



Policy principles for the creation and success of corporate and academic spin-offs ☆

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ABSTRACT

Following a design science approach, this paper develops a framework of policy design principles for fostering technology entrepreneurship in a region. These principles are grounded in research findings and describe the factors and causal mechanisms that explain the founding and success rates of both corporate and academic spin-offs. We differentiate between principles that serve the *creation* of spin-offs versus those focusing on their subsequent *chances of success*. We provide an in-depth empirical application of this framework to spin-off policy in the regions of Eindhoven and Leuven. This application of the framework serves to assess the extent to which standing spin-off policy in both regions is (1) up-to-date, (2) comprehensive as well as (3) sufficiently robust against 'policy fashions'. Several directions for redesigning spin-off policy follow from this assessment.

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1. Introduction

Technology entrepreneurship implies the creation of new companies that exploit opportunities provided by technological innovation. Fostering technology entrepreneurship has become a major topic for (regional) public policy makers, as a means to release currently unexploited opportunities hidden in individuals, shelved technologies and resource combinations. Researchers in the field of technology entrepreneurship have conducted detailed studies of, for example, the factors fostering (successful) technology-based university spin-offs (Rothaermel et al., 2007; Shane, 2004), corporate spin-off creation (e.g., Tübke, 2005; Zahra et al., 2007), spin-off creation from research institutions (e.g., Clarysse et al., 2005; Hindle and Yencken, 2004; Lockett et al., 2005), and the role of science parks and incubators (e.g., Bergek and Norrman, 2008; Lofsten and Lindelof, 2005; Phan et al., 2005). As such, the literature on corporate and university spin-offs has been growing in dispersed directions, making it difficult to formulate unequivocal policy recommendations. Furthermore, previous attempts to develop practice-oriented design recommendations from 'thick' case descriptions (e.g., Debackere, 2000;

Lockett et al., 2005; Rasmussen, 2008; Roberts and Malone, 1996) provide a partial view of spin-off policy or have refrained from specifying the contextuality of policy recommendations (O'Gorman, 2003).

At the same time, policy fashions rather than empirical evidence or well-established theory tend to influence the policies adopted by policy makers (Bower, 2003; Mowery et al., 2004). In other words, there is a major risk that policy misses out on key scholarly insights and lacks a solid basis from which adequate policy programs and measures can be developed for stimulating technology entrepreneurship in corporate and university settings.

In this respect, we adopt a design science method to develop design principles grounded in the body of research evidence and targeted at informing policy makers. This approach connects the existing or emerging body of scientific knowledge to the pragmatic, action-oriented knowledge of practitioners. It codifies design knowledge in principles grounded in both practice and theory; these principles can be continually improved by obtaining feedback from implementation and experimentation (Romme, 2003; Romme and Endenburg, 2006). The resulting principles serve to develop new policies or improve existing policies, by applying academic knowledge that tends to be dispersed and difficult to access by policymakers (Van Aken, 2004; cf. Rasmussen, 2008).

Based on this design science approach, the aim of this paper is to develop a policy framework that serves to assess whether standing spin-off policy (1) reflects recent academic insights, (2) is comprehensive and (3) is sufficiently robust against 'policy fashions'. The principles implied by this framework can motivate and inform the (re)design of policies regarding technology-based

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entrepreneurship in a region. To test the validity of this claim, we apply our framework by assessing and comparing standing policy in two high-tech regions, namely Eindhoven (the Netherlands) and Leuven (Belgium).

In this respect, this paper makes two key contributions. First, we offer policy makers in the area of technology entrepreneurship an integrated framework for assessing their current policy in a grounded and coherent way, allowing for systematic comparisons with other regions. Such a framework is not available in the current literature, which may be one of the reasons why policy misses out on key academic findings. Second, this study informs (technological innovation and entrepreneurship) research by demonstrating how one can develop empirically and theoretically valid policy principles that address (major) voids in standing policy practices. In this way, our study informs scholars about how they can enhance the practical value of their findings and inform policy makers in a more grounded way.

The paper proceeds as follows. First, in Section 2, we introduce the research method of science for design in relation to fostering technology entrepreneurship in regional settings. Subsequently, in Section 3, design principles are developed by drawing on previous research. In Section 4, we assess spin-off policy in the Eindhoven and Leuven regions. Finally, we discuss the main findings and draw a number of conclusions in Section 5.

2. Method: science for design

The science for design approach, developed by organization researchers, links the scientific knowledge base to the pragmatic and creative work of practitioners (e.g., Romme, 2003; Van Aken, 2004). According to Romme and Endenburg (2006), the worlds of academia and practice can be linked by propositions – so-called design principles – that are grounded in state-of-the-art research. These normative principles connect the descriptive nature of scientific research and the action-oriented nature of policy-making practices, as they serve to define the deeper intentions and ‘generative mechanisms’ behind particular public policies (Denyer et al., 2008). With help of these design principles, particular policies can be developed (Romme and Endenburg, 2006). In this study, we derive policy design principles from a synthesis of a variety of literatures.

The conceptual basis for this qualitative synthesis is constituted by the model developed by Bekkers et al. (2006). This model is based on the notion that different institutional layers of a national system of innovation form the selection environment for spin-offs (Nelson, 2001; Groenewegen and van der Steen, 2006). This model is useful for the purpose of our qualitative research synthesis, for two reasons.

First, the model distinguishes between the creation of a spin-off and its subsequent chances of success, once established. This is in line with recent calls in the literature not to conflate foundation rates and success rates, and to keep the process of spin-off creation analytically separate from its subsequent success or failure (e.g., Djokovic and Souitaris, 2008; Hackett and Dilts, 2004).

Second, the model demonstrates how different institutional layers of a national system of innovation have a differential effect on the creation of spin-offs *viz-à-viz* their success chances (Nelson, 2001; Groenewegen and van der Steen, 2006). In particular, it shows that higher institutional levels provide the conditions that affect the establishment of spin-offs, whereas the low(er) levels form the conditions that mostly affect their success chances once established (Bekkers et al., 2006). Given the largely person-centric view that dominates the entrepreneurship literature, the factors affecting the creation and growth of spin-offs

have to some extent been ignored—although they seem to be particularly relevant for policy. Developing an understanding of the role of these different institutional layers requires an inquiry into a different literature, such as on the role of sectoral characteristics (O’Gorman, 2003), technology (Marsili, 2001; Shane, 2001), regional institutions (Audretsch and Stephan, 1996; Saxenian, 1996), and the role of incumbent firms (Shane and Venkataraman, 2003). Here, the model presented by Bekkers et al. (2006) provides a coherent framework to understand and combine the role of such antecedent conditions for spin-off creation and success. An overview of the model is provided in Fig. 1.

Following this model, we have systematically collected literature along the different institutional layers, based on four steps.

As a first step, we determined the relevant bodies of literature for this study. We selected the field of economics of innovation to consider the role of sectoral characteristics and technology development patterns, forming the second layer. The literature on strategy and management as well as entrepreneurial activities of universities and/or PROs was selected to explore the role of the parent company or PRO/university (as the third layer). In addition, we selected literature on regional policy and regional innovation systems with regard to the fourth layer of the model. We have not included literature on the first layer, as the role of national law and policy falls beyond the scope of our study.

As a second step, we identified key articles from two sources: the ABI/Inform database and a gross list of references assembled from publications that provide reviews of the field and/or synthesize relevant theoretical perspectives. Here, we followed four guidelines. First, the article needed to be related to the creation and/or success chances of spin-offs and needed to belong to one of the core fields of literature that we considered. Second, the article was published in a journal with a high impact factor (beyond 1.5) or in a specific topic-oriented journal such as *Technovation* or *Journal of Technology Transfer*. Third, from this set of selected articles, we have chosen those articles that carried the highest number of citations. Fourth, we ensured to also include articles from key authors as identified in review articles and textbooks, such as Di Gregorio and Shane (2003), Dosi (Dosi et al., 1988), Gans and Stern (2003), Levinthal and March (1993), and Teece (1986). Table 1 provides an overview of the selection of literatures and examples of key publications.

As a third step, from this literature selection we coded the main factors fostering or discouraging the creation and/or success chances of spin-offs (Denyer et al., 2008). We specifically searched for ‘generative mechanisms’ that explain the factors and causal mechanisms for spin-off creation and its success (cf. Denyer et al., 2008; Van Aken, 2004).

As a fourth step, we clustered these findings and combined them into instructive policy principles. In this way, the resulting principles are linked to general theories that explain the key mechanisms underlying the creation and/or success chances of spin-offs (Denyer et al., 2008). Table 1 presents an overview of the different bodies of literature, with examples of core publications and some of their key insights.

3. Design principles to foster technology entrepreneurship

In this section we discuss the conditions enhancing or inhibiting the foundation and success chances of spin-offs along the three institutional layers in Fig. 1 (i.e., the second, third and fourth layer). In Section 3.1 we discuss how institutions at the sectoral and parent company level imply founding conditions for the creation of corporate spin-offs. In Section 3.2 we focus on

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