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# Integration capabilities as mediator of product development practices–performance

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### ABSTRACT

The use of integration practices, both internal (where various functions work together) and external (links with customers and suppliers during development), are espoused in the new product development (NPD) literature. However, empirical findings in the literature suggest adoption of integration practices does not necessarily lead to positive performance. We introduce the concept of integration capabilities to explain the relationship between use of integration practices and NPD performance. We tested a mediation model using data from 141 Japanese and American firms and found that effects of both types of integration on time and product performance were mediated by the integration capabilities developed. We also found differential effects of the type of integration. The findings demonstrate that developing superior integration capabilities are needed for companies to meet and exceed product development expectations in terms of both product and time performance. Simply, a company may utilize integration practices but if it does not utilize them in such a way as to generate real capabilities, the use of integration practices may not lead to positive performance effects.

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### Introduction

The new product development (NPD) and operations literature on collaboration practices espouses the use of collaboration with suppliers and customers (Droge et al., 2004) and internal functions (Millson and Wilemon, 2002; Tassarolo, 2007). It is not clear, however, whether greater levels of

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collaboration alone result in positive performance. For example, Swink et al. (2007) argued that too much functional collaboration could negatively affect NPD performance. We argue that a more complete picture of the performance effects of collaboration practices in NPD requires examining multiple types of collaboration and potential mediator variables. Specifically, following a resource-based view of product development (Verona, 1999), achieving the benefits of collaboration practices requires the development of integration capabilities (Marsh and Stock, 2003). Furthermore, only recently have researchers begun to examine multiple types of collaboration practices and more complex relationships (Flynn et al., 2010; Koufteros et al., 2010). The roles of capabilities as per the Resource Based View of the firm and meditation effects are only now becoming more widely studied in innovation-based research (e.g. Chen and Tsou, 2012; Rodriguez-Pinto et al., 2012). As such, despite the plethora of research on collaboration practices, we still have much to learn about how to manage them toward achieving high performance effects. This constitutes an important research venue into maximizing efficiencies and effectiveness of product innovation.

These collaboration practices, within the firm and with external partners, appear to be related to NPD and operational performance (Droge et al., 2004; Millson and Wilemon, 2002, 2006). However, in extending research in the area we ask the questions: (1) Do integration capabilities better explain the connection of collaboration practices with performance parameters?; and (2) Do the types of collaboration have different total effects on performance? These questions constitute an important gap in the literature on the use of collaboration practices in NPD. Despite an increasing amount of research, questions remain of how and with what impact different collaboration practices exert their effects on NPD performance and efficiencies.

Collaboration practices may be of two types – internal and external – as investigated by previous studies. Internal collaboration (exemplified by communication, information sharing and use of integrated teams from functional areas of product development, marketing and manufacturing) has an extensive history in the literature (e.g., Ettl, 1997; Ettl and Reifeis, 1987; Gupta et al., 1986; Parry and Song, 1993; Ruekert and Walker, 1987; Swink, 1999). Studies of the external collaboration practices, exemplified by interaction of NPD design teams with customers and suppliers of the firm, are relatively new when compared with research on internal collaboration (e.g., Hartley et al., 1997; Parker et al., 2008; van Echtelt et al., 2007; Wasti and Liker, 1999).

Studies examining both collaboration practices simultaneously are only recently being produced (e.g. Droge et al., 2004; Flynn et al., 2010; Koufteros et al., 2005, 2010; Millson and Wilemon, 2002, 2006). Extant studies tend to focus on specific examples of collaboration practices – for example, internally on marketing–manufacturing integration (e.g. Calantone et al., 2002; Kahn and Mentzer, 1994; Swink and Song, 2007) or externally on early supplier involvement (e.g. Petersen et al., 2005; Primo and Amundson, 2002; Stump et al., 2002). The research described here adds to our knowledge of the effects of collaboration practices on performance via integration capabilities. These capabilities help a firm develop a better knowledge of market information and needs and innovation activities and processes (Verona, 1999). Our research design allows us to look at the collaboration practices simultaneously in order to test the overall and individual effects on performance and offers a better understanding of the beneficial effects of collaboration practices on NPD performance, moving away from a mechanistic or deterministic vision of the practice–performance relationship.

The next section reviews the literature of collaboration practices with NPD performance and develops the conceptual framework behind the meditation model of our research. We then develop hypotheses linking the two types of collaboration practices with integration capabilities and finally performance in terms of NPD product success and time performance. We then discuss the methodology employed and use our bi-country dataset of 141 firms to test the mediation hypotheses. The results are reported followed by a discussion of the implications of the findings.

## **Conceptual model**

### *The use of collaboration practices and integration capabilities as a mediator*

Research on collaboration practices has tended to focus on either internal or external integration, with the former being the more widely studied phenomenon until recently (Koufteros

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