

Innovation in Queensland Firms: Implications for the Smart State

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The cost cutting days are over. We have reengineered, restructured, reorganised and reexamined ourselves about as much as we can.... The incremental benefits of streamlining our processes, reducing our workforce and decreasing our unit costs (in most cases) are limited.

Innovation is the single best way to leapfrog competition, move ahead of the industry pack and most important, create new ways to bolster profit margins and fuel future earning streams (Kuczmarski 1996: 9).

Abstract

The challenges in the business environment are forcing Australian firms to be innovative in all their efforts to serve customers. Reflecting this need there have been several innovation policy statements both at Federal and State government level aimed at encouraging innovation in Australian industry. In particular, the innovation policy statement launched by the Queensland government in the year 2000 primarily intends building a Smart State through innovation. During the last few decades the Australian government policy on innovation has emphasized support for industry R&D. However industry stakeholders demand a more firm-focused policy of innovation. Government efforts in this direction have been hindered by a lack of a consistent body of knowledge on innovation at the firm level. In particular the Australian literature focusing on firm level antecedents of innovation is limited and fragmented. This study examines the role of learning capabilities in innovation and competitive advantage. Based on a survey of manufacturing firms in Queensland the study finds that both technological and non-technological innovations lead to competitive advantage. The findings contribute to the theory competitive advantage and firm level antecedents of innovation. Implications for firm level innovation strategies and behaviour are discussed. In addition, the findings have important implications for Queensland government's current initiatives to build a Smart State through innovation.

Introduction

The challenges in the current business environment characterised by increased competition, fragmented markets and technological changes have forced Australian businesses to be innovative in their strategies for survival and growth. Reports in the mid 1990s indicated that Australian productivity lagged the best performing country, the U.S.A., by 30%, which was primarily attributed to slower adoption of innovation (McKinsey & Company Australia 1995). There have been two Federal government policy statements on innovation in 1994 and 2001 (Keating, 1994; Howard, 2001) both of which reflect the government's desire to keep Australia at the cutting edge of technological developments in the Asia-Pacific region. Similarly, at the state level, the innovation policy statement launched by the Queensland government in 2000, aims at establishing Queensland as a national leader in innovation in five years (Department of State Development, 2000). Government policies have, however, been primarily directed at technologies and industries rather than enterprises. Whilst industry stakeholders demand firm-focused innovation policies, government efforts to meet this need have been hindered by the lack of a well-founded body of knowledge on firm level innovation. The literature in general suggests that innovation leads to higher performance and competitive advantage, however, past innovation research has primarily focused on technological innovation. This paper reports the findings of a study that examines the role of both technological innovation and non-technological innovation, i.e. organisational innovation, in competitive advantage in manufacturing firms in Queensland. Premised on the capability-based theory of competitive advantage the conceptual model, which is tested in this study, suggests that firms pursuing the path of innovation-based competitive strategy build and nurture distinctive learning capabilities, which enables such firms to create superior value to their customers. This paper is primarily targeted at practitioners, particularly those firms wishing to incorporate innovation as a key strategy in their efforts to outperform competitors.

This paper proceeds as follows. First, the links between organisational learning, innovation and competitive advantage are revisited. Second, the conceptual framework and hypotheses are presented. Third, the methods used to test the hypotheses are discussed. The results, based on analysis of data collected from Queensland manufacturing firms, are then presented. The paper concludes by discussing implications for theory and practice.

Links among organisational learning, innovation and competitive advantage revisited

Firm innovation and the competitive advantage process are closely inter-related. Porter (1990) argues that firms create competitive advantage by conceiving new ways to conduct activities in the value-chain for delivering superior customer value, which is an act of innovation. This suggests that innovation leads to competitive advantage and innovation can occur in any value-creating activity of

the organisation and that all types of innovations can lead to sustained competitive advantage. Although the literature suggests that innovations can occur in any value-creating activity, suggesting that it should be conceptualised to cover a broad range of activities (Schumpeter 1934; Porter 1990; Rothwell 1992), past innovation research is biased toward technological innovation. However, in practice, firms undertake both technological and non-technological innovations. For example Rothwell (1992) suggests that a technological innovation can be accompanied by a series of non-technological innovations such as (a) organisational innovation, e.g. a new venture division; (b) management innovation, e.g. a new inter-functional liaison system; (c) production innovation, e.g. a quality control circle; (d) commercial/marketing innovations, e.g. new financing arrangements, a new sales approach or leasing arrangement. Similarly, there is evidence to suggest that firms pursue all forms of innovation. The McKinsey & Company's (1993) international study on innovation (including the US and Australia) observes three types of innovation (product, process and business system). Similarly the Australian Manufacturing Council (1995, p. 7) observes that 'Australian firms use all sources of innovation (product, process, market and business system) to achieve competitive advantage'. This evidence provides ample support to conceptualise organisational innovation broadly to include both technological and non-technological innovations suggesting that all such innovations can lead to competitive advantage (AMC 1995; Hyvarinen 1990).

The innovation literature also suggests that organisational learning activities are closely related to innovation. The degree of innovation reflects the extent of new knowledge embedded in an innovation (Dewar and Dutton 1986; Ettlie 1983). 'Radical and incremental [innovation] pertain[s] to distinctions along a theoretical continuum of the level of new knowledge embedded in an innovation' (Dewar and Dutton 1986: 1423).

Despite the reported emphasis on innovative activities by Australian firms, e.g. the pursuit of many forms of technological and non-technological innovation (AMC 1995), and the spending of a substantial portion of their resources on innovation-oriented activities such as R&D, acquisition of technology, training, tooling-up and marketing (ABS 1995), Australian research specifically examining the behavioural antecedents of organisational innovation is limited. The Australian Manufacturing Council (1995) study of Australian firms pursuing innovation as a competitive strategy was limited to an examination of key characteristics of firms engaged in product innovation. Although the study did suggest that Australian firms use all forms of innovation to gain sustained competitive advantage, no in-depth examination was undertaken to determine how the behavioural antecedents of innovation influence sustained competitive advantage. No known research has examined the role of distinctive capabilities in organisational innovation and sustained competitive advantage, in particular in the Australian context.

This discussion, whilst suggesting that innovation can be a key source of competitive advantage for the firm, highlights the need to conceptualise this construct more precisely. In this study organisational innovation is defined as the application of ideas that are new to the firm, to create added value either directly for the

enterprise or indirectly for its customers, whether the newness and added value are embodied in products, processes, services, or in work organisation, management or marketing systems.

The theory of competitive advantage and the role of organisational capabilities

The capability-based theory that has gained prominence in competitive strategy literature over the last decade, suggests that a firm can achieve competitive advantage through distinctive or core-capabilities possessed by the firm (Grant 1991; Prahalad and Hamel 1990; Hayes, Pisano and Upton 1996). The capability-based theory effectively explains the value creation process by assigning a proactive and dominant role to the strategic leadership of the firm. Distinctive capabilities that enable firms to gain competitive advantage are developed consciously and systematically by the wilful choices and actions of the firm's strategic leaders (Grant 1991; Hayes, Pisano and Upton 1996). The competitors' inability to duplicate the distinctive capabilities is suggested as the key source of sustainability under the capability theory of competitive advantage (Grant 1991; Hayes, Pisano and Upton 1996).

Conceptual framework

The model that is tested in this paper is indicated in Figure 1. The model incorporates six key theoretical constructs, namely, entrepreneurial intensity, market-focused learning capability, internally focused learning capability, relational learning capability, innovation intensity and sustained competitive advantage. Premised on the capability-based theory, this paper argues that distinctive learning capabilities are built and nurtured by entrepreneurial key decision makers of the firm. The model argues that entrepreneurial firms pursuing innovation as a key thrust in their competitive strategy build and nurture distinctive learning capabilities. In turn, these distinctive capabilities lead to higher innovation intensity and SCA. These constructs and their inter-relationships are discussed below.

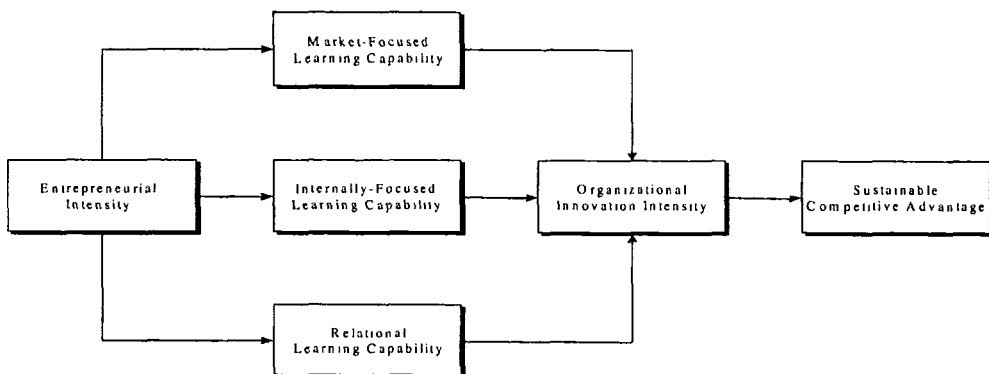


Figure 1: Conceptual model

Entrepreneurial intensity

Based on the firm-behaviour model of entrepreneurship (Covin and Slevin, 1986; Naman and Slevin, 1993) that has gained popularity among strategy researchers over recent years, entrepreneurship is conceptualised in this paper as a firm behaviour in which the firm displays innovativeness, proactiveness and risk-taking propensity in their strategic decisions. Entrepreneurship is conceptualised as a continuum using these three attributes that reflects the degree of 'entrepreneurial intensity' of the firm.

Distinctive organisational learning capabilities

Premised on organisational learning approaches to innovation (Dewar and Dutton 1986; Porter 1990; Tushman and Nadler 1986), organisational innovation is conceptualized as a process in which waves of new knowledge are integrated into the firm's value-creating activities. Organisational learning capabilities play a key role in this process.

Market-focused learning capability captures the capacity of the firm to learn from markets. To be effective innovators, organisations should constantly scan the marketplace for new opportunities to satisfy customers (Levitt 1960). Generating innovative ideas through the collection and dissemination of marketplace information is a starting point for innovation (Foxall and Fawn 1992). The market-focused learning capability is defined as the capacity of the firm relative to its competitors, to acquire, disseminate, unlearn and use market information for organisational change.

Internally focused learning capability reflects the capacity of the firm to generate technological and non-technological knowledge through internal sources. Research and development (R&D) is a commonly pursued experimental learning activity in manufacturing firms, which is a search process that aims to generate cumulative technological advances (Durand 1988; Hyvarinen 1990). Empirical evidence suggests that research and development is essential for effective innovation (Kim, Song and Lee 1993). Internally focused learning capability is defined as the capacity of the firm, relative to its customers, to develop technological and non-technological knowledge through internal sources and to disseminate, unlearn, and use this knowledge for organisational change.

Relational learning capability reflects the firm's capacity to exploit external sources of knowledge. Many innovations result from borrowing rather than invention (March and Simon 1958). Collaborative linkages or 'networking' improve the potential of the organisation to develop innovations (Contractor and Lorange 1988; Mowery 1988). The relational learning capability is defined as the capacity of the organisation, relative to its competitors, to acquire technological and non-technological knowledge through external linkages, and to disseminate, unlearn, and use such knowledge for organisational change.

The strategy literature suggests a positive association between entrepreneurship and the capability-building efforts of the firm (Rizzoni 1991). Accordingly, we

argue that entrepreneurial intensity influences market-focused, internally focused, and relational learning capabilities.

Organisational innovation

Our earlier discussion suggesting that innovation can be a key source of competitive advantage, highlights the need to conceptualise this construct broadly in examining its influence on sustained competitive advantage. In this study organisational innovation is defined as the application of ideas that are new to the firm, to create added value either directly for the enterprise or indirectly for its customers, whether the newness and added value are embodied in products, processes, services, or in work organisation, management or marketing systems. Thus organisational innovation is directly affected by market focused, internally focused and relational learning capabilities. Organisational innovation is conceptualised as a continuum that reflects the degree of 'organisational innovation intensity' of the firm.

Sustained competitive advantage

Competitive advantage can be conceptualised as a superior 'marketplace position' that captures the provision of superior customer value and/or the achievement of lower relative costs, which results in market share dominance and superior financial performance (Hunt and Morgan, 1995). Premised on the capability-based model, this construct is operationalised as: whether the firm has gained superior financial and market advantages (Day and Wensley 1998) and whether it is possible for competitors to duplicate the firm's competitive strategy (Grant 1991) and distinctive capabilities on which advantages have been founded (Grant 1991).

As observed earlier, the literature suggests that innovation leads to competitive advantage (Porter 1990). The evidence supporting this view comes from several streams of research. For example, research examining innovation and firm performance suggests that innovation leads to higher performance (Hyvarinen 1990; Rothwell, 1992; Lengnick-Hall 1992). Similarly, the literature on export market penetration strategies suggests that innovation enables small firms to enter export markets and maintain or increase those markets once entry has been made (McKinsey and AMC, 1993).

A detailed discussion on the conceptualisation and operationalisation of these constructs is available in Weerawardena (2003, 2003a) and Weerawardena and McColl-Kennedy (2002).

Hypotheses

H₁: There is a positive relationship between entrepreneurial intensity and market-focused learning capability.

H₂: There is a positive relationship between entrepreneurial intensity and internally-focused learning capability.

H₃: There is a positive relationship between entrepreneurial intensity and relational learning capability.

H₄: There is a positive relationship between market-focused learning and organisational innovation intensity.

H₅: There is a positive relationship between internally focused learning and organisational innovation intensity.

H₆: There is a positive relationship between relational learning and organisational innovation intensity.

H₇: There is a positive relationship between organisational innovation intensity and SCA.

Research Methodology

Data collection

The sampling frame for the study was a list of 1,272 manufacturing firms in Queensland. The decision to select a sample of firms from the manufacturing industry was driven by the aim of examining all types of innovation within the firm including product innovation. A further consideration was to avoid heterogeneity of technological processes used by the firms that has implications for industry effects in research (Dess, Ireland and Hitt, 1990). Firms were selected from two industry subgroups within the manufacturing industry, namely, the Machinery and Equipment Manufacturing, and the Metal Product Manufacturing industries. These two industry subgroups are engaged in metal-based manufacturing activities and have no vast differences in their adopted technological processes. A survey packet including a personalised cover letter and self-administered questionnaire was sent to the chief executive officer of each firm. To achieve a higher response rate a follow up mail was undertaken after contacting 200 randomly selected firms. The 326 useable questionnaires that were returned yielded a response rate of 25.6%. The response rate is quite satisfactory given that average top management survey response rates are in the range of 15% to 20% (Menon, Bharadvaj, and Howell, 1996).

In this study CEOs were used as the key informants. CEOs have been used as key informants in similar research on innovation-based competitive strategy (Li and Calantone, 1998). Tests of nonresponse bias were conducted comparing the means of four variables, i.e., number of employees, year established, number of years exporting and annual sales between early and late respondents (Armstrong and Overton, 1977). There were no significant differences suggesting that nonresponse bias is not a problem.

Analytical approach

All of the theoretical constructs in the conceptual model were measured using multi-item scales. Information about the items used in the scales is given in Weerawardena (2003, 2003a). The model was tested using a two stage structural equation modelling technique where the measurement model is separately estimated to the structural model testing the hypothesized relationships among the constructs. This enables the measurement properties of the scales to be examined.

Results

The results of the test of the measurement model indicated that the measures were acceptable. For example, *entrepreneurial intensity* $\chi^2 12.51$ ($p=0.17$), RMSR .03, GFI .99, AGFI .98 and RSMEA .03 and reliability of .83, *market focused learning capability* $\chi^2 7.423$ ($p=0.191$), RMSR 0.02, GFI .99, AGFI .98 and RSMEA .038 and reliability of .83, *Internally focused learning capability* $\chi^2 7.423$ ($p= .0191$), RMSR .026, GFI .99, AGFI .98, RSMEA .03 and reliability of .87, *relational learning capability* $\chi^2 7.761$ ($p=0.171$), RMSR .029, GFI .99, AGFI .98, RSMEA .04 and reliability of .83, *organisational innovation intensity* $\chi^2 33.25$ ($p=0 .01$), RMSR .06, GFI .99, AGFI .98, RSMEA .05 and reliability of .86, *sustained competitive advantage* $\chi^2 3.84$ ($p=0 .57$), RMSR .024, GFI .99, AGFI .99, RSMEA .001 and reliability of .80.

The results of the test of the structural model support the hypothesized relationships as shown in Figure 1. Market-focused learning is strongly influenced by entrepreneurial intensity, supporting H₁ ($B = .757$, $t = 11.499$). As per H₂, internally focused learning is strongly influenced by entrepreneurial intensity ($P = .777$, $t = 15.800$). As predicted (H₃), there is a positive relationship between entrepreneurial intensity and relational learning ($P = .385$, $t = 4.643$). As predicted by H₄, there is a positive relationship between market-focused learning and organisational innovation intensity ($P = .356$, $t = 5.192$). Supporting H₅, internally focused learning influences organisational innovation intensity ($P = .284$, $t = 4.378$). As predicted (H₆), there is a strong positive association between relational learning and organisational innovation intensity. ($P = .407$, $t = 6.290$). Finally, there is a strong positive relationship between organisational innovation intensity and SCA, supporting H₇ ($P = .610$, $t = 10.489$).

Discussion and implications for practitioners

Overall, the data analysis supports the following key theoretical relationships hypothesised in the initial model:

(1) Firms adopting an entrepreneurial posture related to innovativeness, proactiveness and risk-taking propensity in their decision making possess distinctive capabilities in market-focused learning, internally focused learning, relational learning and marketing (H₁, H₂ and H₃).

(2) Distinctive capabilities in market-focused learning, internally focused learning and relational learning are positively related to organisational innovation (H4, H5 and H6).

(3) Organisational innovation intensity is positively related to sustained competitive advantage (H7).

These findings support the two theoretical propositions of the capability-based theory of competitive advantage: First, that distinctive capabilities are the foundations of the organisational strategy; second, that distinctive capabilities do not merely accrue to the firm, but are consciously built by the wilful choices of strategic leaders of the firm.

The findings of the study have important implications for policy planners and firms pursuing innovation-based competitive strategy. As observed by the Innovation Study Commission of the Business Council of Australia (1993), a vital priority for the government is to develop a much sharper focus on the enterprise in the policies and programs. The findings of the study are based on firm level strategies for innovation and competitive advantage and therefore facilitate the formulation of firm-focused policies to encourage innovation. Similarly, the Queensland government's innovation policy statement which is aimed at building a Smart State primarily intends (a) building an environment conducive to innovation, and (b) to invigorate research and provide the necessary infrastructure for increased innovation capacity in the private and public sector organisations. The findings of the study have important implications for these initiatives. The implications of the findings for practice are discussed below.

Encourage entrepreneurship

The study finds that entrepreneurship is the nucleus of the innovation process. Entrepreneurial firms pursuing organisational innovation as the primary focus of their competitive strategy build and nurture distinctive innovative capabilities. Conventional measures of entrepreneurship are predominantly based on the characteristics of key decision-makers of the firm. However, in the current study the entrepreneurship was measured as a behavioural characteristic of the firm in which the firm displays tolerance for risk taking, innovativeness and proactiveness in the strategic decisions. This suggests that any firm can adopt an entrepreneurial posture in its strategic decisions. These findings also lead to the conclusion that firms can be guided to be entrepreneurial in their strategic decisions through policy planning and advice.

Educate and facilitate market focused learning

The findings support the current hypothesis that firms that are of higher entrepreneurial intensity possess distinctive market-focused learning capabilities. Accordingly, it can be concluded that entrepreneurial firms, compared to their competitors, extensively undertake market-focused learning activities. These activities as reflected in the indicators of the construct include frequently collecting

information about changes in the market or markets served by the firm, searching for innovative ideas through market information, possessing an extensive knowledge of the market segments of the industry in which the firm operates, extensively integrating customer and competitor information into innovations in the firm, and extensively reviewing unsuccessful market-focused learning projects and communicating the results within the organisation (unlearning). These activities undertaken by the sampled firms suggest that market-focused learning capability goes beyond the scope of individual learning that is confined to the knowledge acquisition by the individuals of the firm. Firms possessing market-focused learning capabilities not only acquire market information but also integrate market knowledge into innovation. They also actively undertake reviewing of unsuccessful market-focused learning projects and share such information within the firm. The study suggests that market focused learning capability leads to organisational innovation. Firms pursuing the path of innovation should be encouraged to actively engage in market focused learning activities.

Educate and facilitate internally focused learning

The study finds that firms' internally focused learning capability is a key determinant of the organisational innovation intensity. The study conceptualised this capability to cover both experiential (trial & error) and experimental (systematic search). These activities include extensive research and experimental activities, regular review of unsuccessful research and experimental projects and communication of results within the firm (unlearning), involvement of highly skilled staff in R&D activities, greater allocation of staff to research and experimental activities than competitors, and assignment of greater importance to internally-focused learning capability in order to successfully compete with competitors. These learning activities are aimed at building the technological and non-technological knowledge base of the firm that influences technological and non-technological innovations. Policy planning efforts should go beyond the current emphasis of encouraging R&D activity that represents only one of the internally focused learning activities. Policy planner's efforts should be directed to educate the firm on the importance of both technological and non-technological learning efforts in the organisational innovation process and stress the importance of developing such learning efforts as an organisational learning capability.

Educate and facilitate relational learning

The study finds that distinctive relational learning capabilities lead to higher degrees of innovation. Firms possessing relational learning capability extensively use links with external organisations and other firms to acquire technical and non-technical knowledge, have highly formal arrangements with other organisations and research institutions to acquire knowledge/technology, extensively search for ideas/opportunities for innovation through links with external agencies, extensively engage in unlearning, and assign a great deal of importance to the relational learning capability to successfully compete with competitors.

These findings provide support to the observations of the AMC study (1995) that highlight the significance of external linkages in sustaining innovation and growth of Australia's high-value-added exporters. It was observed that these firms use leading-edge customers, suppliers, R&D providers and other industry linkages; however, they do not exploit the maximum value from these linkages. Policy planning efforts should be directed to educate manufacturing firms on the benefits of learning from external linkages in the innovation process. Firms should also be educated on the importance of developing external learning activities as an organisational learning capability.

Educate on paths to organisational innovation

The study finds that both technological and non-technological innovations lead to sustained competitive advantage. The technological innovations pursued by the sampled firms are product and process innovation. The non-technological innovations are managerial and marketing innovations. This classification of innovation was based on the view that innovations can occur in any activity of the value-chain. Therefore, policies aimed at facilitating organisational innovation should educate and encourage firms to pursue all paths to innovation.

Conclusion and implications for developing a Smart State

This paper examined the role of organisational innovation in the competitive advantage process. The research setting was manufacturing firms in Queensland. The study found that entrepreneurial firms pursuing innovation-based competitive strategy build and nurture distinctive learning capabilities. These learning capabilities lead to higher organisational innovation intensity and competitive advantage. The study contributes to the capability-based theory of competitive advantage by testing key theoretical relationships among the constructs. The findings provide valuable input to government policy planning efforts aimed at formulating firm-focused innovation policies and for the Queensland government's innovation initiatives aimed at building a Smart State. Innovation in Queensland firms in the Smart State should be directed towards adopting an innovative posture in decision-making; and in building capabilities in market focused, internal and relational learning. Smart State government policy and programs should foster and facilitate development in these directions.

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