The Impact of Business Strategies and Business Conditions on Innovation

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Abstract

This paper focuses on the factors that drive innovation activity by businesses. A survey of over 200 businesses in the Queensland road and bridge industry was undertaken in 2002 and respondents were asked to rate the importance of key elements of business strategy to business success and to identify key elements of their business conditions. The results were then correlated with two measures of innovativeness. Exploratory tests indicated that the most important business strategies involve 'investing in R&D' and 'protecting intellectual property', while the most important business condition to innovation success is 'obtaining high quality external technical support'. The conclusions stress the importance of building inter-organisational relationships and effective business networking. In future research, the results will be interpreted more widely, by undertaking a comprehensive integrative analysis of emerging academic literature.

Keywords

innovation, business strategies, business conditions, construction industry, business networking, industry relationships

INTRODUCTION

Innovation and its contribution to economic growth has been the focus of extensive academic attention since the early explorations of influential economists such as Joseph Schumpeter in 1943 and Robert Solow in 1956. The relationship between innovation and growth is no longer contested. Innovation improves the competitive advantage of nations, industries and businesses (OECD 2000). The current literature on innovation is vast and covers a broad

range of objectives, perspectives and levels of analysis. Innovation is a current public policy buzz-word and leading contemporary consultants such as PricewaterhouseCoopers assert that 'the time has come for innovation to enter the main stream of management thinking, to achieve its rightful place alongside financial management and strategic planning as a determinant of business success' (PWC 2003, i).

This paper focuses on the factors that drive innovation activity. At a broad level, these factors are most commonly classed into two groups: those internal to the business and those external to it. These classes are frequently interpreted as business strategy and business conditions, broadly paralleling the traditional classification of innovation drivers into 'technology-push' and 'market-pull' factors. Contemporary analyses have added considerable depth and breadth to this early distinction. However, most studies of innovation drivers focus on a particular element of business strategy or conditions, such as regulations (eg. Gann 1998), communication (eg. Kivimaki 2000), R&D investment (eg. Wakelin 2001) or sophisticated clients (Morrison et al 2004). This paper takes a broader approach, comparing the relative importance of different elements of business strategy and business conditions and identifying overall themes.

METHODOLOGY

In order to identify the most important elements of strategy and conditions to innovation success, a survey was designed listing key features of these variables and asking about innovation levels. The industry contacts of the researchers suggested that this survey could be successfully applied in the Queensland Road and bridge industry. Indeed, data were collected from a survey of 335 organisations in that industry, including clients (Queensland Department of Main Roads district offices and local governments), consultants (mainly engineers and quantity surveyors), contractors (private and public sector) and input suppliers (equipment,

product and material suppliers). The survey was mailed out in April and May 2002. Responses were gained from 202 of the organisations to which the survey questionnaire was sent, giving a response rate of 62%, which can be considered exceptional for a voluntary mail survey (eg. Saunders, Lewis and Thornhill, 2000, 159; Ling 2003, 642).

Survey respondents were asked about a range of potential innovation drivers identified in the literature. These drivers were grouped into *business strategies* and *business conditions*, as shown below:

Business Strategies

Human Resource Strategies
Actively encouraging your employees to seek out improvements, through a 'no blame' organisational culture
Ensuring employees are aware of business/community issues
Hiring experienced employees
Hiring new graduates
Participating in apprenticeship programs
Providing or supporting local training programs for your employees
Use of multi-skilled teams

Technology Strategies
Enhancing your organisation's technical capabilities
Introducing new technologies
Investing in local research and development
Participating in the development of industry standards and practices
Protecting your organisation's intellectual property

Marketing Strategies
Delivering products/services which reduce your client's costs
Seeking business outside your present region
Increasing your market share
Building relationships with existing clients
Attracting new clients
Providing a broader range of services to your clients

Business Conditions

Materials and supplies quickly become obsolete
My clients can easily find a substitute for my services
My clients' needs are easy to predict
My competitors' actions are easy to predict
My organisation has many suppliers to choose from
Our organisation receives high quality technical support provided by other organisations
Our relationships with other organisations in the road industry are assisted by a culture of trust
Regulations impacting on our organisation encourage improvements in products/services
Technologies in the office are changing rapidly
Technologies on the construction/building site are changing rapidly
The arrival of new competitors is a constant threat

Respondents were asked to rank the importance of the 18 business strategies to the success of their organisations, and to rank the relevance of the 11 business conditions to their organisations. High rankings were assumed to promote innovation, based on findings in the literature (Seaden et al 2001). A Kruskal-Wallis test[1] was carried out to test this and to see which of the statements were most important to innovativeness. Where there significant differences in the rankings of strategy and conditions statements by managers, based on whether their organisations were classed as innovative or not?

Two measures of innovation were employed to make this classification. Innovative organisations were defined as ‘original innovators’ or ‘top quartile adopters’. Organisations with activity falling into either of these categories were determined to be innovative and the remaining respondents were classed as ‘not innovative’.

Original innovation involves inventing highly novel (substantially new) and previously unseen technological products/services or managerial practices. On the other hand, adoptive innovation is the diffusion of original innovation, where organisations implement existing technologies and advanced practices. Adoptive innovation is not new in an absolute sense,

[1] The Kruskal-Wallis test is a non-parametric version of one-way ANOVA.

however it is new to the organisation that adopts it. Although adoptive innovation is less novel than original innovation, adoptive activity is crucial for improved industry performance (Anderson and Schaan, 1999, 6). Adoptive innovation is clearly likely to occur more frequently than original innovation, especially in mature industries such as the road and bridge industry. For the purposes of this study, 'top quartile adopters' were defined as those organisations that adopted at least three-quarters of the leading technologies and practices listed in the survey. Twenty-two technologies and 24 practices were listed. The lists comprised technologies and practices that had been identified by industry experts as newly emerged innovations, and drew in part on a similar exercise undertaken in Canada (Anderson and Schaan, 1999).

RESULTS AND DISCUSSION

Business Strategies

The Kruskal-Wallis test indicated, with 95 per cent confidence, that *original* innovators and other respondents (who were deemed 'not innovative' by this measure of innovation) responded significantly differently to the strategies shown in Table 1, with original innovators valuing the strategies more highly. Note that a significance of .000 indicates that, at three digit level at least, there is a certainty that the findings of the current survey accurately apply to the overall industry. Indeed, for all the results shown in this section, there is more than a 95 per cent chance that they accurately apply to the overall industry.

Eight of 18 strategies emerged as being significant determinants of whether an industry participant was an original innovator or not. Four of the five technology strategies listed in the questionnaire were significant – skills in intellectual property, R&D, industry standards and new technologies. One of the seven human resource strategies listed was significant – hiring

new graduates – while three marketing strategies were significant – relationships with clients, reducing client costs, and offering more services to clients.

Table 1: Significant business strategies: original innovators versus other respondents

Business strategy	Significance
Protecting your organisation's intellectual property	.000
Investing in research and development	.000
Hiring new graduates	.001
Participating in the development of industry standards and practices	.007
Introducing new technologies	.010
Building relationships with existing clients	.023
Delivering products/services which reduce your client's costs	.025
Providing a broader range of services to your clients	.039

The Kruskal-Wallis test was also used to compare the strategy responses of top-quartile adopters and others. For the statements shown in Table 2, these two groups responded significantly differently, at a 95 per cent confidence level, with high-level adopters valuing the strategies more highly.

Table 2: Significant business strategies: top quartile adopters versus other respondents

Business strategy	Significance
Hiring new graduates	.000
Introducing new technologies	.000
Investing in research and development	.000
Protecting your organisation's intellectual property	.000
Actively encouraging your employees to seek out improvements, through a 'no blame' organisational culture	.002
Enhancing your organisation's technical capabilities	.007
Participating in the development of industry standards and practices	.041

Seven of 18 strategies emerged as being significant determinants of whether an industry participant was a high-level rather than a low-level adopter. All five technology strategies listed in the questionnaire were significant in determining an organisation's level of innovativeness – these were capabilities related to new technologies, R&D, intellectual property, technical skills and industry standards. Two of the seven human resource strategies were significant – hiring new graduates and a 'no-blame' organisational culture – while none

of the marketing strategies were significant in determining a respondent's level of innovation adoption.

A comparison of Tables 1 and 2 indicates that five strategies were significant by both invention and adoption measures of innovation. 'Hiring new graduates' is a significant factor in identifying inventors *and* adopters (while 'hiring experienced employees' is not significant in differentiating innovative organisations from non-innovative organisations, regardless of the measure of innovation employed). The rapid pace of technological change requires the employment of those with advanced skills, who may be best supplied by universities, given their involvement in frontier research. This suggests that businesses interested in improving their innovation performance ought to focus on new graduates in their human resource strategies.

The other four commonly significant strategies are all technology strategies. Three of them focused very much on original technological innovation, rather than organisational innovation or adoption activity. These strategies involved introducing new technologies, investing in R&D, and protecting intellectual property.

The final commonly significant technology strategy was 'participating in the development of industry standards and practices'. This is a key networking function and reflects the importance of knowledge networks and their role in supporting innovativeness.

A greater number of strategies were significant using the 'original innovator' measure of innovativeness. There were three strategies important *only* by this measure and they were all marketing strategies directly involving clients – 'building relationships with clients', 'reducing clients' costs', and 'providing a broader range of services to clients'. This finding draws attention to the lead role played by clients in original innovation, and the importance of

on-going relationships in developing the insights required for effective invention of new technologies and practices.

In order to isolate the factors that are *most* important to success across the two measures of innovation, attention is focused on only the most significant results; those achieving a .000 confidence level. Tables 1 and 2 reveal that two factors are significant at .000 across original and adoptive measures of innovation: investment in R&D and protection of intellectual property rights. It is interesting that these activities, which are normally associated with original innovation, are associated with both innovation measures. This highlights the extent to which successful adoption of innovation developed elsewhere depends on in-house R&D skills, as noted elsewhere in the literature (eg. Marceau et al 1997).

Business Conditions

Kruskal-Wallis test results for business conditions, based on the two measures of innovativeness used above, are shown in Tables 3 and 4.

Table 3: Significant business conditions: Original innovators versus other respondents

Business condition	Significance
My organisation has many suppliers to choose from	.005
Our organisation receives high quality technical support provided by other organisations	.026

Two of 11 business conditions emerged as being significant determinants of whether an industry participant was an original innovator or not, with original innovators being more likely to strongly perceive the existence of the condition. Choice amongst suppliers and technical support providers enables flexibility, creativity and, hence, innovation. Being locked into a particular supplier or relying on in-house technical support is clearly more limiting in comparison (though in-house R&D remains important).

Table 4: Significant business conditions: top quartile adopters versus other respondents

Business condition	Significance
Technologies on the construction/building site are changing rapidly	.000
Technologies in the office are changing rapidly	.004
Materials and supplies quickly become obsolete	.013
Our organisation receives high quality technical support provided by other organisations	.014

Four of 11 business conditions emerged as significant determinants of whether an industry participant was a high- or low-level adopter, with high-level adopters more likely to strongly perceive the existence of the condition. Perceptions of rapid technological change were linked to higher innovation levels – in terms of building site changes, office changes and material changes.

The final significant business condition was the cultivation of external technical support. Comparing Tables 3 and 4, only this business condition was commonly significant. If an organisation perceives that it is involved in effective industry networks, it is more likely to also be an effective innovator – both in terms of invention and adoption.

CONCLUSIONS

This study shows that technology strategies are important to innovation success; more so than human resource and marketing strategies. Two technology strategies in particular stand out: investing in research and development and protecting intellectual property. These findings fit in with the established literature, which emphasises the importance of these two activities as drivers of innovation success (Wakelin 2001; OECD 1997a). This is reflected in the extent to which the measures of both are used as a proxy for innovation activity (OECD 1997b). Indeed, historically, academics and business managers have focused on the benefits of *technological* innovation, which relies very much on these two activities. However, the structure of production is shifting in developed countries as we move into the 21st century,

from being manufacturing-dominated, to rapidly increasing reliance on services in the knowledge economy (Marceau et al 1997; OECD 1996). This brings with it a rapidly escalating need for *organisational* innovation, which is more about innovation in management than about technical innovation. This involves building new relationships to maximise opportunities in changing economic circumstances, which necessitate businesses providing a broader range of bundled products and services, often involving new areas of operation (Pappas and Sheehan 1998). Organisational learning in this context is greatly facilitated by building effective external business networks, through nurturing inter-organisational relationships.

This 'relationship' theme runs through many of the results presented here. Organisational flexibility and creativity is driven by these relationships. For example, to keep abreast of the escalating pace of change in business environments, it has been shown that successful innovation is often associated with hiring new university graduates. This practice updates the business's skill base and creates opportunities for new relationships strategically positioned with representatives of the international science community.

Similarly, it has been shown that participation in the development of industry standards and practices is a key driver of successful innovation. This strategy involves the business in a web of potentially useful relationships. For example, in the construction industry, government clients are often closely associated with government regulators. This suggests that membership of such networks could be very advantageous for contractors and consultants who work for repeat clients, not to mention the obvious benefits of helping shape the standards that they need to conform to. Finally, the literature emphasises the role that standards and regulations can play in driving innovation, through appropriate formulation and

placement of ‘goal posts’ (Gann 1998; Porter 1990). Industry participants can play a key role in informing such placement through their relationships with regulators.

The results also underline the importance of direct relationships with clients, with strategies such as ‘building relationships with clients’, ‘reducing clients’ costs’, and ‘providing a broader range of services to clients’ being significant determinants of successful *original* innovation. These findings suggest that relationships with clients promote the novelty of innovation, where higher levels of novelty can represent a quantum leap in growth opportunities, compared to the sustained incremental improvements in industry performance offered by the diffusion of existing innovations.

The focus on relationships continues in the context of significant business *conditions* supporting innovation. The results show that having a choice of suppliers and technical support providers is correlated with innovation success. These two groups are acknowledged in the literature as key innovation drivers (Gann 1997; Manley and Thorburn 1997). Choice amongst each group enhances flexibility and creativity, and is created by businesses investing in building inter-organisational relationships.

Perceptions of rapidly changing construction sites, office environments and materials were also linked to successful innovation. Considered alongside the findings above, it can be surmised that businesses that understand the fluidity of the economic context, build the relationships they need to cope with change.

In conclusion, it has been shown that among specific elements of business strategies and business conditions, those key to innovation success can be identified. Further, by combining analysis of a range of organisational-level strategies and environmental conditions, it has been

possible to identify the overarching importance of inter-organisational relationships and effective business networking to innovation success.

Further research will involve interpreting these exploratory results more widely, through comprehensive integrative analysis of emerging academic literature. It will then be possible to develop robust hypotheses for further testing.

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