JOURNAL OF SMALL BUSINESS STRATEGY

TYPES OF PRODUCT INNOVATIONS AND SMALL BUSINESS PERFORMANCE IN HOSTILE AND BENIGN ENVIRONMENTS

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ABSTRACT

The relationship between innovation and performance has been widely studied. In addition, many studies have examined moderating effects of types of competitive environments on this relationship. However, little work has been done to examine how specific types of product innovation strategies are related to performance in hostile and benign environments.

Using results from a survey of a sample of small businesses, this paper used regression analysis to examine how degree of change in new product offerings and number of new product lines were related to satisfaction with financial performance. While neither type of innovation was related to satisfaction with performance in benign environments, the number of new lines developed was positively related to satisfaction with financial performance in hostile environments. The results from this sample indicate that the strategy of innovation through development of more new product lines may be preferable to developing dramatic innovations for small businesses in a hostile external environment.

INTRODUCTION

Innovation has been identified as a key source of competitive advantage for small firms (Changhanti & Changhanti, 1983; Figenbaum & Karnani, 1991; Meredith, 1987). Innovation has the potential to create new markets or change existing markets to create new patterns of competition and consumer behavior (Brown, 1992). Through innovation, small firms may gain first mover advantages in good or service markets (Carpenter & Nakamoto, 1989; Kallenberg, 1986), create markets and customers (Berthon, Mac Hulbert, & Pitt, 2004), respond in a timely manner to moves by competitors (Covin & Slevin, 1989), or more effectively differentiate goods or services on offer (Miller & Toulouse, 1986). Thus, innovation may contribute directly to profitability and long term viability of businesses.

Innovation by firms has been widely examined. Studies have typically focused on a general innovation strategy, where innovation is seen as a complex set of interacting factors which together affect financial performance (e.g., Covin & Slevin, 1989). However, little work has been done to evaluate how specific types of product innovation strategies affect financial performance in small businesses. Innovation in small firms is different than innovation in large firms (Verbees & Meulenberg, 2004). Unlike larger firms, small businesses typically have limited resources and may have to choose to pursue a limited number of innovative tactics rather than pursuing a broad-based, multi-faceted innovative strategy (Firth & Narayan, 1996).

After choosing a product innovation strategy, firms may choose to focus their efforts on developing a large number of product innovations, or they can focus their efforts on developing innovations that differ a great deal from present product offerings of the firm. deBrentani (2001) noted that many studies have overlooked the fact that degree of innovativeness of a product may be a key variable in the relationship between innovation and a firm's financial performance.

Product innovations may be dramatic, or they may be incremental (Garcia & Calantone, 2002). Dramatic product innovations vary greatly from current products; may be very costly to produce, requiring new equipment and technology (Garcia & Calantone, 2002); and typically require businesses to educate consumers as to the differential advantage of the new product, as well as how the product should be used. Dramatic product innovations may therefore require a substantial investment in promotional support (deBrentani, 2001). Substantial customer resistance may result in product failure and devastating losses for a small business.

Incremental product innovations may differ only slightly from existing products (Garcia & Calanatone, 2002). Cost of production tends to be much lower than for dramatic product innovations. Marketers need only convince the customer that the product is better than its competitors, rather than educate the customer on how to use the product, lowering the cost of promotional efforts. Dramatic innovations therefore tend to be high-risk, high-reward innovations, whereas more incremental innovations have lower risk. New products may increase costs significantly over an imitative product, as well as increasing average time to market dramatically (e.g., Robinson, 1990). In addition, the failure rate of those products that are the first to sell in a new product category (market pioneers) is 47 percent (Tellis & Golder, 1996, p. 1).

Dramatic innovations are typically very costly and risky. Incremental innovations are most often much less costly, with a corresponding decrease in risk. However, it is not clear from the literature which strategy should be undertaken by a small business owner and under what conditions.

While studies have shown that the relationship between an overall innovative strategy and performance is impacted by the type of competitive environment a firm operates in, little work has been done to examine how the relationship between different product innovation strategies and performance in small businesses is affected by the type of environment. This study seeks to provide small business owners with insight into the potential impact of different types of innovative product strategies on performance. Specifically, the purpose of this study is to examine the relationship between the type of innovative strategy (i.e., degree of innovation or number of new product lines) and satisfaction with performance in competitive and benign environments.

PRODUCT INNOVATION AND FINANCIAL PERFORMANCE

Studies examining relationships between product innovation and financial performance have generally yielded inconsistent findings. For example, in a study of 260 high tech firms, Pearce and Carland (1996) found that firms that placed a strong emphasis on new product introductions

reported higher levels of sales growth, profitability, and ROI than firms that placed a lesser emphasis on new product introductions. Likewise, in a study of 97 manufacturing firms, Robinson and Pearce (1988) found that firms that placed a major emphasis on product innovation, including development of new products and adaptations to existing product lines, were among the highest performing firms in the sample. However, this situation was only true for those firms that also possessed an adequate level of planning sophistication.

Similarly, Dess, Lumpkin, and Covin (1997) found that innovative differentiation was a positive predictor of firm performance. Hsueh and Tu (2004) found that innovation was positively related to both profits and sales growth. Keller (2004) also found that new product development was related to profitability for a variety of new products, with key variables being time to market and ability to achieve first mover advantage. McMillan, Mauri, and Hamilton III (2003) found that the number of new products (as measured by new molecular entities approved) was significantly related to company performance, as measured by the market to book ratio for firms in the pharmaceutical industry in the United States.

In a study of entrepreneurial activity in 102 manufacturing firms, Zahra (1993) reported positive associations between product innovation, as measured by the emphasis that firms placed on developing new products; rates of new product introductions, levels of spending on product development; number of new products added by companies; and both return on sales and sales growth. However, the author also reported non-significant relationships between these variables for those firms operating in benign competitive settings. Contrary to many of the previous findings, Mishra, Kim, & Lee (1996) found that increased frequency of new product introductions was associated with failure of new products.

These studies show that, in general, it appears that innovation is positively related to performance. However, these studies do not differentiate between types of innovation strategy in order to determine if the strategies affect firm performance in different ways.

DEGREE OF INNOVATION AND PERFORMANCE

In terms of innovation, firms may pursue a strategy of numerous, incremental innovations (as discussed above) or fewer, more dramatic innovations (Garcia & Calantone, 2002). Different strategies, in terms of degree of innovation, may have differing impacts on financial performance of the firm. The uncertainty associated with dramatic innovations is much higher than that associated with incremental innovations (Avlonitis, Papastathopolou, & Gounaris; 2001). For example, in a study of firms that provided business to business services, deBrentani (2001) found that incremental adaptations to service offerings tended to be more successful than more radical adaptations to offerings. The author explained that the fit of service offerings with current customer needs, level of employee expertise in providing services, and the ability of firms to readily translate to customers the features and benefits of incremental service offerings contributed to this finding. Similarly, Goldenberg, Lehmann, & Mazursky (2001) found that radical innovations were associated with new product failure. Yap and Souder (1994) found that customers in some markets were not seeking unique product solutions touting superior performance.

Garcia & Calantone (2002) proposed that the degree of innovation may affect both the speed of adoption of an innovation and the marketing strategy required for communication efforts concerning the innovation. Some authors (e.g., Dhebar, 1996; Mick & Fournier, 1998) note that increasing levels of innovation may create hesitancy in a consumer, in terms of innovation adoption, due to fear of buying products that may quickly be superceded by lower cost, higher performing versions, or for fear of adopting unproven technology (Lee & O'Connor, 2003).

However, as Mascitelli (2000) stated, firms creating a continuing stream of radical new products can gain a sustainable competitive advantage in the market. McDermott & O'Connor (2002) suggested that radical innovation is critical to long term success of firms. Goldenberg, Lehmann, & Mazursky (2001) found that low levels of newness to the market were associated with failure. Mishra, Kim, & Lee (1996) also found that increased levels of innovativeness were associated with success of new products across countries. Hultinik, Hart, Robben, & Griffin (2000) found that firms with higher levels of product innovativeness were more successful, while Cooper & de Brentani (1991) found that highly innovative services were marginally more successful than less innovative services. In addition, Atuahene-Gima (1995) noted that firms are likely to face less competition for radical products than for less innovative products, and Keller (2004) suggested that radical new products might be more difficult to imitate, leading to a higher long-term revenue stream than incremental innovations.

In one of the few studies to examine potentially differential effects of different types of innovations, Freel and Robson (2005) found no association between either incremental or novel innovations and profits in a study of small firms in Scotland and Northern England. However, they did not take into account the type of environment in which the firms were operating, or the number of innovations undertaken.

While innovation has been shown to be related to performance in many firms, the results of previous studies provide little guidance as to whether small firms should pursue a strategy of developing many new lines or focus on developing radical innovations. In fact, Berthon, Mac, Huber, and Pitt (2004) noted that empirical research has so far not differentiated between strategies focusing on incremental (develop many new lines, with small changes) versus discontinuous (develop fewer, more radical innovations) research and development. With small firms typically possessing limited resources, they may be unable to pursue both strategies.

ENVIRONMENTAL HOSTILITY

In one of the few studies explicitly examining predictors of innovation in small firms, Covin and Slevin (1989) found that businesses operating in hostile competitive environments, characterized by intense rivalry among firms and weak or diminishing competitive opportunities, tended to adopt innovations with greater frequency than firms operating in more benign competitive settings. Innovations leading to the creation of a differential product or service advantage were crucial to the success of these firms.

In a study of small to medium enterprises, Salavou, Baltas, and Liokas (2004) also found that those firms operating in an environment that was very competitive had a higher level of product innovation.

Utilizing samples consisting of large firms, studies by Flaherty (1983) and Miller and Freisen (1982) also reported positive associations between environmental hostility and innovation. Serious challenges by competitors forced firms to undertake efforts that enabled them to more effectively serve markets through innovative adaptations to product lines. In contrast, innovation was of less importance to those firms operating in environments where competitive pressures were not as intense. However, Souder, & Song (1997) found that in competitive markets, product failure was likely when radical innovation was stressed. This may occur when firms commit early to a new technology, market, or product process that does not become dominant (Calantone, Schmidt, & Di Benedetto; 1997). In addition, as Friar (1995) postulated, it may be difficult to establish a differential advantage over competitors in consumers' minds in a market where there is constant innovation by participants. As a market becomes inundated with new product introductions, failure of new products may become much more likely (Redmond, 1995). Thus,

firms that reduce costs through a strategy of limiting introduction of innovations may increase financial performance in such highly competitive markets. Surprisingly, Cooper and de Brentanni (1991) found that new service products were equally successful in highly competitive and less competitive markets.

Previous research has provided small business owners with guidance on how an overall innovative strategy is related to performance in different environments. However, studies on innovation and performance have typically combined many elements of innovation in their analysis. Little research has focused on precisely how the degree of innovation and the number of innovations are related to performance in hostile or benign environments.

HYPOTHESES

Based on the preceding discussion, it seems clear that innovation is likely to have a positive impact on financial performance in a hostile environment. This leads to the following hypotheses:

H1: Innovation in terms of number of new product lines or services will be positively related to satisfaction with financial performance in a hostile environment.

H2: Innovation in terms of degree of change in product or service lines will be positively related to satisfaction with financial performance in a hostile environment.

Previous authors have typically found no relationship between innovation and performance in a benign environment. It would seem logical that the type of innovation would not affect this relationship. Therefore, the following hypotheses are proposed:

H3: Innovation in terms of number of new product lines or services will not be related to satisfaction with financial performance in a benign environment.

H4: Innovation in terms of degree of change in product or service lines will not be related to satisfaction with financial performance in a benign environment.

METHOD

To examine this issue, the relationship among degree of innovation, number of innovations, type of environment, and financial performance was examined in a sample of small businesses. Names and addresses of 1293 small businesses in the Indianapolis, Indiana metropolitan area were obtained from a business communication database. Of these establishments, 721 were confirmed to still be in operation in the area. Out of the questionnaires sent to these businesses, 183 were returned, for a response rate of 25.4 percent. 178 of those returned had complete data for the purposes of this study.

Of those businesses responding, 11.5 percent listed manufacturing as the primary nature of the business, while 7.7 percent listed retailing, 11.5 percent listed wholesaling, 11.5 percent listed construction, 42.6 percent listed service as the primary nature of their business, and 15.3 percent listed "other." These statistics show that the businesses in the study encompassed a wide range of industries.

The average number of employees for the firms in the sample was 9.5, indicating the generally small size of the firms. In terms of sales revenue for the most recent full year, 55.5 percent of the sample reported revenues of $300,000 or less. The firms were well distributed among the sales

revenue categories. Businesses that reported sales at less than $100,000 amounted to 25.5 percent, while 18.6 percent of the businesses reported sales between $100,000 and $200,000, 10.9 percent of the businesses reported sales of between $200,001 and $300,000, 12 percent of the businesses reported sales of between $300,001 and $400,000, 4.9 percent of the businesses reported sales of $400,001 to $500,000, and 27.3 percent of firms reported sales of over $500,000. The average number of years of operation for the firms was 17.4 years, indicating that the firms were, in general, fairly well established.

The nature of competitive environments was measured utilizing an environmental hostility scale first developed by Khandwalla (1976/77) and later adopted by Covin and Slevin (1989). Respondents were asked to report levels of agreement with a statement indicating the degree to which the external environment in which the firm operated was risky, using a seven point scale. The endpoints of the scale were "Very safe, little threat to survival, and well-being of my firm" and "Very risky, a false step can mean my firm's undoing." Those organizations with a rating of four or above on the seven point hostility scale were categorized as operating in a hostile environment. Those with a rating of three or less were categorized as operating in a benign environment.

Innovation was measured using two items developed by Miller and Freisen (1982). One question asked how many new lines of products or services had been developed in the past five years. A seven point scale was used to allow responses ranging from "no new lines developed" to "many new lines developed." A second question asked respondents whether changes have been "mostly minor" or "changes have usually been quite dramatic" (also on a seven point scale).

To determine profitability, respondents were asked their level of satisfaction with net profit on operations on a seven point scale from highly dissatisfied to highly satisfied, based on a performance scale developed by Gupta and Govindarajan (1984) and adapted by Covin and Slevin (1989). Covin and Slevin (1989) note that small firms are reluctant to provide objective profit information, which may lead to incorrect or missing data when objective measures are asked for. In addition, they state that even if firms report accurate profit information, it may be difficult to interpret, depending on the firm's strategy. Finally, Covin and Slevin point out that objective scores on financial performance may differ due to industry related factors, making objective data acquired across industries misleading. Given these factors, especially the fact that data was collected from firms in a variety of industries, it was therefore decided to use this subjective measure of performance for this study.

Those businesses categorized as being in a benign environment had an average satisfaction with a profitability rating of 3.20, with a standard deviation of 1.02. Those classified as being in a hostile environment had an average satisfaction rating of 2.89, with a standard deviation of 1.01. The averages for satisfaction with profits are not statistically significantly different at the .05 level between firms in the two different groups.

RESULTS

Levels of product innovation as indicated by the number of new lines of products or services developed were a positive predictor of satisfaction with profitability in firms operating in a hostile environment ($p<.05$) (see Table 1.) This result supports Hypothesis One.

Innovation as measured by the degree of change in products or services was not related to satisfaction with profitability in hostile environments (see Table 1). This result is counter to Hypothesis Two.

For this sample of firms operating in a hostile environment, those with more lines of new products or services were more satisfied with their level of profitability than those with fewer lines of new products or services. However, the degree of change in products or services was not related to level of satisfaction with profits for firms in this sample. For this sample, innovation in terms of new lines of products developed was a more satisfactory strategy than innovation in terms of degree of change.

Table 1 -Summary of Simultaneous Regression Equation Predicting Profits in a Hostile Environment

(N=108)

Variables	B	SE B	***B***
Innovation (New Lines Developed)	.15	.06	.26**
Innovation (Degree of Change)	.06	.06	.09
R^2 (Total) .11 R^2 (Adjusted) .09 F 6.18**			
* p < .05 ** p < .01			
B is the coefficient estimate for each of the two variables, as estimated by the regression equation. SE B is the standard error associated with each coefficient estimate. B is the standardized estimate of the coefficient.			
The positive sign on the coefficient indicates that the more new lines developed, the higher the satisfaction level with profits. The p value indicates that the coefficient is statistically significantly different from 0 at the .05 level. In other words, there is a greater than 95% probability that innovation in terms of new lines developed is positively related to satisfaction with profits.			

The equation predicting satisfaction with profits in a hostile environment using the two measures of innovation was a statistically significant predictor of satisfaction with performance, with an F statistic of 6.18 ($p<.05$.) The regression equation explained 11 percent of the variance in satisfaction with profits.

There was no relationship between either measure of innovation and profitability for firms operating in benign environments. These results support Hypotheses Three and Four and are in line with much of the research in innovation and performance.

The F statistic for the regression equation predicting satisfaction with profits in a benign environment was .05 ($p>.10$). The amount of variance explained by the equation was zero (See Table 2). These results indicate that, for the firms in this sample operating in a benign environment, neither type of innovation was related to satisfaction with profitability.

DISCUSSION

Product innovation is often viewed as an essential element of success for a business. Small businesses, in particular, are in the forefront of innovation (Karlsson & Olson, 1998; Scarborough & Zimmerer, 2000; Tether, 1998). However, this study makes clear that innovation is not always a viable strategy. Neither type of innovation examined in this study was related to satisfaction with financial performance in benign environments. This finding reinforces the previous work of Covin and Slevin and others, who found that innovation was not necessarily a desirable strategy in benign environments. In such an environment, with a low level of competition, resources that

otherwise might be allocated for research and development to support innovation might better be allocated to such efforts as increasing promotional efforts or increasing levels of customer service.

Table 2 -Summary of Simultaneous Regression Equation Predicting Profits in a Benign Environment

(N=70)

Variables	B	SE B	***B***
Innovation (New Lines Developed)	-.01	.09	-.02
Innovation (Degree of Change)	-.01	.11	-.02
R^2 (Total) .00 R^2 (Adjusted) .00 F 0.05			
* p < .05 ** p < .01			
B is the coefficient estimate for each of the two variables. SE B is the standard error associated with the coefficient estimate. ***B*** is the standardized estimate of the coefficient.			
The lack of statistically significant coefficient estimates indicates that neither of the variables had a statistically significant impact on satisfaction with profits.			

In a hostile environment, number of new product lines was positively related to satisfaction with financial performance, but the degree of change in existing lines was not. This finding contradicts both DeBrentani (2001), who suggests that both highly innovative and incremental new products are necessary for long term performance, and Garcia and Calantone (2001), who suggest that a clear definition of type of innovation (in terms of difference from existing products) is critical in examining performance due to the differential effect of different types of innovation on firm performance. However, our results are consistent with Calantone, et al. (1994), who found no evidence that major product innovations or more minor product innovations differed in their effects on firm performance. Findings from this study may also help explain the lack of any relationship between innovation and profitability for either novel or incremental innovations found by Freel and Robson (2005). The lack of relationship they observed may have resulted from not including the level of environmental hostility as a factor in their analysis.

IMPLICATIONS

Small business owners typically operate with significant resource constraints. Given these constraints, guidance is needed in how to most efficiently allocate limited resources to achieve firm goals. Innovation is frequently recommended as "the" key strategy for small businesses. However, little guidance is given to the small business owner on the particulars of innovation. Innovation can range from extremely costly, long-term product development that produces a totally new and different product (the Segway scooter) to the relatively simple (adding raisins to bran flakes). Each of these strategies may have a very different risk/reward potential.

This research provides some insight into the potential success of innovation, depending on the type of innovation pursued and the environment a firm is operating in.

For those firms operating in a benign environment, there is no clear difference between the two innovation strategies. Neither was related to satisfaction with performance of the firms in this study. This implies that firms in a benign environment should be very careful about undertaking an innovation strategy. Such a strategy could be counterproductive, requiring substantial

investment with little guarantee of an adequate return. Available funds might better be used on promotional activities designed to increase sales of present products.

The results of this study, along with those of many other authors in the field, clearly demonstrate that a critical success factor for small firms operating in hostile environments is the development of new product offerings to meet consumer needs.

However, the results of this research study make clear that it is not necessary for small firms to develop discontinuous product innovations (major changes from existing products) that are extremely costly in terms of research and development. In addition to their development costs, such innovations may require a significant amount of promotional dollars spent on consumer education as to use and differential advantage over the old product. Such costs increase the probability of a negative result for the firm introducing such an innovation.

In contrast, development of many new lines of products was shown in this study to be associated with an increase in satisfaction with profitability in a hostile environment. Small firms may reduce their risk by constantly improving upon existing products in an incremental fashion, rather than attempting major changes in products. Such incremental improvements would typically be much less costly in terms of research and development. However, they would show the firm's customers that the firm was constantly improving its products to meet customers' needs. This strategy might be necessary to retain customers in a competitive environment. Such product development could also be used to target new market segments, thereby increasing sales and profits.

CONCLUSION

While a broad body of research has examined relationships among innovation, environment, and financial performance of firms, little work has been done providing insight for small business owners into the proper innovative strategy to follow in benign and hostile environments. Is a strategy to attempt to develop a number of new product lines preferable, or is it preferable to develop fewer new products, with major changes in the product? How does the appropriate strategy change depending on the level of hostility in the environment?

Based on the results of this study, small business owners appear to be more likely to achieve a higher level of financial performance through product innovation in hostile environments. However, even in hostile environments, findings suggest that an innovative strategy based on degree of change to existing product lines was not related to financial performance. Results from this study suggest that innovative efforts of small businesses in a hostile environment should focus on developing a number of new product lines in order to maximize the likelihood of enhancing financial performance.

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