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Scientists, venture capitalists and the stock exchange: The mediating role of accounting in product innovation

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ABSTRACT

This paper examines the role of accounting in the development of a biotech innovation, called the Pyrosequencing technology, intended for the scientific and commercial analysis of human DNA. Building on an extensive case study, we follow the development of this technology from its inception to the eventual downfall of the company built around the technology, Pyrosequencing AB. Using the concept of mediating instruments (Miller and O'Leary, 2007), we focus on how accounting calculations participated in shaping particular development trajectories by connecting and mediating between discrete domains and dispersed actors. We follow the development process in three different stages: first, when it was in the hands of the scientific founders; then when it became a commercial company, partially owned by a venture capital firm, HealthCap; and, finally, when Pyrosequencing AB became listed on the stock exchange. We find that different accounting calculations were used in each of these stages, and we analyse how these shaped the development process by forging particular linkages between scientific and economic ideas and different actors. Our study contributes to the literature on the relationship between accounting and product innovation in several ways: firstly, it provides an analysis of how certain accounting calculations enable particular development trajectories by mediating between different actors and domains. Secondly, our findings show the importance of attending to the shifting economic domains and economic ideas to which development processes may be linked. Finally, the results contribute to the discussion about the enabling or constraining role of accounting by showing how the enabling of particular development trajectories entails the constraining of alternative courses of action. This research adds a longitudinal perspective to the enabling/constraining question, which has often been examined using a cross-sectional design. We introduce the concept of calculative momentum as a way to increase our understanding of the role accounting play in this regard.

1. Introduction

The relationship between accounting and product innovation has been a matter of longstanding concern in the accounting literature. To date, researchers have mainly used a contingency approach and studied the effects of accounting in the aggregate. It has been argued both that accounting constrains (Abernethy and Brownell, 1997; Rockness and Shields, 1984) and that it enables (Bisbe and Otley, 2004; Ditillo, 2004) innovation and product development.

However, it has been suggested that more detailed examinations of the relationship between accounting and

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product innovation are needed. In an early contribution to the literature, Power (1994) argued for the need to attend to the specific accounting calculations through which economic ideas were related to research and development activities. Later studies have shown how the use of particular accounting calculations can affect the product development process (Mouritsen et al., 2001, 2009). Mouritsen et al. (2009), for instance, show how the use of different accounting calculations suggested different potential directions for the product development process. These studies have suggested a change in focus from the question of *what* the effects of accounting are to the question of *how* accounting affects product innovation processes in practice.

This study follows in the footsteps of this later set of research; it seeks to understand how accounting affects product innovation processes in practice. To this end, we examine how accounting calculations were involved in the development of a biotech innovation, called the Pyrosequencing technology, intended for the scientific and commercial analysis of human DNA. By means of a longitudinal case study, we follow the development of this technology from its inception to the eventual downfall of the company built around the technology. We follow this development process in three stages: first, while driven by the scientific founders. In the second stage, the project became a commercial company, called Pyrosequencing AB, which was partially owned by a venture capital firm, HealthCap. In the final stage, Pyrosequencing AB was listed on the stock exchange.

Following Miller and O'Leary (2007), we consider accounting calculations from the perspective of their capacity to act as mediating instruments. The concept of a mediating instrument foregrounds the capacity of particular accounting calculations to shape development trajectories by connecting and mediating between discrete domains and dispersed actors. Throughout our account we will examine the mediating role of accounting calculations. We find that different accounting calculations were used to value the company and the technology during the development process. We trace how these calculations forged linkages between different actors and scientific and economic ideas, and how they, in so doing, enabled particular development trajectories.

Our study contributes to the literature on the relationship between accounting and product innovation in several ways. Firstly, it provides an analysis of how accounting calculations affect product innovation processes in practice. We suggest that accounting is primarily interesting because of the connections and mediations that it makes possible. Further, we will also show the importance of attending to the shifting economic domains and economic ideas to which the development processes were linked. We find that different types of owners operated in different domains where there were different ideas about what is valuable, and we show how these ideas were embedded in accounting calculations and related to the development process. Finally, our study contributes to the discussion about the enabling or constraining role of accounting. Whereas the previous literature has mainly discussed whether accounting enables or constrains product innovation, we will show how the enabling of particular development trajectories entails the constraining of alternative courses of action.

The remainder of this paper is organised as follows: the next section positions the study in relation to central discussions about the relationship between accounting and product innovation. Here, it is argued that, while recent studies have demonstrated that accounting may enable particular product development trajectories to be pursued, more research is needed on how this happens. This section also outlines aspects of the concept of mediating instruments that are central to the analysis of our case findings. The third section then discusses the research methods adopted during the case study and presents the background to the case. The fourth section analyses how different accounting calculations were linking scientific and economic considerations together over the course of the development process in Pyrosequencing, and examines how, in so doing, these calculations enabled particular development trajectories. Finally, the findings of the study and their implications for future research are discussed in the concluding section.

2. Theory: mediating instruments and product innovation

2.1. The relationship between accounting and product innovation

Traditionally, it has been argued that accounting constrains innovation (Abernethy and Brownell, 1997; Birnberg, 1988; Brownell, 1985; Rockness and Shields, 1984; Ouchi, 1979, 1980). In these studies, the relation between accounting and product innovation is often presented as a control/creativity-dilemma. Accounting is considered to restrict the freedom and creativity of the developers and therefore hinder the development of innovative products.

More recently, however, it has been proposed that accounting may enable product innovation (Cooper and Slagmulder, 2004; Davila, 2000; Davila and Wouters, 2004; Hansen and Jönsson, 2005; Ittner and Kogut, 1995; Widener, 2007). In these studies, accounting is considered to be a tool for helping managers to reduce the uncertainty inherent in the development process. Accounting enables product innovation either by structuring the dialogue between participants in the development process (Ditillo, 2004; Bisbe and Otley, 2004; Håkansson and Lind, 2004; Jørgensen and Messner, 2009, 2010; Nixon, 1998), or by providing information about technical properties and market conditions (Davila, 2000; Simons, 1990, 1995). Nixon (1998), for instance, found that the use of target costing in the company in his case study structured the dialogue between senior managers and project participants. In structuring the dialogue, target costing helped to reduce both technical and market-related uncertainties and thus enabled the product development project to move forward. Davila (2000) found that the prevalence of different types of uncertainty is a main factor explaining the design and use of management control systems in product development practices. He concluded that accounting can enable