



# Effectuation and causation in science-based new venture creation: A configurational approach



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## ABSTRACT

Science-based entrepreneurship plays a central role in economic and technological development. The existing literature shows that the process of new venture creation differs between science-based and traditional ventures. Building on effectuation and causation literatures, we aim to explore the antecedent factors of the approach that science-based entrepreneurs follow in new venture creation. Using data from PSED II and a QCA approach, we identify two configurations of antecedent factors relevant for science-based founders to successfully launch their ventures, and two for nonscience-based founders. We contribute to entrepreneurship literature, as well as to effectuation and causation literatures, by looking at the antecedent factors characterizing the approach, followed by an examination of the specific types of entrepreneurs in the establishment of successful ventures.

## 1. Introduction

Over the years, an increasing number of reforms and regulations within universities and public research organizations has fostered the transfer of research results to industry (Fini, Grimaldi, Marzocchi, & Sobrero, 2012) and, as a consequence, science commercialization has become an activity that is much more diffused by scientists (Rasmussen & Wright, 2015; Miozzo & DiVito, 2016). Although many possible commercialization channels exist – including consulting, patenting, and licensing – new venture creation has received particular attention, specifically for the impact it has on new job creation and technology advancement. Science-based (hereafter SB) entrepreneurship has proved to be of special relevance for the emergence and, even more importantly, the improvement, of industrial fields, such as biotechnology (Krabel & Mueller, 2009). Because of this potential to transfer lab-based knowledge to the marketplace, SB new ventures are considered to play a more relevant role in technological and economic development than traditional non science-based (hereafter nSB) start-ups (Rasmussen & Wright, 2015; Knockaert, Ucbasaran, Wright, & Clarysse, 2011).

Previous literature has, however, acknowledged some important differences between new nSB start-ups and SB start-ups originated by a lab (Samsom, 2013). Specifically, SB start-ups not only face some unique external challenges, such as decisions about disparate markets and applications, cognitive distance from final consumers, and the need for complementary innovation, but also some distinct internal challenges,

such as lack of commercial experience, the need for considerable resources, and diverging objectives about how to advance science and create wealth (Lubik & Garnsey, 2016), that make them more likely to follow a different approach during the process of new venture creation (D'Este, Mahdi, Neely, & Rentocchini, 2012) as compared to other, nSB start-ups. While prior research has highlighted these differences (Colombo & Piva, 2008) and has looked at specific factors favouring and/or hindering nSB and SB start-ups, scant attention has been devoted to understanding how specific features of these two types of companies come into play along the phases of starting up the new venture and the extent to which this variety affects the process through which new ventures are established.

In this paper, we tackle this important issue by using data from PSED II and applying Qualitative Comparative Analysis (QCA) to explore the antecedents and specificities of the approaches that SB entrepreneurs follow in new venture creation (and make a comparison with nSB entrepreneurs). We consider a diversity of such antecedents because more than one (and in specific configurations that we aim at exploring) will most likely best articulate scientists' approaches to founding new ventures.

In doing so, we make two contributions to the existing literature. First, we contribute to the entrepreneurship literature with an in-depth focus on the process through which scientists move from an idea to its implementation (Arend, Sarooghi, & Burkemper, 2015). Second, we contribute to the effectuation and causation debate by showing that for

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scientists to get successfully started, a combination of both approaches works better (Welter, Mauer, & Wuebker, 2016). In doing so, we demonstrate that the founding processes of new ventures is a complex endeavor. We highlight that this process is defined by equifinality and, as a consequence, challenges researchers to transcend the dominant linear paradigm underlying the standard methodological tools in management research.

## 2. Theoretical framework

### 2.1. Peculiarities of science-based ventures

The peculiarity of SB start-ups is that, in the majority of cases, their products or services are at the frontier of knowledge, incorporating scientific innovation or developments and refinements of the innovation itself. Their founders (SB entrepreneurs) often bring to the new ventures their own past experience, which is based on scientific research and academic activities (Lubik & Garnsey, 2016; Samsom, 2013). They comply with a specific institutional logic, which is the logic of producing knowledge and advancing it, often for its own sake (Villani, Rasmussen, & Grimaldi, 2017). This often implies minimal attention to the outside market dynamics and, usually, poor competencies relating to management and market analyses.

Prior research has made an attempt to better understand the characteristics differentiating SB start-ups and nSB start-ups (Lubik & Garnsey, 2016; Miozzo & DiVito, 2016). Many contributors, while searching the antecedent factors leading to effective start-ups, have looked at individual-level characteristics available at the funding team level, including risk tendency (Fini & Toschi, 2016; Zhao, Seibert, & Lumpkin, 2010), start-up experience (Miozzo & DiVito, 2016), industry experience (Krabel & Mueller, 2009; Wennberg, Wiklund, & Wright, 2011), and networks and partnerships (Lubik & Garnsey, 2016; Miozzo & DiVito, 2016), to the extent they can channel the competences and resources necessary to succeed.

Some scholars have tried to capture the specific psychological attributes (Shane, 2004) and cognitive elements (Fini et al., 2012) characterizing one group with respect to the other in order to explain possible different outcomes. We know, for example, from Lubik and Garnsey (2016) that SB ventures require different business models to deal with their unique challenges; then, from Zahra, Van de Velde, and Larraneta (2007), we learn that SB entrepreneurs differ from traditional entrepreneurs in prior experience and in networks and connections, which in turn affect the way conceptualization and visioning, configuration and design, and embodiment and integration happen in new venture creation (Fini et al., 2012).

As far as we know, however, little attention has been paid to the opportunity development process through which the idea, originated in the lab, is gradually transferred to the market, thus gaining elements of attractiveness in line with the business logic (D'Este et al., 2012; Wennberg et al., 2011). Some entrepreneurs may launch a venture with only a rudimentary business concept in mind, while others have very clear and focused business plans (Gruber, 2007). Some entrepreneurs could also be highly influenced by the “lab” logics, which identify linear models of development with specific phases, from basic research all the way to more applied stages, using causal-effect sequences, which inevitably influence the modalities of commercial exploitation by would-be scientist-entrepreneurs.

The different patterns followed by entrepreneurs during the process of new venture creation can be the result of the diverse backgrounds they possess (Grandi & Grimaldi, 2005; Zahra et al., 2007). Since the entrepreneurial process is conceived of as a collection of capabilities and decision-making tasks (Read & Sarasvathy, 2005), the particular background held by SB entrepreneurs surely affects how they master these staged elements in terms of, for example, business planning, risk taking, strategy formulation, etc. We find the factors that the entrepreneurship literature acknowledges to be particularly relevant for entrepreneurs launching a new venture to be industrial experience and

business knowledge (Rasmussen, Mosey, & Wright, 2011; Wennberg et al., 2011), risk propensity (Fini & Toschi, 2016; Goethner, Obschonka, Silbereisen, & Cantner, 2012), network and external relations (Grandi & Grimaldi, 2005; Lubik & Garnsey, 2016), strategic goals (Burke, Fraser, & Greene, 2010), and flexibility towards challenges and environmental changes (Arend et al., 2015; Rasmussen, 2011). Their effects, however, are shown to be different for SB versus nSB entrepreneurs and, sometimes, also with contradicting results. In some cases, for example, a business plan is thought to be a good exercise for entrepreneurs with little prior business experience in order to have access to resources and enhance credibility (Burke et al., 2010); in other cases it is thought to undermine the flexibility required for SB to react to unpredictable events and challenges occurring during the transition from an academic to a business context (Rasmussen, 2011). Instead, nSB founders – who are more likely to possess relevant experience – may feel that writing a business plan is a costly use of time (Burke et al., 2010). Moreover, while SB entrepreneurs are usually described as more risk-averse due to their need to receive large enough entrepreneurial benefits for compensating their academic condition (Goethner et al., 2012), nSB founders are thought to have stronger entrepreneurial support and, as a consequence, lower entrepreneurial risk aversion, which fosters entrepreneurial action (Forlani & Mullins, 2000).

Although the relevance of specific factors for SB and nSB entrepreneurs has been acknowledged by previous literature, we find a significant gap concerning the understanding of which combination of these antecedent factors characterizes the process of SB founders, with respect to nSB founders, while creating a new venture. Given that entrepreneurial decisions and actions are very complex, no single antecedent factor, but most likely the combination of them, makes the difference (Cheng, Chang, & Li, 2013). With antecedent factors we refer to individual-level characteristics available at the funding team level, including risk tendency, prior experience, industry experience, networks and partnerships, etc., which are traditionally associated with successful engagement in entrepreneurship (Fini et al., 2012).

Following these premises, this paper aims to better understand whether the academic logic to which SB entrepreneurs are exposed has an impact on the configuration of antecedent factors at play at the very beginning of the entrepreneurial process, and if this configuration is ultimately likely to lead to success.

### 2.2. Causation and effectuation approaches in the process of starting up a new venture

McGrath and MacMillan (1995) have noted that “by definition, new ventures call for a company to envision what is unknown, uncertain, and not yet obvious to the competition” (p. 44). The process of new venture creation represents a particularly risky phenomenon because decisions relating to how to develop a business idea (Bhave, 1994), acquire necessary resources, and implement effective decision-making (Sarasvathy, 2001) take place under uncertain conditions (Gruber, 2007; Rasmussen et al., 2011). As such, framing matters because the particular decision-making approach that entrepreneurs use influences the way they understand and formulate problems, which constrains what ideas they accept and reject, what resources they consider relevant, and why they heed some criteria rather than others in designing and implementing their business concept (Dew, Read, Sarasvathy, & Wiltbank, 2009; Reymen et al., 2015).

For many years, entrepreneurship scholars have assumed that individuals pursuing entrepreneurial opportunities were guided solely by rational, goal-driven behavior (Perry, Chandler, & Markova, 2012), the type of framing that Sarasvathy (2001) called the *causation* model. More recently, *effectuation* has emerged as a new theoretical perspective describing a different approach and different behaviors underlying the process of entrepreneurial action (Alsos, Clausen, Hytti, & Solvoll, 2016; Arend et al., 2015; Sarasvathy, 2001, 2008). Thus, causation and effectuation represent two distinct frameworks applicable to new venture creation: the first is characterized by careful planning and cause-effect

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