Firm Innovation, Performance and the Market Environment: a study of Australian Manufacturing SME’s

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Abstract
This paper undertakes an analysis of a range of previous studies to explore the link between firm innovation, performance and the competitive environment.

This paper first reviews literature which suggests that good innovative practices can lead to superior firm performance. It then reviews links between the construct of innovation with that of market orientation which may explain a link this research found between innovation and the competitive environment a firm operates within.

This paper then presents the results of an empirical study of 73 Australian manufacturing firms located in Greater Western Sydney. From the analysis of the data, links are established between changes in a firm’s competitive environment and the resulting innovation activity of respondent firms.

Key Words: Innovation, Culture, SME, Market Environment

1 Innovation

Innovation is seen as having a positive impact on the economy (Teece 2002) as well as being a key element in the entrepreneurial process (Schaper and Volery 2003). Many definitions of innovation can be found in the literature; Zaltman, Duncan and Holbeck (1973), Damanpour and Fariborz (1984), Damanpour (1991) and Boer and During (2001) all provide definitions of innovation. Each of these have a common theme that the item being innovated must be new to the target audience. It has also been suggested that when viewed as a process, innovation may be culture specific (Sawy, Eriksonnen, Raven and Carlsson 2001).

Innovation, or at least the firm’s capacity to innovate, is a characteristic that has been shown as having a relationship to firm performance. Studies have found, for instance, that successful product and process innovation has a positive link to firm performance (Caves and Ghemawat 1992). New product development can lead to increased market share (Zahra and Covin 1983) and product innovation has been linked to increasing market share (Banbury and Mitchell 1995). Yamin, Gunasekaran and Mavondo (1999) studied innovation and firm performance on Australian manufacturing companies and found a link between financial performance and innovation performance.
The literature indicates therefore that there is a positive relationship between firm innovativeness and firm performance, with many authors suggesting innovation as a firm strategy to achieve superior performance. However, one can conjecture that there may be both internal (to the firm) and external influences on firm innovation performance and the motivation to innovate.

One such internal influence identified within the literature is the concept of market orientation, which has also been shown to have a positive relationship to firm performance. Market orientation refers to the organization-wide generation, dissemination, and responsiveness to market intelligence (Kohli & Jaworski 1990). Shapiro (1988) suggests that a number of areas of the business other than marketing participate in all three functions; hence, the function is wider than the marketing department. By this they mean that “market orientation entails (1) one or more departments engaging in activities geared toward developing an understanding of customer’s current and future needs and the factors affecting them, (2) sharing of this understanding across departments, and (3) the various departments engaging in activities designed to meet select customers needs.”

One study that linked a high level of market orientation with the innovation performance of the firm was Atuahene-Gima (1996: 94) which, in a cross-sectional study of 600 firms in Australia, found that there was a significant negative correlation between market orientation and the product newness to customers, suggesting “market orientation helps to reduce the chances of the firm producing innovations that require major behavioural changes on the part of potential customers for adoption”. Han, Kim and Srivastava (1998: 41) found “some support that innovations facilitate the conversion of market-oriented business philosophy into superior corporate performance”. Erdil, Erdil and Keskin (2004) investigated this link in a study of 55 European firms and found that the undertaking of market orientation activities by firms, as defined in previous literature, was correlated with firm innovativeness.
Turning to external influences on firm innovative performance, this paper identifies two categories of external factors (a) characteristics of the firm’s external competitive environment and (b) the amount and rate of change in this competitive environment. With regards to the competitive environment, firm relative size and cost (to major competitors), as well as the ease of new entrants to their market and the size of market share held by competitors, has been identified as relevant to understanding the competitive environment. Changes in marketing practices, technology turbulence and research and development expenditure have also been identified as relevant to measuring changes in the competitive environment as well as changes in competitor activity such as hostility, predictability and market activity.

This paper does not investigate factors internal to the firm, such as the relationship between Market Orientation and firm innovation performance illustrated earlier; rather, it looks at the influence on market conditions and activity on the innovativeness of firms. It does this by measuring the innovativeness of firms, together with environmental factors within the firm’s competitive environment and changes in the competitive environment.

This paper suggests two propositions with regards to the relationship between the competitive environment and a firm’s innovative performance:

*P1: the firm’s competitive environment will relate to the innovativeness of firms,*

*P2: Changing competitive landscapes will influence the innovativeness of firms.*

2 Data Collection And Analysis
This study used the “ENTRESCALE” as refined by Covin and Slevin (1989); this scale was chosen as it has been shown to have strong validity in numerous studies (Covin and Slevin 1989, Khandwalla 1977 and Miles and Snow 1978). It has also been shown to have validity in cross-cultural and inter-language situations (Knight 1997). The scale consists of two subscales, these being Innovativeness and Proactiveness. The innovativeness subscale focuses firmly on product (rather than process innovation) and the proactiveness subscale measures whether firms are being reactive or proactive in the marketplace.

This scale was then incorporated into the one questionnaire together with questions designed to capture other data that recorded business performance (financial) as well as industry and industrial environmental conditions.

A mailing list was obtained of 316 firms who are located in Greater Western Sydney and are involved in manufacturing goods for Australian or overseas markets; this was defined by their “ANZSIC” code (Australian New Zealand Standard Industrial Classification). The mail out was preceded by a phone call to request participation. Each survey was individually addressed to the company and also a manager in the firm. Of the 316 surveys distributed, 74 were returned (23.4% response). We reviewed each questionnaire for completeness; of the 74, one was considered unusable due to large amounts of missing data giving us 73 usable responses.

The questionnaire asked for responses on the business’s competitive environment, changes in the competitive environment, business performance as well as the Entrescale questions. As for of the respondents, we had a sample from small to large enterprises based on self reported size relative to their largest competitor (see figure 1 below); this has been determined by calculating the chi-squared statistic and we found that the actual responses did not differ to the expected result.
A reliability test was conducted to determine the internal consistency of the scale adopted for this study. The ENTRESCALE returned a Cronbach Alpha coefficient of .848. This indicates a high level of internal consistency within these measures as the generally accepted lower limit is .7 (although some studies allow .6) Hair, Anderson, Tatham and Black (1998).

As non-parametric data had been collected, chi-square statistics were then calculated on both the competitive environment and also the changes in environment sections. This basically compares the actual observed counts with expected counts. In this way we can calculate if we have a random distribution or if the actual result is different to the expected result. This has been calculated by comparing the Critical Values in the Chi-Squared Statistical table with the relevant Chi-Squared value from the data. This means that in terms of Entry Ease, Competitor Competition, Hetrogenity of Marketing, R&D, Competitor Predictability, Competitor Hostility and Competitor Activities the distribution differs from the expected values and therefore we have some idea of what is happening in the market place of respondents.
By analysing the distribution we can summarize these findings and say that where the respondents operate in a market sector where it is hard to enter and succeed, dominated by a few large players, marketing practices have become more diverse, the majority have increased their R&D spend, competitors have become somewhat less predictable and more hostile while the firms reported that they were now competing against their major competitors in more areas than three years ago. This leads to two questions (a) are companies in this industry sector responding to these market forces by changing their innovation practices, and, (b) is there any relationship between innovation and firm performance?

To discover this relationship we used the respective subscales; that is Innovativeness and Proactiveness. By way of explanation, to calculate a firm’s Innovation Score we summed the responses of the three questions of the subscale. The possible outcomes of these are between 3 (3x1) and 21 (3x7), giving 19 possibilities, given that chi-square cross tabulation analysis requires the expected value to be higher than 5, which would require a sample size of 95. As the sample size is 73 it was decided to group the responses into 4 categories, these being Low, Medium, High and Very High responses. We used the same methodology for the Proactiveness Subscale.

With regards to the competitive environmental factors, this study found no relationship between those measured on either the Entrepreneurial or subscale measures. Hence, we have to conclude that there was no support for Proposition One.

This study did, however, find relationships between changes in the competitive environment and both the Entrepreneurial and subscale measures. Changes in R&D expenditures (.000), competitor predictability (.027), hostility (.000) and competitive areas (.000) all had relationships with aspects of the Entrepreneurial measure. Accordingly, there was support found for Proposition Two. These relationships are illustrated in diagram 1, while the statistics are shown in table 1 below:
### Pearson Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig (2 sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Development</td>
<td>48.033</td>
<td>15</td>
<td>.000</td>
</tr>
<tr>
<td>Competitor Predictability</td>
<td>31.194</td>
<td>18</td>
<td>.027</td>
</tr>
<tr>
<td>Competitor Hostility</td>
<td>45.276</td>
<td>18</td>
<td>.000</td>
</tr>
<tr>
<td>Competitor Activity</td>
<td>52.055</td>
<td>18</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 1

![Diagram 1: Quantitative Data Analysis Relationships Found](image)

1: R&D, 2: Competitor Predictability, 3: Competitor Hostility, 4: Competitive Areas

**3 Discussion**

No significant relationships between the business environmental factors of firm size, cost structure, entry ease and industry concentration and the subscales contained in the “Entrescale” was found. This may mean that the existing industry structure does not affect firms’ actions in this regard or that this study has not identified the environmental factors that do influence these constructs. Furthermore, increasing innovation activity can be seen as a strategy a firm may adopt as a reaction to a particular condition or phenomenon occurring; the environmental factors measured by this study are not linked to increased innovation activity or indeed innovation activity could mean that all respondent companies...
regard innovation as independent of the nature of their business environment, rather than dependent upon it.

The analysis found significant relationships between Research and Development expenditure, changes in competitor predictability, increased hostility and increased areas of competition with the subscale of innovativeness. While the R&D link is to be expected we suggest that the other relationships highlight a business strategy of the firms investigated. Namely, that Innovation is seen as a successful strategy to combat the tactics and actions of competitors who are already in the firm’s target market.

This supports the suggestion that the response of the sample companies to an increase of competitive activities in their marketplace such as hostility, more unpredictable actions by competitors and competition in more areas by competitors over recent years has been to turn to innovation as a source of competitive advantage.

Furthermore, if firms are choosing innovation as a response to an increase in competitive activities in their marketplace, then they must be have some sort of feedback from the marketplace to monitor this activity of competitors. This may be indicated by the relationship between the three measures of changes in competitors actions and their relationship with the innovativeness factor.

4 Conclusion and Future Direction of Research

Much of the innovation literature, in particular practitioner based literature, discusses the concept of having a supportive “culture” to promote a higher level output in the innovation process. The implication of this is that employee behaviour plays a role in a firm’s innovativeness. This is illustrated by the literature that suggests that a supportive “culture” within a firm will facilitate the innovative output of the organization. While this paper recognises such a link, particularly if
innovation is accepted as a process within a firm that involves employee action, this study is as yet to fully understand the link with changes in the competitive environment that this study found.

The thesis of this paper is that the role that individual employees play within the internal process of the firm are key to the successful completion or outcome of these processes. If this is true then the attitudes and behaviours of employees may establish a relationship between these internal firm processes. For example, previous studies have found significant relationships between other internal processes such as market orientation and innovation (Atuahene-Gima 1994, Han et al 1998, Erdil et al 2004).

The future direction of this research is to conduct a deeper analysis into the factors that make up the subscales studied as well as other internal processes within the firm. This will be done using qualitative methods so as to ensure that both the role of the employees in both activities are captured as well as any strategic direction that the firm may have with regards to both innovation and other competitive responses.

Future research should use the firm as the unit of analysis rather than the industry, as this will enable a deeper understanding of (a) how employee attitudes and values shape the firm’s innovativeness, (b) if this differs between organisations; and, (c) how firms react to changes in their marketplace. This then is the future research direction of the author.
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