authors emphasise the differences in social

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