SMALL FIRMS ASSESSMENT OF COMPLIMENTARY ACTORS IN THE DEVELOPMENT OF INNOVATION – SOME PRELIMINARY FINDINGS

Tim Mazzarol
Centre for Entrepreneurial Management & Innovation,
Graduate School of Management
University of Western Australia
35 Stirling Highway, Crawley WA 6009
Tel: 618 6488-3981
Fax:618 6488-1072
Email: mazzarol@gsm.uwa.edu.au

Sophie Reboud
Centre for Business Research
Groupe ESC Dijon Bourgogne
29 Rue Sambin BP 50608-21006, Dijon, France
Tel: (+33) (0)380 72 59 89
E-mail: sreboud@escdijon.com

Abstract

Small firms are frequently the source of many significant innovations and it is common for national governments to focus attention upon smaller entrepreneurial firms when seeking to encourage enhanced innovation. However, the entrepreneur within a small firm is frequently resource poor and requires collaborative partnerships with other organisations in order to bring their innovation to market. The role of complimentary actors as a part of the firm's strategic network is well recognised as being important to innovation, particularly in the diffusion of new technologies into established markets. This study examines the findings of a pilot study of small, high innovator firms in Australia and their assessment of the risks and benefits of forming strategic alliances with third party complimentors. A linear regression analysis found that the entrepreneurs of these small innovator firms were willing to form strategic alliances where such collaboration would assist in reducing customer perceptions of risk in the adoption of their innovation, while also enhancing the customer's understanding of the innovation. However, the entrepreneur of the small firm also needed to be confident that the alliance would allow him or her to retain control over the quality of the final outcome to their customer. These findings suggest that entrepreneur education in the development and management of strategic networks may be a useful enhancement to the process of innovation in small firms.

INTRODUCTION

Small to medium sized enterprises (SME) (e.g. those with fewer than 200 employees) operate within a web of stakeholders that typically include customers and suppliers, financial institutions and venture capital providers, employees and government agencies (Jennings & Beaver, 1997). Unlike their larger, vertically integrated counterparts, many

SME lack sufficient resources to fully develop all aspects of a new innovation or bring it to market. Entrepreneurs of small firms it is often advantageous to form strategic partnerships with customers, suppliers and third-party actors that supply finance or even intellectual property to assist the firm to secure a competitive advantage (Ostgaard & Birley, 1994).

This study examined the strategic decision making of entrepreneurs from small firms who were engaged in the commercialisation of a new innovation. A collaborative study involving Australian and French research groups, the project explored strategic risk assessment frameworks originally developed within France (Santi, et.al. 2003), and applied them to a sample of firms drawn from a government database of small innovator firms in Western Australia, the study examined the strategic decision making of the entrepreneurial owners in relation to their risk-return profile (Mazzarol & Reboud, 2005). Particular attention was given to their decision to proceed with a new product or process innovation, and their willingness to engage third party complimentary actors in its development and diffusion. Of interest was the role complimentary actors might potentially play in the innovation diffusion process.

FACTORS INFLUENCING NETWORKING AMONG SMALL FIRMS

Alliances within networks for small firms can be both formal and informal and can take place across both the production and resource network layers. Given the importance of the owner-manager in the decision to form an alliance, it is within the social network layer that attention needs to be given in seeking to understand the networking of small firms. A personal network – whether formal or informal in nature – is a valuable source of knowledge and ideas for the owner-manager and can assist them in making strategic decisions (Hogberg and Edvinsson 1998).

Common causes of network failure include the attempt by a large focal firm to appropriate the resources of other network partners, or attempt to interfere too much in the operations of their suppliers or distributors. A lack of trust or poor communication between network members can also lead to fatal damage to the alliance. Finally, if the network actors become overly specialized and narrow in their focus, they can lose their ability to innovate and the alliance may see its competitiveness reduced over the long-term (Miles and Snow 1992).

An examination of the strategic networking behaviour of small firms in Europe suggests that entrepreneurs from such business are motivated to forge alliances due to social ties built upon family and friends, but this may widen over time to enable the gathering of useful market intelligence. Such networks are both formal and informal in nature and are related to both the customer-supplier relationships and those associated with industry or trade associations and professional agencies (Donckels & Lanbrecht, 1997). A study of Australian small firms found that entrepreneurs are likely to seek strategic alliances in order to either create new market related opportunities, secure access to resources so as to build up business capacity, or defend market position against competitors (Jarrett, 1998).

For many small business entrepreneurs the prospect of forming strategic alliances with other firms is fraught with problems. A common concern appears to be fear that valuable information or intellectual property will be leaked away via the network. This 'leakage' of information is recognized as a major challenge facing business networks and is only really controlled via the trust and mutual respect held among network members. These entrepreneurs may also avoid entering into strategic alliances out of a desire to retain their independence, and a perception that other firms could not be trusted (Dean, Homes and Smith, 1997). Manufacturing firms were found to be more likely to avoid such collaboration than service-based firms, and older, more established firms were more likely to seek collaboration than younger, less established ones. Entrepreneurs that did engage in strategic alliances expressed the benefits of doing so to be sustainable growth and profitability, as well as enhanced information exchange and the improvement of product quality.

A study of 149 small manufacturing firms in the United States found that social networking by the entrepreneurs running these firms were the principal determinant of how strategic alliances were formed. Entrepreneurs who had a high propensity to network were more likely to be engaged in a wide range of formal and informal professional, trade and social organisations. Of importance was their perception that an association in such circles was likely to enhance their prestige. Also important was the strength of the alliances that comprised the network. It was of more importance that the network was focused on valuable outcomes for the entrepreneur than its overall size. Such a network might be focused on production activities or support activities involving marketing, sales, training or investment agreements (BarNir & Smith, 2002).

THE ROLE OF COMPLIMENTARY ACTORS IN INNOVATION DIFFUSION

Brandenberger and Nalebuff (1995) outline the concept of complimentary actors within a firm's strategic network. In addition to customers and suppliers, the firm's "value net" contains both "substitutors" and "complimentors". The first of these are essentially the competitors who have the ability to substitute the firm's products or services for their own. The latter are those that offer the firm complimentary services or whose products or services can compliment those of the firm, enhancing the overall benefits to the customers. An example might be that of hotels and airlines, or software companies and those that manufacture computer hardware.

For small firms seeking to commercialise a new innovation it is useful or even necessary to secure access to complimentary technologies or resources that can assist the diffusion process. The brilliance or originality of the innovation is often not sufficient to allow a new idea to find ready acceptance within a selected market (Price, 1996). Innovation must be able to meet a market need and must be configured in such a way as to conform to the customer's existing environmental requirements (Grupp & Maital, 2001). Much may depend on the nature of the innovation itself. For example, an incremental innovation may be relatively easy to bring to market without much external assistance. Market disruption is low and customers can readily adopt the product or process with

minimal effort. By comparison a radical technological product or process innovation is likely to be more disruptive of the market and may be more difficult for the customer to quickly adopt, even if it brings substantial benefits to them (OECD, 2001).

Customer acceptance of an innovation – particularly a technological one – is likely to be contingent on their capacity to determine during the selection process five key things: i) the relative advantage of the innovation; ii) how complex it is to understand and use; iii) whether it is compatible with existing technologies and systems; iv) whether it can be trialled before it is accepted; and v) how observable are the benefits from the innovation (Rogers, 1995). In decision making relating to the acceptance of a new technological innovation the customer is also likely to consider how useful this new product or process is, and how easy it can be to use (Davis, Bagozzi & Warshaw, 1989). In some markets the decision as to whether or not a new innovation is adopted may be impacted by the influence of social pressure groups, the brand image associated with the product, how relevant the new technology is to the adopters core business or work, whether the adopter can demonstrate the benefits of the innovation, and also the experience the adopter might have with such technologies (Legris, Ingham & Robertson, 2003). Further, within organisations it is common for the adoption decision making to be a two-stage process that involves initially the adopting firm's management, but then the implementation stage in which the end users are engaged (Zaltman, Duncan & Holbeck, 1973; Leonard-Barton & Deschamps, 1988). This can create additional problems for small firms seeking to get their innovation adopted by larger organisations as the diffusion process can be complex.

Complimentors can assist the diffusion process by providing a supportive strategic network where the innovation developed by the originator firm is combined with the existing technologies or business systems of a complimentary actor in the firm's network. A case in point is that of Australian firm TCG that possessed expertise in electronic metering. To enable them to bring a new product into the aviation refuelling market TCG formed strategic alliances with two complimentary actors; a large oil company supplying fuel to the aviation sector, and an existing fuel metering manufacturer that did not have the advanced electronic systems offered by TCG. Together the three firms collaborated in the process of new product development. This strategic collaboration enabled TCG to enter this new market that might have been otherwise impossible to access alone (Matthews, 2001).

Based upon this previous evidence this study sought to test several research propositions:

P^1 – that small innovator firms will seek to implement an innovation strategy where the customer is perceived to secure a significant benefit from the new innovation;

P^2 – that small innovator firms will seek to implement an innovation strategy where the new innovation is perceived to be compatible with the customers existing technologies or systems;

P³ – that small innovator firms will seek to establish strategic alliances with complimentor networks when the market diffusion may be impeded by above average levels of perceived risk by customers due to the innovation's complexity;

SAMPLING & METHODOLOGY

In 2002 a small scale qualitative study was undertaken in France with 15 entrepreneurs from small firms based in the Dijon region. The study identified a risk-return evaluation framework for entrepreneurs seeking to invest in a new innovation (Santi et. Al, 2003). This study sought to follow up the earlier French research and in 2004 a pilot survey was conducted with a sample of entrepreneurs from high innovator small firms in Perth, Western Australia. A questionnaire, developed from the original French qualitative study, was distributed to around 550 SME (less than 100 employees, with ¾ of them having under 20 employees, over 80 percent had turnover less than AUD$5 million, with the average around AUD$1 million) identified as highly innovative and registered with the WA State Government Department of Industry and Resources (DOIR). A total of 57 usable responses were returned (10% response rate). The majority of respondents were both executive managers and owners.

The questionnaire was targeted at persons within the firms who could report on behalf of the entire organisation. Within the final sample 42 percent were owner-managers, 23 percent were executive managers and principal shareholders, 25 percent were executive manager shareholders and 10 percent were executive managers without shareholdings. Thus the majority of corespondents were both executive managers and owners. The questionnaire asked respondents to indicate whether they had an innovation that they were planning to invest in over the next three years, and 96.5 percent indicated that they did so and were planning to introduce a new innovation into the market during this time frame. All firms had introduced a new product or process innovation in the past three years with the average number of new product or service innovations being 4 over the previous three years. The average proportion of annual turn over that these firms invested in new product R&D was 24 percent, reflecting their high innovator status. This should be compared with the Australian industry average of only 0.6 percent (ABS, 2005).

Other questions in the survey were structured around their risk-return assessment of the innovation, as well as the strategic decision making associated with the investment. A particular focus was placed on the role of complimentors in the market diffusion process, examining the size of the complimentor network, the impact this network was felt to have on the firm's success and the relative importance of the complimentors to the innovation.

A step-wise linear regression analysis was employed to test the strength of this complimentor network with the dependent variable being the relative importance of complimentary actors to the proposed innovation. There were 28 independent variables tested in the regression analysis that related to customer perceptions of the benefits and risk of the innovation, customer ease of understanding the innovation, their ability to

measure the innovation's benefits, as well as customer and supplier power issues. These variables are shown Table 1.

Table 1: Independent Variables used in regression models

Q22 value offer to customer	**Q39** suppliers power over cost control
Q23 price offer to customer	**Q40** customers power over quality
Q24 customer ease of understanding	**Q41** customers power over cost control
Q25 customer prior test evaluation	**Q42** firm power over quality
Q26 customer post test evaluation	**Q43** firm power over cost control
Q27 customer compatibility of technology	**Q44** customers power over switching costs
Q30 customers views of risk	**Q45** suppliers power over switching costs
Q31 customers views of transfer costs	**Q46** firm power over switching costs
Q32 customers views of time saving	**Q47** supplier power to integrate forward/backward
Q33 customers views of complexity	**Q48** customer power to integrate forward/backward
Q34 customers views of opportunities	**Q49** firm power to integrate forward/backward
Q35 customers views of ease of understanding	**Q50** importance of sales turnover to suppliers
Q36 customers views of ease of measurement	**Q51** importance of sales turnover to customers
Q38 suppliers power over quality	**Q52** importance of sales turnover to firm

FINDINGS

Within the sample, 51 percent indicated that they had entered into some form of joint venture with leading customers, but only 25 percent had entered into any formal joint ventures with key suppliers. Almost half the sample (47%) indicated that they had entered into a joint venture with other companies. This suggests an above average level of strategic alliance building within these firms, which is consistent with highly innovative small companies (Mazzarol 2003). In terms of the number of potential complementary actors that might be involved in the diffusion of the innovation, the firms could identify: 69.6 percent could identify 1-2 partners; 21.4 percent could identify 3-5 partners; and 8.9 percent could identify over 6 partners. With respect to the value such complementary actors might offer, 60 percent considered that their value would be high and 40 percent low. Further, 51 percent of the firms considered that these complementary actors would be larger and stronger firms, while 49 percent identified their complementary actors as smaller and more dispersed.

The regression analysis used a stepwise methodology in the SPSS statistics package that produced a model after five steps. It can be seen from Table 2 that this model had an

adjusted R-square of 0.42 suggesting that the model explains around 42 percent of the variation in the data. This model suggests that the predictors of the importance of complementary actors to the innovation were:

- The customer's perception of the level of risk they were likely to face when adopting the new innovation.
- The level of power the innovator firm had over quality within its industry.
- The customer's perception of the opportunities the innovation would create for them if adopted.
- The compatibility of the innovation to the existing technologies operated by customers.
- The customer's ability to easily understand the innovation.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
5	.695	.483	.420	1.512

Predictors: (Constant), Q30 customers views of risk, Q42 firm power over quality, Q34 customers views of opportunities, Q27 customer compatibility of technology, Q24 customer ease of understanding

Dependent Variable: Overall the relative importance of complementary actors to my proposed innovation is.

Coefficients

Model		B	Std Error	Beta	t	Sig.
5	(Constant)	-3.224	1.582		-2.038	.048
	Q30 customers views of risk	.571	.171	.391	3.341	.002
	Q42 firm power over quality	.504	.123	.494	4.079	.000
	Q34 customers views of opportunities	.479	.139	.412	3.452	.001
	Q27 customer compatibility of technology	.397	.150	.312	2.652	.011
	Q24 customer ease of understanding	-.447	.181	-.288	-2.470	.018

DISCUSSION OF THE FINDINGS

The regression model outlined above suggests that the respondent's assessment of the importance of complementary actors to their proposed innovation is determined by how easily the customer can understand it and the customer's assessment of the risk and potential opportunities offered by the innovation, as well as how easily it can be integrated into their existing technologies. Finally the model suggests that the small innovator firm's own ability to influence the level of quality in the industry plays an important role.

The findings provide support for the research propositions outlined at the commencement of the study, particularly the third proposition. They are consistent with the evidence from innovation diffusion theory that highlights the importance of customers being able to overcome the issues of complexity, compatibility, trial ability and observability in an innovation prior to its adoption (Rogers, 1995). However, where these issues become too difficult to address alone the innovator firm is likely to seek collaborative partners.

As noted above, previous research into the strategic networking behaviour of small firms in Australia suggests that many find the formation of alliances with complementary actors both confusing and somewhat threatening (Dean, Holmes and Smith 1997). However, such alliance building can provide significant benefits to small firms in terms of enhancing their competitiveness (Ostgaard and Birley 1994).

As previously explained small firms benefit from forming alliances with complementary actors in order to secure access to new markets or product opportunities, to access resources otherwise unavailable to them and to defend established market positions (Jarrett 1998). In markets where the small firm may lack suitable access to key resources, or requires additional enabling technologies to facilitate the adoption of an innovation, collaboration becomes essential. This has been described as a 'triangular' process of new product development, in which the innovator firm collaborates with a third party to secure the adoption and diffusion of their innovation by a potential customer (Matthews 2001).

The findings from this analysis suggest that the small innovator firms in the sample are considering such a process. Where customer's perception of risk is high and their understanding of the innovation is low collaboration is likely. However, the small innovator firm must also be confident that it has an innovation that can offer customers good opportunities and one that will integrate readily into the existing technology base. Finally, the small innovator firm should feel that it could control the quality of the product or innovation within the industry. This last point is likely to be important, because this is likely to provide the small innovator firm with a degree of control over the end result. Should they feel that they couldn't control the quality, they are likely to be vulnerable when engaging complementary actors who might adversely influence the final outcome. The beta score of Q24 "firm power over quality" is not surprisingly the largest within the model.

CONCLUSIONS

Although tentative, these findings suggest that entrepreneur education in the development and management of strategic networks may be a useful enhancement to the process of innovation in small firms. Small firms benefit from forming alliances with complimentary actors but the management of such relationships can be taxing on the entrepreneur and is fraught with potential risks. Teaching entrepreneurs the benefits of strategic partnering and assisting them to find and forge useful strategic alliances should be placed among other management skills in future entrepreneurial education programs.

While only a small scale study the findings suggest that future research to explore the benefits and impediments to strategic networking among small firms is relevant and useful. Lessons learnt from this research can inform policy makers and entrepreneurs as to the most effective ways to encourage and build alliances. Entrepreneurs need to recognise that the commercialisation of a new – particularly radical – technological innovation is unlikely to be undertaken successfully without the involvement of third party complimentary actors. The formation of strategic partnerships with such actors is therefore a strategic management issue that should be addressed early within the business planning process. Policy makers and management educators also need to recognise that the formation and management of strategic alliances is often crucial to the process of successful commercialisation. However, it is frequently viewed as a risky process and assistance processes such as facilitation services that assist entrepreneurs to network in a secure environment can be most helpful. Teaching entrepreneurs the value of strategic alliances and how to manage these from both a legal and social perspective is also important.

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