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Can innovation be measured? A framework of how measurement of innovation engages attention in firms

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ABSTRACT

Many firms manage the innovation process by using metrics. Yet, whether measurement supports or hinders innovation continues to be a topic of debate. To shed new light on this debate, this paper presents a conceptual framework of how measurement engages attention in firms. We draw on attention based theory and conceptualize innovation measurement as an attention-focusing device. We identify two ideal types of measurement practices. i) *Directional Measurement*: which is based on few and unidirectional metrics and encourages exploitative innovation efforts. ii) *Conversational Measurement*: which is based on multiple and ambiguous metrics and encourages exploration. We extend theory building in the technology and accounting literatures by theorizing the role of metrics and measurement for attention and by discussing the implications of such attentional engagement for innovation performance. In so doing, we engage closely with the managerial task of managing innovation while simplifying its conditions, thereby providing actionable advice.

1. Introduction

Many firms manage the innovation process by using metrics (Chan et al., 2008). This makes the measurement of innovation an important topic in the technology- and innovation management literature (Richtnér et al., 2017). The extent to which measurement is beneficial for innovation, however, continues to be a topic of debate (Criscuolo et al., 2017; Chiesa, 1999). Even after decades of research, results are mixed. One line of research suggests that measurement can be beneficial to innovation (e.g. Markham and Lee, 2013). Scholars in this stream have argued that measurement help managers to audit structural antecedents, processes and outcomes, thus ensuring that innovation is sufficiently supported and efficiently performed. Another line of research suggests that measurement discourage managers from pursuing more ground-breaking innovation (Criscuolo et al., 2017). Here, studies have shown that innovation measurement obstructs or hinders innovation since it pushes organizational members to focus their attention too narrowly (Abernethy and Brownell, 1997; Amabile et al., 1996; Tushman, 1997).

The purpose of this paper is to shed new light on this debate by proposing a framework on how innovation can be measured. Drawing on attention based theory (Ocasio, 1997, 2011) we conceptualize innovation measurement as an attention-focusing device.

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We identify two ideal types of measurement practices: *Directional Measurement*, which is based on the use of few and unidirectional metrics, and *Conversational Measurement*, which is based on the use of multiple and ambiguous metrics. Our framework specifies mechanisms through which directional and conversational measurement affect attention and, in extension, innovation performance. We discuss how different levels of ambiguity, meaning that there is unclarity such as that it is difficult to interpret or distinguish issues and action alternatives, requires different types of measurement practices. Our core argument is that situations of low ambiguity call for directional measurement since this allows a sustained and persistent focus of attention. Situations of higher ambiguity, on the other hand, call for conversational measurement. This is because conversational measurement engages attention in a bottom-up process, allowing organizational members to consider multiple issues and action alternatives simultaneously.

On the basis of our framework, we develop actionable advice on how innovation can be better measured to produce desirable outcomes. The paper builds upon and contributes to two streams of literature: the technology- and innovation management (e.g. Boly et al., 2014; Richtnér et al., 2017) and the managerial accounting literature (e.g. Davila et al., 2009; Bisbe and Malagueño, 2015; Carlsson-Wall and Kraus, 2015). Both literatures provide important insights into the different contingencies surrounding innovation measurement. By theorizing the role of metrics and measurement for attention, our framework extends both literatures by proposing different ways in how the use of metrics can engage attention; and by discussing the implications of such attentional engagement for innovation performance. In so doing, we engage even more closely with the managerial task of measurement and innovation while simplifying its conditions, thereby providing actionable advice to managers.

2. Measuring innovation: a literature background

Following the Oslo manual, we define innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. We adopt a broad definition of innovation performance, acknowledging that innovation can have a range of performance implications within and across firms, from effects on turnover and market share, to improved productivity or efficiency. Two literatures have addressed how measurement of innovation improves or reduces innovation performance: the technology- and innovation management literature, and the literature on managerial accounting. In the following section, we provide a short overview of each.

2.1. Prior insights from research in technology- and innovation management

Table 1 provides an overview of research on innovation measurement in the technology- and innovation management literature.

Research in technology- and innovation management conclude that many firms use predefined innovation metrics to evaluate their innovative efforts, and firms that do so tend to perform better than the ones that do not (Chan et al., 2008; Markham and Lee, 2013). Multiple survey studies have aimed to identify a set of “best-practice” metrics (e.g. Chan et al., 2008; Rejeb et al., 2008; Shapiro, 2006; Visser et al., 2001). Rejeb et al. (2008), for instance, developed an innovation measurement index based on 13 best practices for innovative firms. Another example is the global Product Development Management Association’s best-practice study (see Markham and Lee, 2013). This survey identified 12 commonly applied innovation metrics, and suggested that “Profit from new product sales” and “New product sales as a percentage of total sales” were the two most frequently applied. Other studies have discussed types of metrics. For example, Pawar and Driva (1999), along with Werner and Souder (1997), emphasized the need for balancing qualitative with quantitative metrics. Shapiro (2006) suggests that firms should combine fixed and variable metrics, while Brown and Svensson (1998) conclude that firms should use a limited number of metrics.

Research in the technology- and innovation management literature further acknowledges that innovation encompass multiple performance objectives, and that different objectives require different metrics. Chiesa et al. (2009a,b), for instance, emphasize the need for metrics that capture both innovation objectives and innovation activities. Chan et al. (2008) surveyed best practices in the use of innovation metrics, and concluded that firms should pay greater attention to the measurement of innovation inputs, as a complement to innovation output metrics. Adams et al. (2006) conducted a thorough review of the innovation-measurement literature. They identified a comprehensive set of metrics, which they organized according to seven dimensions of innovation: inputs; knowledge management; strategy; organization and culture; portfolio management; project management and commercialization.

Work in this research stream has also emphasized the need for more adaptive approaches to innovation measurement. Richtnér et al. (2017) develop a framework for innovation measurement, suggesting that innovation measurement should be seen as a process, where current measurement practices are continuously evaluated and re-evaluated. Boly et al. (2014) proposed a framework of innovation capacity evaluation. In contrast to traditional measurement frameworks, where the focus centres on outcomes (e.g. number of new products), the purpose was to provide an action-oriented evaluation framework where the objective was to compare outcomes to up-front objectives. In a similar vein, Loch and Tapper (2002) implemented a performance measurement system for a technology research group by means of the case-study method. These authors also take a systemic perspective on innovation and propose four dimensions: new technologies, technical support, knowledge repository, and research process. In their paper, Loch and Tapper (2002) also discuss the need for adjusting metrics according to the nature of innovation work – such as long-term or short-term, or routine versus breakthrough innovation efforts.

In sum, the technology- and innovation management literature suggests a contingency and systemic approach to innovation measurement. Metrics should be chosen to align with external and internal conditions, and metrics should be adapted to firm-specific objectives of measurement. While this literature provides important insights about what to measure, it tells us less about how metrics are actually put to use by organizational members. For this latter issue, we turn to insights from research into managerial accounting.

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