



## Performance outcomes of supply chain agility: When should you be agile?



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### ABSTRACT

Traditionally, researchers have claimed agility as an attribute closely tied to the effectiveness of strategic supply chain management. Because of its association with customer effectiveness, some researchers have considered agility to be fundamentally different from lean, which has been linked to cost efficiency (Goldsby et al., 2006). Therefore, the relationship between agility and cost efficiency is not clear due to limited empirical scrutiny from researchers. Since elimination of waste is the cornerstone of lean, unraveling the relationship between agility and efficiency can also offer a better perspective on relationship between the fundamental paradigms of agility and lean. The manuscript makes a key contribution to the agility literature by examining the association between supply chain agility (FSCA), cost efficiency and customer effectiveness across various environmental situations. We use archival data to examine the moderating effects of environmental munificence, dynamism, and complexity. It has been argued that firms should embrace agile strategies when operating in highly uncertain environments, and embrace lean strategies when operating in more stable environments (Lee, 2002; Sebastiao and Golcic, 2008). We empirically question this premise to determine whether supply chain agility can also lead to superior performance for firms operating in stable environments. The study results also provide a better understanding of how FSCA contributes to firm financial performance. We evaluate the impact of FSCA on the firm's Return on Assets using archival data from the Compustat database. Thus, we provide evidence to managers that deploying resource to enhance FSCA can positively impact the firm's bottom line.

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### 1. Introduction

Agility has been identified as one of the most salient issues of contemporary supply chain management (Gligor and Holcomb, 2012a). Firms operate as part of dynamic global supply chains where “it's not the big that eat the small...it's the fast that eat the slow” (Jennings and Haughton, 2002). Although the benefits of agility have been documented across a variety of domains (Christopher, 2000; Wilson and Doz, 2011; Zhang, 2011), little empirical research addresses the impact of firm supply chain agility on firm performance (e.g., Swafford et al., 2006, 2008; Gligor and Holcomb, 2012b). Defined as the firm's ability to quickly adjust its supply chain tactics and operations, firm supply chain agility (FSCA) is a relatively new construct in the operations and supply chain

management literature (Braunscheidel and Suresh, 2009; Gligor et al., 2013).

Traditionally, researchers have claimed agility as an attribute closely tied to the effectiveness of strategic supply chain management (Ketchen and Hult, 2007; Lee, 2004; Li et al., 2008, 2009). Because of its association with customer effectiveness (CUST) (i.e., the extent to which customer-related objectives have been met), some researchers have considered agility to be fundamentally different from lean, which has been linked to cost efficiency (COST) (defined as the ratio of resources utilized against the results derived) (Goldsby et al., 2006). Although there are commonalities across the two paradigms, research consistently describes lean and agility as distinct paradigms (Narasimhan et al., 2006). Lean strongly emphasizes the elimination of all non-value adding activities (i.e., muda), while agility calls for rapid reconfiguration and the elimination of waste as much as possible; it does not emphasize waste reduction as a prerequisite (Naylor et al., 1999). Within lean, COST is considered a market winner, while within agility it is only considered a market qualifier (Agarwal et al., 2007). As

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such, the relationship between agility and COST is not clear due to limited empirical scrutiny from researchers. Further, the relationship has yet to be empirically examined in a supply chain setting. This is a significant gap in the literature. Consequently, agility and lean still cause considerable confusion among both academics and practitioners (Kisperska-Moron and De Hann, 2011). Without a clear understanding of the performance outcomes associated with agility, supply chain managers have little guidance on what results to expect from the implementation of agility-focused strategies. Since elimination of waste is the cornerstone of lean (Koste and Malhotra, 1999; Naylor et al., 1999), unraveling the relationship between agility and efficiency can also offer a better perspective on relationship between the fundamental paradigms of agility and lean.

Our research makes several noteworthy theoretical and managerial contributions.

First, we investigate the direct relationship between FSCA, CUST and COST. As such, we examine whether FSCA helps improve CUST, COST, both or none of these performance dimensions. This theoretical contribution has important implications for managers as it informs whether FSCA related investments can also increase COST. For instance, it could be the case that a firm that is cost driven might not attempt to develop FSCA because of possible misconception regarding its impact on efficiency. A deeper understanding of the performance outcomes associated with supply chain agility allows managers to better decide when, how much, and where to invest resources to enhance FSCA.

Second, we make a key contribution to the agility literature by examining the association between FSCA, COST and CUST across various environmental situations. We use archival data to examine the moderating effects of environmental munificence, dynamism, and complexity. It has been argued that firms should embrace agile strategies when operating in highly uncertain environments, and embrace lean strategies when operating in more stable environments (Lee, 2002; Christopher et al., 2006; Sebastiao and Golicic, 2008). We empirically question this premise to determine whether supply chain agility can also lead to superior performance for firms operating in stable environments.

Third, we provide a better understanding of how FSCA contributes to firm financial performance. This is an important theoretical contribution with significant managerial implications. We evaluate the impact of FSCA on the firm's Return on Assets (ROA) using archival data from the Compustat database. Thus, we provide confirmation to managers that deploying resources to enhance FSCA can positively impact the firm's bottom line.

In summary, we address the following research questions: How does FSCA impact firm performance? and How does the firm's environment impact the relationship between FSCA and firm performance? The rest of the manuscript is structured as follows. In the next section we present the theoretical background and the hypotheses formulation process. This is followed by the details of the empirical approach. Next, the results of analyses are discussed. Finally, research implications and limitations are explored and areas for future research are suggested.

## 2. Theoretical development

According to resource-based view (RBV), the identification and possession of internal strategic resources contribute to a firm's ability to create and maintain a competitive advantage (Barney, 1991; Crook et al., 2008). The dynamic perspective of RBV helps explain a firm's competitive advantage in changing environments and, therefore, facilitates a better understanding of how FSCA impacts performance.

### 2.1. Hypotheses development

Dynamic capabilities represent "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997). The form that dynamic capabilities take on depends on the firm's environment. Within stable industries they are complicated, detailed analytic processes that depend heavily on prior knowledge to deliver expected outcomes. In unstable industries they are simple, experiential, unstable processes that are heavily contingent on rapidly created new knowledge to yield unpredictable outcomes (Eisenhardt and Martin, 2000). Dynamic capabilities are higher level capabilities (Winter, 2003) that are dedicated to the modification of operating routines (Zollo and Winter, 2002). They allow firms to reconfigure their resources and thus capitalize on environmental changes (Teece, 2007). FSCA displays these characteristics and, therefore, can be considered a dynamic capability that results from the firm's ability to reconfigure firm-level and supply chain-level resources (Gligor and Holcomb, 2012b; Blome et al., 2013). Blome et al. (2013) posit that supply chain agility is a complex capability that is a central component of the firm's competitive strategy, particularly in an uncertain environment. Since dynamic capabilities are hard to replicate, they may provide sustainable competitive advantage. As such, FSCA can positively impact firm performance (Gligor and Holcomb, 2012b).

Performance measurement is an analysis of both efficiency and effectiveness in accomplishing a given task (Mentzer and Konrad, 1991; Fugate et al., 2009). Efficiency is defined as the ratio of resources utilized against the results derived, and is referred to in this research as COST; effectiveness is defined as the extent to which customer-related objectives have been met, and referred to as CUST (Mentzer and Konrad, 1991).

CUST is at the very core of agility (Goldman et al., 1995). As a business concept, agility was introduced as a means for firms to meet the rapidly changing needs of the marketplace. As Gligor and Holcomb (2012a) point out in their comprehensive literature review of the concept, "enriching the customer" is one of the most common outcomes associated with agility. For example, van Hoek (2001) describe it as a management concept centered around responsiveness to dynamic markets and customer demand. Ismail and Sharifi (2006) refer to agility as rapid response to changes in supply and demand, while Lee (2004) similarly describes it as the ability to quickly react to unexpected shifts in supply and demand. Meeting customer expectations in the context of shortened delivery lead times is a key feature of agile entities (Cao and Dowlatshahi, 2005). Agility emphasizes the ability to react effectively to changing markets (Jain et al., 2008) by providing mass customization (Sanchez and Nahi, 2001) as well as catering to individual customer specifications (Fliedner and Vokurka, 1997).

Research has also consistently associated agility with effective supply chain management (Christopher, 2000; Ketchen and Hult, 2007). Within a supply chain context agility has been referred to as an effective response to change (Holsapple and Jones, 2005), and as effective, flexible accommodations of customer demand (Christopher, 2000). Also, Ketchen and Hult (2007) suggest that agility is a criterion for gauging a supply chain's effectiveness. However, despite the plethora of theoretical claims, there has been little empirical effort to support this relationship. To empirically test this premise, the following hypothesis is considered:

**H1.** There is a direct and positive relationship between FSCA and CUST.

There are divergent perspectives across operations and supply chain management researchers regarding the relationship between agility and efficiency. Some have considered agility to be significantly different from lean, which has been linked to COST (e.g.,

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