



## Corporate effectuation: Entrepreneurial action and its impact on R&D project performance

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### ABSTRACT

Innovative products are widely recognized as an important source of competitive advantage. However, many companies have difficulties finding efficient and successful approaches to different types of R&D projects, particularly those that involve a high level of innovativeness. Therefore, the present study moves effectuation theory from the entrepreneurial context to R&D research. First, the characteristics of an effectual approach in the context of R&D projects are developed and differentiated from those of conventional prediction-based strategies (causation). Second, using a thorough qualitative and quantitative scale-development process to capture particularities of effectual and causal dimensions in the R&D context, expert interviews and a pilot study (123 R&D projects), the study develops a multi-factor measurement model of effectuation and causation. These measures are validated in a follow-up study with a larger sample of 400 projects. Third, the new measures are applied to test two central hypotheses: (a) effectuation is positively related to success in highly innovative contexts, (b) causation approaches are beneficial in projects with low levels of innovativeness. Overall, this study moves the effectuation logic from the entrepreneurial to the corporate R&D context, captures its particularities, and investigates its performance outcomes.

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### 1. Executive summary

R&D literature provides contradictory findings on planning as a success factor in more innovative R&D projects and is characterized by a dearth on broader R&D project success factors beyond planning for these projects. Therefore, the present study adopts the lens of effectuation and causation and applies it to the corporate R&D context in order to provide meaningful contributions to the burgeoning literature on R&D projects. The effectuation logic is particularly suitable for forming a conceptual basis in the R&D context since both entrepreneurs and decision-makers in innovative R&D projects face high levels of uncertainty (Saravathy, 2001). The study also contributes to the discourse on effectuation in three ways: First, it applies the theoretical lens of effectuation to the empirical setting of the R&D context. Second, it develops measurement instruments for effectual dimensions in the corporate R&D context and links these dimensions to performance measures. Third, this study addresses weaknesses of some recent studies by sticking closer to the original conceptualization of the effectuation concept and by integrating four key dimensions: means, affordable loss, partnerships, and acknowledging the unexpected (Saravathy, 2001).

By using a thorough scale-development process we develop a research model which links four effectual dimensions and their causal counterparts in R&D projects to R&D project performance in terms of output and efficiency, thereby allowing for different degrees of project innovativeness. In order to empirically validate the research model, we use two samples of corporate R&D projects.

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Findings indicate that the effectual dimensions are inclined to be positively related to R&D performance when innovativeness is high: While means-driven projects do not show a high R&D performance, there is a positive relationship between a preference for affordable loss and R&D efficiency in projects with high innovativeness. Further, a preference for partnerships positively impacts R&D output when innovativeness is high. The same applies to the relationship between “acknowledging the unexpected” and R&D output. The causal dimensions, in contrast, show to be performance drivers in R&D projects with low innovativeness. For example, goal-driven projects show high R&D output and R&D efficiency when innovativeness is low. Similarly, a preference for expected returns is positively linked to R&D efficiency when innovativeness is low, while there is no such relationship between a preference for competitive market analysis and R&D output. Finally, the preference for overcoming the unexpected is positively related to both R&D output and efficiency when innovativeness is low.

Overall, the study informs R&D literature that different degrees of innovativeness require different R&D approaches. In particular, the study indicates that the application of effectual dimensions in the corporate R&D context can positively impact R&D performance when innovativeness is high. In terms of effectuation, the transfer of the concept from its original field of entrepreneurship to the corporate R&D context increases its generalizability.

While process management activities (such as Total Quality Management) provide important guidance to R&D managers when innovativeness is low, the present study informs R&D managers that effectual dimensions offer ways to deal with innovative projects and to rethink internal processes in favor of forming effectual cells that allow for a more co-creational innovation approach. As such, R&D managers learn that deciding along the principle of affordable loss positively impacts R&D efficiency when innovativeness is high. Leaving room for individual entrepreneurial projects – that is, guided by effectuation – may be the key to driving corporate innovation capabilities.

## 2. Introduction

The dichotomous concepts of effectuation and causation provide a framework for building processes in contexts with varying degrees of uncertainty. Effectuation refers to processes that start with “a set of means as given and focus on selecting between possible effects that can be created with that set of means” while causation builds on prediction and processes that “take a particular effect as given and focus on selecting between means to create that effect” (Sarasvathy, 2001; p. 245). With innovativeness providing significant uncertainty in R&D projects (Tatikonda and Montoya-Weiss, 2001), the setting offers a unique environment to examine the iterative effectual problem-solving process and contrast it with what can be referred to as the causal rational plan approach (Brown and Eisenhardt, 1995).

In extant R&D literature, there is some agreement about success factors of corporate R&D projects, but it is limited to projects with low levels of innovativeness (e.g. Lewi and Smith, 2007; Khurana and Rosenthal, 1998). In particular, planning activities have shown to be beneficial for these R&D projects (Brown and Eisenhardt, 1995; Hayes et al., 1988). For more innovative R&D projects, however, the literature produces contradictory findings. Fredrickson and Mitchell (1984) study the role of rationality in organizations and identify that comprehensive planning efforts are negatively related to firm performance when innovativeness is high. On the other hand, Shenhar et al. (2002) find in their exploratory, data-driven approach that planning efforts are particularly important for projects that involve higher levels of innovativeness. In addition to the contradictory findings on planning as a success factor in more innovative R&D projects, there is a dearth of literature on broader R&D project success factors beyond planning, such as how processes and problem-solving strategies shape project outcomes (Song and Montoya-Weiss, 2001; Eisenhardt and Tabrizi, 1995). Through the lens of effectuation and causation we gain meaningful contributions to the burgeoning literature on R&D projects.

At the same time, we are able to add empirically grounded theoretical insights to the discourse on effectuation which has – after its initial delineation by Sarasvathy (2001) – largely been of conceptual and qualitative nature (e.g., Sarasvathy and Kotha, 2001). In 2009, first steps towards quantitative assessment were made (e.g., Read et al., 2009b; Wiltbank et al., 2009) and in 2010, Chandler, DeTienne, McKelvie and Mumford developed a measurement scale in the entrepreneurial context. Our research adds to the literature in three important ways: First, we apply the theoretical lens of effectuation to the empirical setting of the corporate R&D context in order to gain new theoretical insights into the relationship of effectuation and processes of innovation. Second, we develop measurement models to show the applicability of effectuation theory in the corporate context and link components of the effectuation theory to performance measures in order to validate empirically its effect on performance. Third, since effectuation theory has not yet been applied to the corporate context, we adhere closely to Sarasvathy's (2001) original conceptualization of effectuation by integrating the four key dimensions: means, affordable loss, partnerships and acknowledging the unexpected (Read et al., 2009a,b) to extend the application of effectuation into a meaningful new context of larger firms.

We proceed as follows: First, we present the theoretical foundations and lay out why effectuation theory is applicable to the R&D context. Then, we derive a research model that links effectuation and causation practices with R&D performance. Next, we describe the research method and the study context, followed by the development and evaluation of measures. We develop a research instrument that operationalizes Sarasvathy's (2001) articulation of effectuation and causation. We then apply the scale to test a set of hypotheses about the relationship of R&D processes and project performance. The scale development is necessary in order to accommodate the fact that effectuation processes may look different in R&D than in entrepreneurial contexts. Next, we present the results of tests of the measures and of the integrated research model using data from 123 R&D projects in a pre-study and 400 R&D projects in the main study. The article concludes with a discussion of its contributions to the literatures on R&D processes, innovation and effectuation.

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