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Impact of New Product Development Flexibility on Performance

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ABSTRACT

Previous research has recognized the importance of flexibility in the new product development process and its impact on the firm's performance. This study develops and tests empirically a conceptual model that captures the relationships among a firm's new product development flexibility, customer orientation, and market performance. This study also evaluates the moderating effect of innovation strategy on these relationships. The results show that the effect of new product development flexibility on firm performance is contingent upon the type of innovation strategy. Managerial and theoretical implications are discussed.

KEYWORDS: New Product Development, Firm Performance, Market Orientation, Customer Orientation, Innovation Strategy

INTRODUCTION

With increased competition in the global marketplace, firms must achieve flexibility in their new product and service development efforts and become responsive to the changing environment.

In this globalized market, customers have become more empowered due to their ability to obtain increased access to rich online information and access to products and services from a myriad of e-commerce sites. This availability of diverse shopping alternatives and customized product options make global customers less loyal and far less forgiving. As a result of the empowered customer, to successfully compete, firms must be paying continuous attention to customer comments and should monitor the performance of their products and services as well as making rapid adjustments to their product and service offerings to retain and attract customers (Lin & Wu, 2014).

Flexibility in the new product development process can have a significant impact on the value of NPD projects (Kettunen, Grushka-Cockayne, Degraeve, & De Reyck, 2015) such that the more intense or innovative the environment, the greater the value of flexibility. Kettunen, et al. (2015) indicated that the types of flexibility required in NPD include various strategies and decision-making ability that can enable the abandonment of the project development, that can enhance the product development, that can defer the product launch, and that can switch the development strategy to pursue more a more radical innovation.

However, little attention has been given to the contingencies of the NPD flexibility - firm performance relationship. To address these attendant concerns, a conceptual framework is developed to integrate key antecedents and consequences of NPD flexibility. A conceptual model captures the role of NPD flexibility while incorporating customer orientation as an important antecedent. Specifically, the purpose of this study is to examine the relationships among NPD flexibility, customer orientation as an antecedent of NPD flexibility and the consequence of NPD flexibility (i.e., market performance). In addition, this study evaluates the moderating effect of innovation strategy on the relationships among customer orientation, NPD flexibility, and market performance. It should be of interest to marketers and managers because it extends our knowledge of the role and significance of NPD flexibility in the globalized competitive markets.

THEORY DEVELOPMENT AND HYPOTHESES

Part of a firm's survivability strategy is its ability to become innovative and agile by developing a number of innovative product and service technologies and by developing flexibility for introducing, developing, manufacturing, and delivering products and services to target customers.

NPD flexibility can be considered as a specific dynamic capability that enables the firm to quickly and effectively respond to market trends and customer preference changes (Roberts & Grover, 2012). Dynamic capabilities can be interpreted as an extension of the resource-based theory, these specific capabilities should be valuable, difficult to produce, rare and non-substitutable (e.g., Barney, 1991; Day 1994; Piening & Salge, 2015; Wernerfelt, 1984). Further, these capabilities should enable firms to create, deploy and protect the intangible assets that support superior long-run performance of the firm (Teece, 2007).

NPD Flexibility

Previous research studies have demonstrated that the faster a firm is able to develop new products, the greater the probability the firm will outperform its competitors. Therefore, every firm needs to know what factors are important in the new product development process to help them achieve this speed (Tessarolo, 2007) as flexibility can have a significant impact on the

value of NPD projects (Kettunen, Grushka-Cockayne, Degraeve, & De Reyck, 2015). NPD flexibility is achieved by embedding suppliers and customers in the NPD process.

The impact from integrating supply chain members on the new product development process has been very well researched (He, Lai, Sun, & Chen, 2014). Further, as the voice of the customer becomes embedded in the new product development effort, a firm can provide personalized customization products to customers. Thus, customer integration is viewed as a key factor with customer integration being defined as the extent to which customers and firms coordinate mutual decisions. A close relationship between the customers and the firms offers opportunities for improving the accuracy of demand information, which ultimately has the potential to reduce the firm's design and production planning time. As one of the firm's flexible resources, this may significantly affect how quickly the firm can react to new market conditions. Ultimately, the product's success in the market depends not only on the product's performance, but also on the firm's competitors' capability to develop competing products. Thus, the intensity of the market that a firm experiences can become the deciding factor for the pace at which new and improved products are introduced by the firm and its competitors.

Customer Orientation

As noted by Roberts and Grover (2012), the firm needs to be customer-oriented and to have integrated the voice of the customer into the NPD process to be flexible. Customer orientation includes intelligence dissemination that is critical to a firm's ability to sense and respond to market opportunities (Kohli & Jaworski, 1990; Teece, 2007). While customer orientation is focused on a firm's ability to respond to customer needs, NPD flexibility expands beyond just being customer orientated. NPD flexibility requires that a firm possess the capability of designing and developing new products or modifying existing products to serve emerging customer segments. Thus, customer orientation can facilitate the firm in being more flexible by better responding to customer-based opportunities in turbulent markets (Roberts & Grover, 2012; Wang, Zhao, & Voss; 2016).

Moderating Effect of Innovation Strategy

Customer orientation helps firms understand current customers and their expressed needs as well as their latent needs or opportunities (Atuahene-Gima, Slater, & Olson, 2005; Narver, Slater & MacLachlan, 2004). Customer orientation is closely linked to NPD flexibility. In fact, customer orientation has been shown to be a strong link with the success of firms' innovative efforts (Atuahene-Gima, 1996; Kohli & Jaworski, 1990; Slater & Narver, 1994; Zhang & Duan, 2010). Customer orientation can also help non-innovative firms more in achieving NPD flexibility as those firms are less sophisticated in their market-sensing and linking processes and are lacking in the needed innovation capabilities (Kotler & Keller, 2009; Narver, Slater & MacLachlan, 2004; Voola & O'Cass, 2010).

Customer orientation leads to superior performance (Kotler & Keller, 2009). An organization-wide customer orientation has been found to have a positive impact on firm performance and their new products (Jaworski & Kohli, 1993; Moorman, 1995; Narver & Slater, 1990). Also, Kumar et al. (2011) provide evidence indicating that customer orientation has a positive effect on the performance of the firm in both the short run and long run. In addition, research by Zhang and Duan (2010) and Voola and O'Cass (2010) suggest a direct relationship between customer orientation and firm performance.

Zhang and Duan (2010) found slightly stronger direct effect of customer orientation on market performance for non-innovators. Coltman et al. (2008) suggest that customer orientation has a stronger direct effect on responsive criterion such as market performance (e.g., level of repeat business). Thus, non-innovating firms focusing on the immediate effect of satisfying current customer needs (Kumar et al., 2011) can expect that the effect of customer orientation will be stronger on market performance. These discussions lead to the following hypothesis.

Hypothesis 1: The relationship between customer orientation and (a) NPD flexibility and (b) market performance is moderated by a firm's innovation strategy such that the relationship will be stronger for non-innovators than innovators.

The innovation strategy chosen by the firm can help the firm differentiate itself from other firms through innovativeness of their products and services (Bode & Alig, 2011). The innovator strategy pursues the active design and development of the innovation idea. Innovation activities undertaken by the firm focus on the successful implementation of an idea for a product in a certain market (Bode & Alig, 2011). The firm must assess their potential resources and intellectual capital, and then select an appropriate innovation strategy to match their objectives and capabilities. The resource profiles of the firm indicate their ability to respond to market opportunities with the various innovation strategies (Chen, Su, & Tsai, 2007). Each of the innovation strategies evaluated by the firm provides different advantages and has different requirements of the firm.

The type of innovation strategy followed by a firm can drive the relative importance of NPD flexibility and influence the NPD flexibility - firm performance relationship. The chosen innovation strategy can influence the firm's resource allocation and competitive focus of a firm. Innovators must focus on NPD flexibility in addition to innovativeness of products and services to improve their firm's performance. While there is evidence to suggest a direct link between innovativeness and business performance (Hult et al., 2004; Hog & Ha, 2009; Menguc & Auh, 2006; Zhang & Duan, 2010), NPD flexibility is also important for innovators, to improve firm performance. Both becoming innovative and flexible requires high level of attention and resources such that most innovators would expect NPD flexibility has a more positive impact on their firm performance than non-innovators. On the other hand, as non-innovators are focusing on learning and adapting to innovators' product offerings, the ability to identify and respond to environmental changes can be less critical for their market and firm performance. These discussions suggest that the effect of NPD flexibility on firm performance may vary depending on the firm's innovation strategy.

Hypothesis 2: The relationship between NPD flexibility and market performance is moderated by a firm's innovation strategy such that the relationship will be stronger for innovators than non-innovators.

RESEARCH DESIGN

Sample and Data Collection

Data were collected for this study via a mail survey. Top executives of manufacturing firms from two industry groups were selected for this study using a key informant approach. The two industry groups that were selected were from the chemicals and allied products (SIC 28) and industrial and commercial machinery (SIC 35) sectors. A total of 172 useable responses were obtained after the three waves resulting in a response rate of 16.4 percent.

Description of the Measures

Most of the measures were adapted from previous studies. The customer orientation measure was adapted from Kohli and Jaworski (1990). Market performance was measured by using three rating scale items anchored by 5 (to a great extent) and 1 (to a very little extent). These constructs served as the dependent measure; the items were adapted in part from Moorman (1995), Griffin and Page (1993) and Morgan and Strong (2003). Firms are classified into innovator and non-innovators based on the primary innovation strategy pursued by a firm. Out of 172 responding firms, 71 firms were classified into innovators and the remaining 101 firms were classified into non-innovators.

The control variables included in the study are firm size and the respondent's years of working in the present position. A firm's size may have influenced the antecedents of firm performance (Glaister, Dincer, Tatoglu, Demirbag, & Zaim, 2008; Pearce, Freeman, & Robinson, 1987). Firm size was defined as the number of employees in a firm (Im & Workman, 2004; Narver & Slater, 1990) and was used to control for the impact of a firm's resources on the firm's performance (Chandy & Tellis, 2000; Im & Workman, 2004; Lin, Lee, & Hung, 2006; Narver & Slater, 1990). Also included as a control variable was the respondent's number of years in their present position. It was envisioned that "years in the present position" should count for industry experience and how to deal with or how to confront different situations (Zahra & Nielsen, 2002).

RESULTS

Confirmatory Factor Analysis

The measurement properties were assessed in one confirmatory factor analysis (CFA). Confirmatory factor analysis results of the measurement items are presented in Table 1. Table 1 shows means, standard deviations, composite reliabilities, factor loadings, and goodness of fit indices. The fit indices showed that the model resulted in a good fit to the data ($\chi^2 = 135.17$, d.f. = 48, normed fit index (NFI) = .90, comparative fit index (CFI) = .93, root mean square residual (RMSR) = .075).

Table 1: Confirmatory Factor Analysis Results

	Number of Items	Mean	Standard Deviation	Composite Reliabilities (CR)	Lambda Coefficients
Customer Orientation	3	5.54	0.92	0.80	.71 - .78
New Product Development Flexibility	3	3.95	1.09	0.63	.48 - .73
Market Performance	3	4.20	1.65	0.87	.72 - .92
Financial Performance	3	4.70	1.42	0.84	.75 - .84

Note: Fit Indices: $\chi^2 / \text{d.f.} = 135.17 / 48$; Normed Fit Index (NFI) = 0.90; Comparative Fit Index (CFI) = 0.93; Root Mean Square Residual (RMSR) = 0.075.

Hypotheses Test

Data were analyzed by path analysis using LISREL 8.8. In testing the path model, the summated scores of the scale items were used as indicators of the construct. Using the multi-group LISREL approach, the path model was estimated for the two innovation strategy type firms. The global fit indices indicate a good fit of the model for the data. The chi-square for the model is 16.00 with 14 degrees of freedom. The normed fit index (NFI) is .91 with goodness of fit index (GFI) of .98. The root mean square residual (RMSR) is .042.

To test whether the path coefficients for the two innovation strategy type firms are significantly different, chi-square difference with one degree of freedom was calculated between the unconstrained model and constrained model with the path coefficient equalities.

The path coefficients from customer orientation to NPD flexibility for the two innovation strategy type firms were compared to test the moderating effect of the type of innovation strategy. The chi-square difference test result showed that the two path coefficients are not significantly different ($\Delta\chi^2 = 0.55$ with 1 d.f., $p > .05$). The path coefficients from customer orientation to NPD flexibility are significant for both innovators and non-innovators with the path coefficient of .49 and .59 respectively. These results do not provide support for the Hypothesis 1a. The chi-square difference for the path from customer orientation to market performance is significant ($\Delta\chi^2 = 5.48$ with 1 d.f., $p < .05$). The path from customer orientation to market performance is positive and significant for the non-innovators ($\beta_{\text{Non-innovators}} = 0.32$, $p < .01$) but not significant for the innovators ($\beta_{\text{Innovators}} = -0.08$, $p > .05$). Hypothesis 1b is supported by the results.

The chi-square difference for the path from NPD flexibility to market performance is significant ($\Delta\chi^2 = 4.76$ with 1 d.f., $p < .05$). The path from NPD flexibility to market performance is positive and significant for the innovators ($\beta_{\text{Innovators}} = 0.25$, $p < .05$) but not significant for the non-innovators ($\beta_{\text{Non-innovators}} = -0.12$, $p > .05$). These results provide support for Hypothesis 2.

DISCUSSION

This study developed and empirically tested a conceptual model capturing the antecedent and consequence NPD flexibility. The moderating effect of the firm's innovation strategy on the relationships among customer orientation, NPD flexibility, and market performance was also incorporated into the model. The findings provide some insights on the contingency effect of innovation strategy and offer theoretical and managerial implications.

The findings show that the customer orientation-market performance relationship as well as NPD flexibility-market performance relationship are moderated by the type of innovation strategy chosen by the firm. NPD flexibility is positively related to market performance for innovators. However, NPD flexibility is not significantly related to market performance for non-innovators. These results suggest that innovators need to pursue NPD flexibility in addition to innovativeness to be successful in competitive global markets. Being innovative alone is not sufficient for innovative firms to maintain market leadership. For the non-innovators, NPD flexibility is not the type of dynamic capability needed for success as they compete in the global market with other competitive advantages such as cost.

This study also found the significant effect of customer orientation on NPD flexibility for both innovators and non-innovators. Customer orientation as a component of market orientation is a significant antecedent of NPD flexibility. These results provide support for the importance of understanding and sensing customer needs in order to develop the NPD flexibility capability of a firm.

REFERENCES

References available upon request.