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# The impact of supplier integration on customer integration and new product performance: The mediating role of manufacturing flexibility under trust theory

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## ABSTRACT

The impact of supply chain integration on new product development has been very well studied in literature. However, little literature examines the relationship between supplier integration and customer integration when they influence new product performance. This study aims to explore the complicated relationships among supplier integration, customer integration and new product performance via the mediating roles of manufacturing flexibility and service capability under the trust theory. The research is based on the data from International Manufacturing Strategy Survey (IMSS). It is found that both supplier integration and customer integration had positive direct effects on new product performance. It is also found that supplier integration has a positive impact on customer integration through the mediating role of manufacturing flexibility. The study contributes to supply chain integration by exploring the complicated relationship between supplier integration and customer integration based on the trust theory. It bears implications for both practice and future research.

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## 1. Introduction

New product development (NPD) is one of the critical processes by which companies sustain or even increase their competitive advantage (Tessarolo, 2007). Research in NPD field has shown that a number of factors are important to the creation of successful new products, and integration is recognized as one of critical enablers. Integration in NPD takes complex and mixed forms, such as cross-functional team integration, intra-process or concurrent integration, resource integration, supply chain or external integration (Hong et al., 2004). As the benefits of internal integration become more widely acknowledged, the literature is increasingly focusing on the relationship between external supply chain integration and new product development. Previous literature suggested that a company's ability to integrate its supplier and customer can improve new product performance and business performance (Koufteros et al., 2005; Petersen et al., 2003, 2005; Flynn et al., 2010). However, the following questions are still needed to be answered in this field.

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First, recent literature has addressed the importance of customer integration in product development (e.g. Bonner, 2005; Enkel et al., 2005; Fang, 2008; Lam and Chin, 2005). However, it was observed that many companies did not integrate customers successfully in their product development process (Tollin, 2002; Enkel et al., 2005). One of the important reasons is that customers will consider the inherent risks in integration with manufacturers, such as the loss of know-how to the outsiders, dependence on manufacturers, increased costs of coordination and inflexibility (Das and Narasimhan, 2006; Enkel et al., 2005). The existing literature suggested the design of technological tools (such as information system, Internet based communication) and internal integration (such as cross-functional integration) to decrease the risks perceived by customers so as to improve customer integration (Fuller et al., 2010; Piller and Walcher, 2006; Devaraj et al., 2007; Tollin, 2002; Frohlich and Westbrook, 2002; Vickery et al., 2003). Nevertheless, the nature of customer integration is fundamentally a social process so that technological tools cannot solve all of the problems in customer integration (Ragatz et al., 2002). Therefore, it needs to consider other factors besides technologies to improve customer integration in further research.

Second, a great deal of effort have been spent on showing how companies that incorporate a customer's perspective in new product technology decisions developed more successful products

(e.g. Bonner, 2005; Fang, 2008; Lam and Chin, 2005). Supplier integration is the most common form of supply chain integration, while it is until the past years when supplier integration has received significant attention in new product development efforts (Petersen et al., 2005; Lin and Chen, 2008; Primo and Amundson, 2002). Evidence supporting supplier integration is less clear than evidence on the positive contribution of customer integration, and the influential mechanism of supplier integration in new product development is still largely a “black box” (Ragatz et al., 2002; Primo and Amundson, 2002). Therefore, future research will identify and examine how supplier integration affect new product performance (Fawcett and Magnan, 2002; Swink et al., 2007; Petersen et al., 2005; Jain et al., 2009).

Third, researchers considered supplier integration and customer integration as two distinct concepts and have limited their analyses to integration with customers (Bonner, 2005; Fang, 2008; Lam and Chin, 2005) or suppliers (Das and Narasimhan, 2006; Handfield et al., 2009; Jain et al., 2009; Vachon et al., 2009) in order to ascertain their distinct contribution to performance. A few recent studies have begun to take a broader perspective and consider both the supplier integration and customer integration simultaneously (Tracey and Tan, 2001; Tan and Tracey, 2007; Lee et al., 2007; Flynn et al., 2010; Danese and Romano, 2011). In fact, customer integration was significantly correlated with supplier integration and the interaction of them had positive impact on firm performance (Lau et al., 2010; Frohlich and Westbrook, 2001; Devaraj et al., 2007). For instance, it is well known that the benefits due to bullwhip-effect reduction are maximized when a high level of customer integration is accompanied by a high level of supplier integration. However, the report on the connection between supplier integration and customer integration in new product development is still very limited. Therefore, an interesting opportunity to improve our understanding of the mechanism of supply chain integration lies in the empirical exploration of relationship between supplier integration and customer integration.

To address these gaps, this study explores the relationship between supplier integration and customer integration and their effects on new product performance from the theoretical perspective of trust theory. The nature of customer integration is fundamentally a social process so that technological tools cannot solve all of the problems in customer integration (Ragatz et al., 2002). A partnership in essence is characterized by a long-term commitment and mutual trust between the collaborators (Morgan and Hunt, 1994). Trust is defined as “the belief that one’s partner will act in a predictable manner, will keep his word, and will behave in a way that will not negatively affect the other” (Spekman et al., 2002). When a firm believes the other party is reliable, it is willing to cooperate with them (Morgan and Hunt, 1994). The absence of trust among supply chain members might hinder the activities related to it, and cause problems of free riding, hold-ups, and leakages, which lead to less satisfactory supply chain performance or even supply chain defection (McCarter and Northcraft, 2007). Competence trust and goodwill trust were regarded as two types in buyer–supplier relationships (Sako, 1992). Competence trust reflects confidence in a partner’s ability to fulfill an agreed upon obligation and goodwill trust refers to the expectation that a partner intends to fulfill their role and responsibilities (Das and Teng, 2001). We argue that manufacturing flexibility is one effective way of enhancing competence trust since it is a core competence against uncertain environment for a manufacturer (Narasimhan et al., 2004), and service capability is one effective way of improving goodwill trust because of the social and interaction nature of service (Vargo and Lusch, 2008). Therefore, there may be two potential contributions to the literature on supply chain integration and new product development. First, we

combine supplier integration and customer integration in one study and examine their impacts on new product performance. Second, we explore the relationship between supplier integration and customer integration through the mediating roles of manufacturing flexibility and service capability from the theoretical perspective of trust.

The rest of the paper is structured as follows. The next section develops the hypotheses. Thereafter the method and the results of the study are presented. The paper ends with a discussion of its theoretical contribution, limitations and future directions, the managerial implications, and a conclusion.

## 2. Hypotheses development

Our conceptual framework is presented as in Fig. 1. The relationships among various constructs will be developed as follows.

### 2.1. The direct impact of external supply chain integration on new product performance

As being information intensive and resource requirements, new product development process was not merely a chain of intra-firm activities, but a network of inter-firm processes (Mele et al., 2010). External integration is related to the ability to gain further information by involving external entities in the development process through network relationships (Tessarolo, 2007). Through integration, a firm can partner with its external entities to structure their inter-organizational strategies, procedures and behaviors into collaborative, synchronized and manageable processes in order to create values (Das and Narasimhan, 2006; Jayaram and Tan, 2010; Zhao et al., 2008). Customers and suppliers are the major sources of innovative ideas for stimulating new products. For example, Procter & Gamble (P&G) aimed to source 50% of all innovation outside the company from suppliers and customers (Chesbrough, 2003). We argue that supplier integration and customer integration have both similar and different mechanisms in new product development. We elaborated the impacts of customer integration and supplier integration on new product performance separately as follows.

Customer integration is the extent to which customers and manufacturers coordinate decisions related to inventory level, production planning, demand forecasting, order tracking, and products delivery (Wong et al., 2011). The positive effect of customer integration on new product performance could be explained from the following aspects. First, customers’ wants and needs, as well as their acquired knowledge through the actual use of products, make them an essential external resource for new product development (Thomke and von Hippel, 2002). Customers can provide innovative ideas when they specify their requirements and articulate their unmet needs (Chesbrough, 2003). In addition,

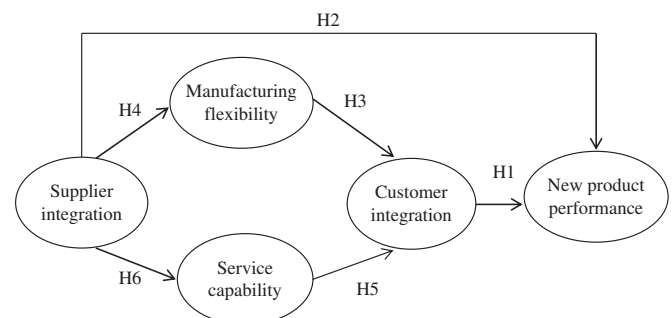


Fig. 1. The conceptual framework in this study.

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