Commercialisation Practice in Small Firms: A Longitudinal Case Analysis

Tim Mazzarol

UWA Business School, University of Western Australia, Crawley Western Australia

Email: tim.mazzarol@uwa.edu.au

Rob D. Hart

Department of Applied Physics, Curtin University of Technology, Bentley Western Australia

Email: r.d.hart@curtin.edu.au

Commercialisation Practice in Small Firms: A Longitudinal Case Analysis

ABSTRACT

Commercialisation is a poorly understood area of innovation management and very little has been published on the way in which small firms engage in its management. This paper examines four case studies of small to medium enterprises engaged in the commercialisation of an innovative new product or process. These firms were initially interviewed in 2006 in relation to a specific innovation they were developing. They were interviewed again in 2012 and their experiences examined against a pre-determined set of factors developed from the literature that relate to innovation management. The findings provide some insights into the way such firms approach commercialisation, and the trade-off that must be made between anticipated return to investment and the allocation of scarce resources.

Keywords: innovation, new product development, technology innovation, small and medium sized enterprises

INTRODUCTION

Small to medium sized enterprises (SMEs) (e.g. those with fewer than 250 employees) comprise around 99% of all the businesses within most developed economies and contribute between 50% and 75% of the value added (OECD 2010a). These small firms are often actively engaged in innovation, but on average this is at a much lower rate than is common amongst large firms. It is therefore important that we gain a better understanding of the way in which SMEs engage in the process of innovation including new product development (NPD) and commercialisation. Such understanding may help to unlock the potential of the SME sector and enhance their engagement in innovation.

The traditional focus of studies on innovation in SMEs has been directed towards fast growth and "Gazelle" firms (Kuratko and Hodgetts 1998). However, such firms comprise only a very small proportion of all SMEs. For example, as measured by employment, fast growth firms (e.g. those with annualised growth over of 3 year period in excess of 20%) represent between 3% and 6% of all SMEs; and "Gazelle" firms (e.g. firms younger than 5 years old with >20% annualised growth over 3 years and with 10 or more employees at the beginning of the observation period) represent less than 1% of all firms (OECD 2010b).

Nevertheless, these firms remain of interest for their potential to generate radical, disruptive or discontinuous innovations, rather than the more incremental innovations that are often developed

by larger firms. Such radical innovations – if successful – have the potential stimulate economic growth and therefore employment (Case et al 1990; Haltiwanger et al 2009). For many small firms the process of commercialisation is made difficult due to a lack of resources, particularly financial resources, but also the management skills and competencies needed for NPD and "go to market" activities (Adams 1982; Vermuelen 2005). Yet for many SMEs the need to innovate may be essential to both growth and possibly survival.

It is the purpose of this paper to examine the experience of SMEs engaged in the process of commercialising an innovation. Of particular interest is the importance of formal or systematic innovation management practices in the success of such commercialisation efforts. Also the way in which the senior management teams who lead these companies perceive the anticipated return to future investment in the innovation, and how this motivates their decision to proceed with the commercialisation process. A longitudinal case study design was employed in this study using four SMEs who were interviewed at the commencement of the commercialisation process and six years later.

NEW PRODUCT DEVELOPMENT AND COMMERCIALISATION IN SMES

The failure rate of new product development (NPD) is surprisingly high, Christensen (2003) suggests that 60% of new products never reach the market and 40% of those that do are not profitable, with approximately 75% of spending on NPD resulting in failure. Researchers have tried to characterise and define best practice models for NPD by investigating more or less successful firms. However where research has been conducted, most studies have investigated large or high technology businesses, *e.g.*, Cooper *et al*, (2004a,b,c) investigated businesses with an average of 4,711 employees and annual sales of $2.5 billion. By comparison there has been relatively little attention given to the commercialisation process of SMEs (Hoffman et al 1998; Varis and Littunen 2010).

SME's are typically constrained by a lack of resources and are more likely to follow emergent rather than planned strategies with 'learning by doing' playing a much greater role within the venture than formal business planning (Cope and Watts 2000). In order to improve their chances of success tools are required to improve entrepreneur's strategic awareness, such as improved screening tools for

potential innovations and tools and methodologies to assist entrepreneurs with commercialisation of innovations (Fassoula and Rogerson 2003). To achieve this, a better understanding of the problems facing entrepreneurs and what has led to success or failure is required to provide knowledge of key areas of management and management strategy that can assist entrepreneurs, particularly innovative entrepreneurs in small firms.

Research into the process of innovation management remains somewhat disjointed and lacking in coherent conceptual foundations (Tidd 2001). Adams, Bessant and Phelps (2006) identified at least seven areas associated with the process of managing innovation, the last two of which comprised NPD and commercialisation. They noted that the latter had received relatively little attention within the academic literature. Commercialisation is not well-defined within the academic literature. However it is generally associated with the process of taking a new product to market, and undertaking the processes of marketing and selling, or licensing the product or related technologies. It is a process that involves the commercial exploitation of an innovation resulting in a profitable return to this investment (Chakravorti 2004).

Commercialisation is one of the most important activities associated with the management of innovation, because it is where the business recovers, or fails to recover, the investment made in the innovation (Akgun et al 2004). Small firms seeking to commercialise new technologies can do so via a range of mechanisms including licensing, consulting, collaborative engineering and joint ventures, as well as direct sales to customers (Libaers and Hicks 2007). Many SMEs lack the resources that they require to fully commercialise their innovations alone, so they often seek third party support from larger firms as customers, or co-developers (Kollmer and Dowling 2004).

NPD is an activity that precedes the commercialisation stage (Adams et al 2006). As with commercialisation, the definition of NPD is also poorly developed in the academic literature. However, in some studies NPD has been defined as; "*products in the pipeline"* (Deeds, Decarolis & Coombs 2000). In large firms it is associated with well-defined processes, the management of R&D portfolios and careful analysis of returns to investment (Cooper et al 2004a,b,c). Key factors for success in NPD have been identified as the systematic control over project selection, product strategies, market research and in particular project management (e.g. process controls, metrics)

(Dooley, Subra and Anderson 2002). The role of senior managers and their ability to support control and communicate with project teams, plus these teams' structure and composition are also seen as playing a key role (Brown and Eisenhardt 1995). However, in SMEs the success of the NPD process seems to be highly related to the firms' ability to obtain input from customers and engage in marketing (Huang, Soutar and Brown 2002). In many small firms the key relationship is the interaction between the entrepreneur and their lead customers (Gibb and Scott 1985; Choi and Shepherd 2004; Mazzarol and Reboud 2005; Eng and Quaia 2009).

Most of the extant research into commercialisation and SMEs has focused on high-tech industries and their interaction with either large firms (Gans and Stern 2003; Lee et al 2010), or universities (Milton-Smith 2001). It also focuses on the role of strategies such as licencing (Kollmer and Dowling 2004). Yet SMEs tend to be opportunistic in their approach to NPD and commercialisation rather than strategic and systematic (Lindman 2002). SMEs within manufacturing industries have been found to focus more on product or patent innovations rather than the wider scale of market expansion that is common in larger firms (Vaona and Pianta 2008). Such firms have also been found to benefit from a more systematic or formal approach to NPD (Terziovski 2010), although the firm's ability to respond to customer or market trends has also been shown to be important (Liao and Rice 2010). There also appears to be some differences between low and high tech firms in relation to their investments in product or process R&D (Raymond and St-Pierre 2010).

A systematic approach to the NPD and commercialisation process with a close alignment of R&D with marketing has been found to be effective within larger firms (Griffin and Hauser 1996; Dutta, Narasimha and Rajiv 1999). However, small firms generally do not follow the same systematic approach to marketing as do their larger counterparts. Decisions are made by the entrepreneurial leadership of the firm which tend to be opportunistic, informal and at time idiosyncratic (Blois and Carson 2000; Carson 1985; 1990).

METHODOLOGY

In the early 2000s the French Institute for Intellectual property (INPI) sponsored research

aimed at developing a risk-return tool to assist innovative entrepreneurs to screen ideas before committing resources. What emerged from this study was a strategic analysis tool designed to assist managers in SMEs assess the potential return to future investment in their innovation using strategic rather than financial analysis (Santi et al 2003; Miles et al 2003). The tool provided an alternate view to net present value models by considering non-financial factors in determining the value of an innovation. It estimated the "rent" that could be anticipated from investment in the intellectual property (IP) associated with the innovation, and sought to understand

This assessment tool examined three levels of "rent". The first was the "potential" rent that might be generated from the innovation, and was assessed by the entrepreneur at the commencement of the assessment process. The second was the "residual" rent that reflected the entrepreneur's assessment after they had considered external market conditions and competitor responses. Finally, there was the "appropriable" rent, which was final assessment after the entrepreneur considered their available resources and competencies for commercialisation. The major factors in the consideration of this RENT framework are the volume of sales (Volume) the achievable profit margin (Rate) and the length or lifecycle of innovation (Length) (Santi et al 2003; Miles et al 2003).

The original RENT typology developed by Santi et al (2003) had six potential rent types and these were developed by Mazzarol and Reboud (2011) into eight distinct types as shown in Figure 1, reflecting different trade-offs of the three primary elements (e.g. volume, rate, length). In a study involving 567 cases from 11 OECD countries they examined the commercialisation practices of SMEs, using an adapted RENT configuration tool. This used 12 items to measure the three primary elements of the rent framework with four items measuring each of the three elements. This questionnaire also examined the level of systematic management of the commercialisation process across 40 items divided evenly into four 10-item scales that examined strategy, marketing, innovation and resources management in the firm. This was known as the Innovation Diagnostic Diamond (IDD) framework (Mazzarol and Reboud 2006).

<INSERT FIGURE 1 ABOUT HERE>

Development of the original database and case study selection

The final dataset generated from this earlier research comprised 567 cases (83 Australian) of innovator SMEs from 11 OECD countries (Mazzarol and Reboud 2011). The firms investigated represented a cross section of innovations that had the potential for commercialisation. Of the firms selected, 35% of the firms were from manufacturing industries, 29% services and retailing and 36% from a variety of sectors including ceramics, jewellery and bio-technology, transport and storage. Only 55% of firms, and then mostly larger firms reported a formal NPD process. There were mixed, almost contrary results suggesting formal systems such as IP protection and access to venture capital funding were not required or wanted by many small firms. As a result many firms relied on informal systems (*e.g*. trade secrets, first mover advantages, causal ambiguity, networks and relationships) as isolating mechanisms for their innovation and on debt and/or retained profits for financing. This suggests that most small firms, in Australia particularly those outside the IT or biotech industries, do not adopt what are usually regarded best practice approaches, and indeed these may not be appropriate for them.

A discriminant analysis of 550 of the original cases was undertaken that grouped these firms into four sub-populations using the 12 items that had been used to measure the RENT framework. This used a step-wise analysis that correctly classified 87% of the original grouped cases and 91% of the cross-validated grouped cases. The four groups classified from this analysis were defined by the potential volume and length, rather than the rate of return. These were grouped into four sub-populations defined as: “Champion” (high volume high length); “Flash in the Pan” (high volume, low length); “Oasis” (low volume high length); and “Shrimp” (low volume low length). The distribution of the original cases into these four groups was fairly even: Champion (112); Flash in the Pan (113); Oasis (139) and Shrimp (186). Of the original 82 Australian firms 24 were classified as Champions, 15 as Flash in the Pan, 27 Oasis and 16 Shrimps.

The original research was a cross-sectional study of different firms in different countries but represented only a single point in time and only pre-launch analyses of the innovations were possible. At the time of the original research the performance of the firms was taken on trust from reports by

the owners/managers. Since the initial studies there have been significant world-wide upheavals that have placed considerable stress on small innovative firms but also emphasised the economic importance of improving the chances of success of small innovative firms for job creation.

This study sought to examine the success or failure of the innovations in SMEs to elucidate, which firms were successful and how did they have to change, if at all, to successfully commercialise their innovation. Did the typology of the innovation drive change within the firm to be successful; *e.g.*, does a Champion innovation, associated with high complexity and uncertainty, which may require formal or systematic planning behaviour push the firm and entrepreneur to become more formal, strategic and externally oriented, protecting innovations through formal IP processes than a firm with Shrimp innovation? Sufficient time has passed to examine what has happened to their innovation projects and provide a longitudinal analysis for a small sub-group of firms from the original case study and examine.

1. What key factors influenced success or failure in commercialisation of innovations within firms?
2. How important are systematic and formal innovation management practices to the successful commercialisation of innovations?
3. Is there a relationship between the level of systematic and formal management of innovation within the firm and the nature of the innovation being and what is the nature of this relationship?

To address these research questions four case study firms were drawn from the Australian sample with one firm selected from each of the sub-groups defined through the discriminant analysis. This was in keeping with Eisenhart's (1989) recommendation that selection of cases for a case study design should be undertaken on a theoretical basis. Firms of broadly equivalent size were selected and all were manufacturers in order to control for any size and industry effects.

Data collection process

The four cases were recruited by identifying the owner-manager or CEO who had undertaken the original interviews in 2006. It was possible for the researchers to locate firms where the same

people were still present and who remembered the innovation they had been seeking to commercialise at time of the first interview. A case study protocol was prepared for the interviews following the recommendations outlined by Yin (1989). The data obtained using the original 2006 interview questionnaire was available to the researchers including the respondent's original assessment of the potential RENT typology and also their management of commercialisation as measured via the IDD framework. Each interview took approximately two hours and involved the respondent reviewing their original 2006 responses, completing a follow up survey and discussing their experiences over the intervening six ears. The history, success or failure of the innovation was investigated by considering the timeline of the innovation using a critical incident technique (Flanagan 1954). The technique is particularly appropriate when the field is new and the goals of research include practical managerial problems and theory development (Keaveney, 1995).

Case Studies Selected

Table 1 provides a summary of the four cases selected for this study. As can be seen, the four firms were all small and highly innovative. The main differences were the nature of their innovations and their approach to the commercialisation process. Of the four, the Champion firm is notable for its being a spin-out from a university and having venture capital financing and ownership. The CEO of this firm was also not a shareholder, and he was not the inventor or founder of the venture. By comparison, the other three firms were managed by their original founders. The Flash in the Pan firm had also received venture capital funding, but the CEO/Entrepreneur had been asked to return to the business to save it from deteriorating performance on two occasions. The Oasis and Shrimp firms had not fully commercialised their innovations, the first due to difficulties in getting the military procurement system to accept the product, and the latter because of a perceived lack of strong demand in the market. However, both firms had not abandoned these innovations, but had either sought alternative market entry points (e.g. direct sales of the product to end users in the military), or placed the product into its NPD portfolio for a better time in the market.

<INSERT TABLE 1 ABOUT HERE>

CASE ANALYSIS

A focus for the case study analysis was the nature of the firm's approach to the management of the commercialisation process. This was examined using the IDD framework and Figure 2 illustrates the overall results from the four cases to the 40 questions contained in the IDD with the responses from the 2006 and 2012 interviews. As illustrated, the results for the Champion indicated a strong score for all four of the IDD indices with slight improvements in the innovation and resources index. By comparison the Flash in the Pan case had only a weak IDD score, but it improved strongly in the 2012 survey, while the Oasis firm appeared to move in the other direction. Overall these results were anomalous. The smallest firm was Oasis, but it also had some of the strongest results on the IDD in the 2006 interview, although these had decreased by 2012. The low IDD performance for the Flash in the Pan case in 2006 and the dramatic improvement by 2012 appear to reflect the learning curve of the firm's owner who was the youngest and least experienced of the four interviewees when initially interviewed. He had also been engaged in two sale and repurchase agreements in relation to this business during the intervening six years, with the lack of systems impacting on the survivability of the company once he had departed.

<INSERT FIGURE 2 ABOUT HERE>

Table 2 summarises the key findings from the four cases. The Champion firm's strong performance and highly systematic approach to NPD and commercialisation reflects its history as a university spin-out that had taken on venture capital investors from its inception, and had grown rapidly into international markets with large business customers. The firm's CEO was also an experienced professional. This structured and strategic approach to NPD and commercialisation fits the tradition "Silicon Valley Business Model" (Cohen 2010).

<INSERT TABLE 2 ABOUT HERE>

By contrast the other three firms were led by entrepreneurial owner-managers. While the Flash in the Pan owner had also attracted venture capital finance, his departure from the company had led it to falter and he had been asked to return to help revive its fortunes. His relative lack of systems as evidenced from the 2006 interview may have been partly responsible for these problems, but he had taken steps to rectify these issues by 2012, although he remained intuitive in his planning behaviour. For the Oasis and Shrimp firm there had not been any success with their innovations. However, their lack of success was not caused by the same issues. In the case of the Oasis firm the problem was a lack of resources to take on a major national contract with the Australian Defence Forces. In the case of the Shrimp, the lack of demand in an otherwise static and conservative market, plus the firm's ability to secure sales from its existing range of products meant that their innovation did not warrant significant investment of time or resources.

DISCUSSION

The findings from these four cases highlights the importance placed on customer or market feedback for most SMEs in deciding whether or not to invest in the commercialisation of an innovation. Customers are more likely than third parties such as lawyers, accountants or investors to influence such decision making, particularly where the senior managers of the SMEs are also the principle shareholders and owners of the business. This is consistent with the earlier findings reported by Mazzarol and Reboud (2011). The two successful firms (e.g. Champion and Flash in the Pan) also demonstrated a close and direct engagement with customers who assisted in the co-development of the final product. By contrast the unsuccessful firms (e.g. Oasis and Shrimp) were selling via agents or distributors. This ability to listen to the voice of the customer has been highlighted by research into successful commercialisation (Griffin and Hauser 1993; Huang, Soutar and Brown 2002). The Champion firm's recognition of the need to strengthen its marketing team with technical specialists, and the Oasis firm's development of retail operations also reflect the importance of customers.

All four companies had strong and competent NPD project teams, and were willing to take advice from customers, employees, other managers and co-directors as well as shareholders. However, they also displayed a strong willingness to back their own judgement and to ignore advice

they disagreed with. They displayed a confidence that they could achieve their goals by using their skills and judgement (Buzenitz 1999; Sarasvathy 2001). All firms anticipated a higher rent return to their original innovation than they actually received. Even the Champion firm continued to expect much higher returns than it had been able to secure over the period of the review, despite their overall success. The CEO of this firm anticipated future growth rates in excess of 50%. The Flash in the Pan had enjoyed strong growth from its products, despite their turbulent history, and was focusing on a future product that they predicted would secure significantly higher returns. Even the two unsuccessful firms continued to remain optimistic. The Oasis hoped to resubmit their tender to the Defence Force and the Shrimp anticipated an eventual improvement in the agricultural market.

All respondents had less than perfect management of their IP rights, particularly in terms of formal patent or design registration. The interviewees all expressed disappointment with IP protection systems. For example, the Oasis firm who manufactured in Asia complained that their products were at risk of copying and many competitors had introduced similar products that could not have been developed by coincidence. Yet the Oasis firm did not formally register its designs and the Shrimp did not take out patents on its inventions. They argued that IP rights were costly and such protection was only as good as their own capacity to fight infringements in the courts. As one owner commented: "*IP protection has been corrupted from its original intention, and is now a commercial weapon"*. The owner of Flash in the Pan had not formally registered his IP although he had investigated it and felt he "could" and "should" do so, but the high cost and uncertainty of enforcement in a global market were given as reasons for not doing so.

The cases also suggest that while systematic and formal approaches to NPD and commercialisation are helpful, they are not essential within SMEs, so long as the owner-managers have competence in these areas. However, as firm size and complexity increase there is a need for more formality and system. A formal NPD portfolio management process seems desirable. The entrepreneurs' optimism and persistence in the face of difficulties were also important to the firm's track record in commercialisation, which is consistent with earlier research (Howell and Higgins 1990; Dushnitsky 2010). The entrepreneurial managers leading these firms also demonstrated a tendency to learn by doing rather than adopt a more systematic approach (Cope and Watts 2000).

The cases also demonstrate an interrelationship between the type of innovation being commercialised and the strategic management behaviour displayed by the firms. For example, the Oasis and Champion firms had more systematic approaches to the commercialisation of their products, but were seeking to secure contracts with major government or mining companies. By contrast the Flash in the Pan firm was initially less systematic and became so as the owner realised the importance of this. The Shrimp firm's owner had quite strong market awareness and an ability to deal with innovation management and resources, but lacked a strategic focus in relation to its product. These cases suggest that in an environment of scarce resources as found in most SMEs, the innovation only receives sufficient systematic or formal attention as the owner feels is necessary to secure a return to any investment. If they feel success can be achieved without much formality or system they will try to do without it.

CONCLUSIONS

This study is still largely exploratory and future research will seek to collect more cases from the original 2006 sample to track performance and assess the factors influencing this. The role of the entrepreneurial leader as decision maker, planner and strategist looms large in these cases. This expertise or competency appears to be a substitute for system and formality, but there seems to be an increased need for formality and system when the firm is seeking to expand its size and complexity, and when it attempts to secure sales with larger more formal and systematic organisational customers. There appears to be interplay at work between the market opportunity and the entrepreneurial manager's perception of the potential rent they can expect from their innovation on the one side; and the firm's resources and competencies to exploit this opportunity on the other. This is consistent with existing theory relating to resource allocation in entrepreneurship (Alvarez and Busenitz 2001), the ability of entrepreneurs to generate rent returns via resource allocation and resource shifting (Alvarez and Barney 2004).

REFERENCES

Adams, R., Bessant, J., and Phelps, R. (2006). "Innovation Management Measurement: A Review." *International Journal of Management Reviews* **8**(1): 21-47.

Akgun, A. E., Lynn, G.S., and Byrne, J.C. (2004). "Taking the Guess Work out of New Product Development: How successful high-tech companies get that way." *Journal of Business Strategy* **25**(4): 41-46.

Alvarez, S. A., and Barney, J.B. (2004). "Organizing rent generation and appropriation: toward a theory of the entrepreneurial firm." *Journal of Business Venturing* **19**(5): 621-635.

Alvarez, S. A., and Busenitz, L.W. (2001). "The entrepreneurship of resource-based theory." *Journal of Management* **27**(12): 755 - 775.

Blois, K., and Carson, D. (2000). Marketing in Small Firms. *Oxford Textbook of Marketing*. Oxford, Oxford UP**:** 570.

Brown, S., and Eisenhardt, K (1995). "Product Development: Past research, present findings and future directions." *Academy of Management Review* **20**(2): 343-378.

Carson, D. (1985). "The Evolution of Marketing in Small Firms." *European Journal of Marketing* **19**(5): 110-119.

Carson, D. (1990). "Some Exploratory Models for Assessing Small Firm's Marketing Performance (A Qualitative Approach)." *European Journal of Marketing* **24**(11): 1-49.

Case, J, Brich, D and Gallese, LR (1990) *The Most Entrepreneurial Cities In America*, **12**, pp. 31-46.

Chakravorti, B. (2004). "The New Rules for Bringing Innovations to Market." *Harvard Business Review* **82**(3): 58-67.

Choi, Y.-R., and Shepherd, D.A. (2004). "Entrepreneurs' Decisions to Exploit Opportunities." *Journal of Management* **30**(6): 377 - 395.

Christensen, C M., 2003. *The innovator's solution: creating and sustaining successful growth*. Harvard Business Press. ISBN 9781578518524.

Cohen, S. (2010) *The Role of Small and Medium-size Firms in Innovation*, paper prepared for the OECD LEED Program, OECD, Paris.

Cooper, R. G., Edgett, S.J., and Kleinschmidt, E.J. (2004a). "Benchmarking Best NPD Practices - I." *Research Technology Management* **47**(1): 31-43.

Cooper, R. G., Edgett, S.J., and Kleinschmidt, E.J. (2004b). "Benchmarking Best NPD Practices - II." *Research Technology Management* **47**(3): 50-59.

Cooper, R. G., Edgett, S.J., and Kleinschmidt, E.J. (2004c). "Benchmarking Best NPD Practices - III." *Research Technology Management* **47**(6): 43-55.

Cope, J., and Watts, G. (2000). "Learning by Doing: An Exploration of Experience, Critical Incidents and Reflection in Entrepreneurial Learning." *International Journal of Entrepreneurial Behaviour & Research* **6**(3): 104-124.

Deeds, D. L., Decarolis, D., and Coombs, J. (2000). "Dynamic Capabilities and New Product Development in High Technology Ventures: An Empirical Analysis of New Biotechnology Firms." *Journal of Business Venturing* **15**(3): 211-229.

Dooley, K. J., Subra, A., and Anderson, J. (2002). "Adoption Rates and Patterns of Best Practices in New Product Development." *Journal of Innovation Management* **6**(1): 85-103.

Dushnitsky, G. (2010). "Entrepreneurial Optimism in the Market for Technological Inventions." *Organizational Science* **21**(1): 150-167.

Dutta, S., Narasimhan, O., and Rajiv, S. (1999). "Success in High-Technology Markets: Is Marketing Capability Critical?" *Marketing Science* **19**(4): 547-568.

Eisenhardt, K. (1989). "Building Theory from Case Study Research." *Academy of Management Review* **14**(4): 532-550.

Eng, T.-Y., and Quaia, G. (2009). "Strategies for improving new product adoption in uncertain environments: A selective review of the literature." *Industrial Marketing Management* **38**(3): 275-282.

Fassoula, E. D., and Rogerson, J.H. (2003). "Management Tools for SMEs." *Total Quality Management* **14**(10): 1114-1119.

Flanagan, J.C. (1954) "The Critical Incident Technique", *Psychological Bulletin*, **51**(4): 327-358.

Gans, J. S., and Stern, S (2003). "The product market and the market for "ideas": commercialization strategies for technology entrepreneurs." *Research Policy* **32**: 333-350.

Gibb, A., and Scott, M. (1985). "Strategic Awareness, Personal Commitment and the Process of Planning in the Small Business." *The Journal of Management Studies* **22**(6): 597-632.

Griffin, A., and Hauser, J.R. (1993). "The Voice of the Customer." *Marketing Science* **12**(1): 1-27.

Griffin, A., and Hauser, J.R. (1996). "Integrating R&D and marketing: A review and analysis of the literature." *Journal of Product Innovation Management* **13**(3): 191-215.

Haltiwanger, J, Jarmin, RS and Miranda, J (2009), *Business Dynamics Statistics Briefing: Jobs Created from Business Start-ups in the United States*, Kauffman Foundation Kansas City.

Hoffman, K., Parejo, M., Bessant, J., and Perren, L. (1998). "Small firms, R&D, technology and innovation in the UK: a literature review." *Technovation* **18**(1): 39-55.

Howell, J. M., & Higgins, C.A. (1990). "Champions of Change: Identifying, Understanding and Supporting Champions of Technological Innovations." *Organizational Dynamics* **19**(1): 40-55.

Huang, X., Soutar, G.N., and Brown, A. (2002). "New Product Development Processes in Small to Medium-Sized Enterprises: Some Australian Evidence." *Journal of Small Business Management* **40**(1): 27-42.

Keaveney, S.M., 1995. Customer switching behavior in service industries: an exploratory study. *Journal of Marketing,* **59**(2): 71–82.

Kollmer, H., and Dowling, M. (2004). "Licensing as a commercialisation strategy for new technology-based firms." *Research Policy* **33**(8): 1141-1151.

Kuratko, D., and Hodgetts, R. (1998). *Entrepreneurship: A Contemporary Approach*. Sydney, Harcourt and Brace.

Lee, S., Park, G., Yoon, B., and Park, J. (2010). "Open Innovation in SMEs – An Intermediated Network Model." *Research Policy* **39**(2): 290-300.

Liao, T.-S., and Rice, J. (2010). "Innovation investments, market engagement and financial performance: A study among Australia manufacturing SMEs." *Research Policy* **39**(2010): 117-125.

Libaers, D., and Hicks, D. (2007). "A Taxonomy of Small Firm Technology Commercialisation." *Academy of Management Proceedings & Membership Directory*: 1-6.

Lindman, M. T. (2002). "Open or closed strategy in developing new products? A case study of industrial NPD in SMEs." *European Journal of Innovation Management* **5**(4): 224-237.

Mazzarol, T., and Reboud, S. (2006). "The Strategic Decision Making of Entrepreneurs within Small High Innovator Firms." *International Entrepreneurship and Management Journal* **2**(2): 261-280.

Mazzarol, T., and Reboud, S. (2009). *The Strategy of Small Firms: Strategic Management and Innovation in the Small Firm*. Cheltenham, UK; Northampton, MA; Edward Elgar Publishing.

Mazzarol, T., and Reboud, S., Ed. (2011). Strategic Innovation in Small Firms: An International Analysis of Innovation and Strategic Decision Making in Small to Medium Sized Enterprises. Cheltenham, UK. Northampton, MA USA, Edward Elgar Publishing.

Mazzarol, T., and, Reboud, S. (2005). "Customers as predictors of rent returns to innovation in small firms - an exploratory study." *International Journal of Entrepreneurship and Innovation Management* **5**(5/6): 483-494.

Miles, M. P., Paul, C.W., and Wilhite, A., (2003). "Modelling corporate entrepreneurship as rent-seeking competition." *Technovation* **23**(5): 393-400.

Milton-Smith, J. (2001). "The role of SMEs in commercialising university research & development: The Asia-Pacific experience." *Small Business Economics* **16**(2): 141-148.

OECD (2010a). SMEs, Entrepreneurship and Innovation. Paris, Organisation for Economic Co-operation and Development.

OECD (2010b). *High-Growth Enterprises: What Governments can do to make a Difference.* Paris, Organisation for Economic Co-operation and Development.

Raymond, L., and St-Pierre, J. (2010). "R&D as a determinant of innovation in manufacturing SMEs: An attempt at empirical clarification." *Technovation* **30**(1): 48-56.

Santi, M., Reboud, Sophie., Gasiglia, Hervé, et., and Sabouret, Alexandre., (2003). Modèle de valorisation et de protection intellectuelle des innovations des PEI. July, HEC/INPI**:** 63p.

Sarasvathy, D. K. (2001). "Effectual Reasoning in Entrepreneurial Decision Making Existence and Bounds." *Academy of Management Proceedings & Membership Directory* **August**: D1-D6.

Terziovski, M. (2010). "Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view." *Strategic Management Journal* **31**(8): 892-902.

Tidd, J. (2001). "Innovation Management in Context: Environment, Organization and Performance." *International Journal of Management Reviews* **3**(3): 169-183.

Vaona, A., and Pianta, M. (2008). "Firm Size and Innovation in European Manufacturing." *Small Business Economics* **30**(3): 283-299.

Varis, M., and Littunen, H. (2010). "Types of Innovation, Sources of Information and Performance in Entrepreneurial SMEs." *European Journal of Innovation Management* **13**(2): 128-154.

Yin, R. K. (1989). *Case Study Research: Design and Methods*, London, Sage Publications.

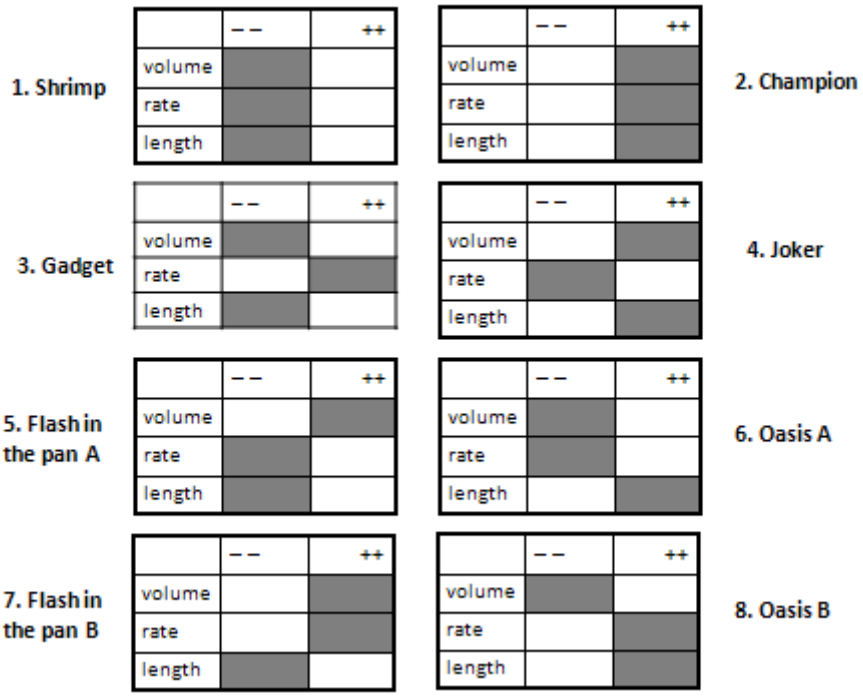

Figure 1: The RENT Typology

Table 1: Case Study Firms

Case	Description
CHAMPION	Founded in 2005 this firm was a spin-out from a university R&D project. Its innovation is a high-technology spatial mapping solution to industrial applications where precision measurement is essential. The company had developed a suite of products from its core technology platform and at time of interview had secured 30 to 40 customers across 12 countries. It was jointly owned by the university from which the original technology had been developed, the inventors of the technology, and third-party venture capital providers. Over the six years between time of first and second interviews the company had grown its employee numbers from 5 to 30 people, and its annual turnover from $1.5m to $4.5m. The CEO of the firm is neither an owner nor shareholder, although he has some stock options and had been the company's leader since foundation. An engineer by background, the CEO had no formal management education, but substantial experience with small, start-up companies as CEO or R&D manager.
FLASH IN PAN	This firm has been in operation for 9 years and is a developer of information technology software and data management systems. Its primary customers are government and large corporations. It has successfully commercialised several data management products across both software and more recently hardware systems. At least 8 distinct products were identified. Growth has been significant with around 80% year on year expansion. The company employs 35 staff and has an annual turnover of $4.5m. Since 2006 the firm had experience significant fluctuations in its performance, although it had expanded rapidly from 5 employees in 2006 to its current size. The founder and CEO is one of three key shareholders. His original career was in geophysics, but he has completed an MBA with specialisation in technology management. The CEO/entrepreneur noted that the company has been sold by him and purchased back twice since the 2006 interview. This was due to him being called back to rescue the firm. He is now working on a Champion innovation.
OASIS	Established in 1979 this company designs and manufactures specialist outdoor clothing and equipment for recreational and commercial end users. It has a significant range of products across a large number of categories. It is owned and operated by one person who had previously employed around 25 people and manufactured locally while selling through a company owned retail outlet. However, since 2000 the company had been downsized, with all manufacturing done offshore in Asia, and retailing undertaken by customer distributors. The company has an annual turnover of around $1m. In 2006 this had been reported as being around $3m. The company's innovation at time of the first interview was a specialist backpack suitable for military use. The firm had already designed and supplied similar equipment to the SAS and Australian Antarctic Division as well as Police and Emergency Services. It had been its intention to expand the new innovation to a wider market by selling to the Australian Defence Forces (ADF), but a contract had not been secured. Instead the product was being sold privately to ADF personnel. The problems associated with the commercialisation of the innovation as originally planned related to the procurement process of the Defence Materials Organisation (DMO). The owner of this business had past experience in retailing and manufacturing before establishing his business.
SHRIMP	This business was established in 1985 and employs 35 full time and 5 part time staff with an annual turnover of $5.5m. It designs and manufactures tools and parts for agricultural machinery used in tillage, seed/fertiliser placement and grain harvesting. The company also provides engineering services. Their innovations include devices that can be used in tillage points made from wear resistant alloys. Tungsten carbide tips that allowed for enhanced shape retention and longer service life estimated at 5 to 10 times that of existing parts. The company has launched a number of innovations and has over 120 parts that it offers to end user farmers. These range from small components for existing farm machinery to major items such as a hay bailing trailer that does not require the operator to leave the tractor. The firm is owned privately by four shareholders, only two of which are active in the company. The director who was interviewed for the study has a background as a chemist and metallurgist, and is primarily responsible for sales and marketing. The innovation examined in 2006 was a hay bailing system designed to sort and remove weed seeds. This product had potential but was expensive (approx. $400K) and would be integrated into an existing combine harvester (priced around $600K). At time of second interview the product has not been commercialised due to a lack of demand in the market.

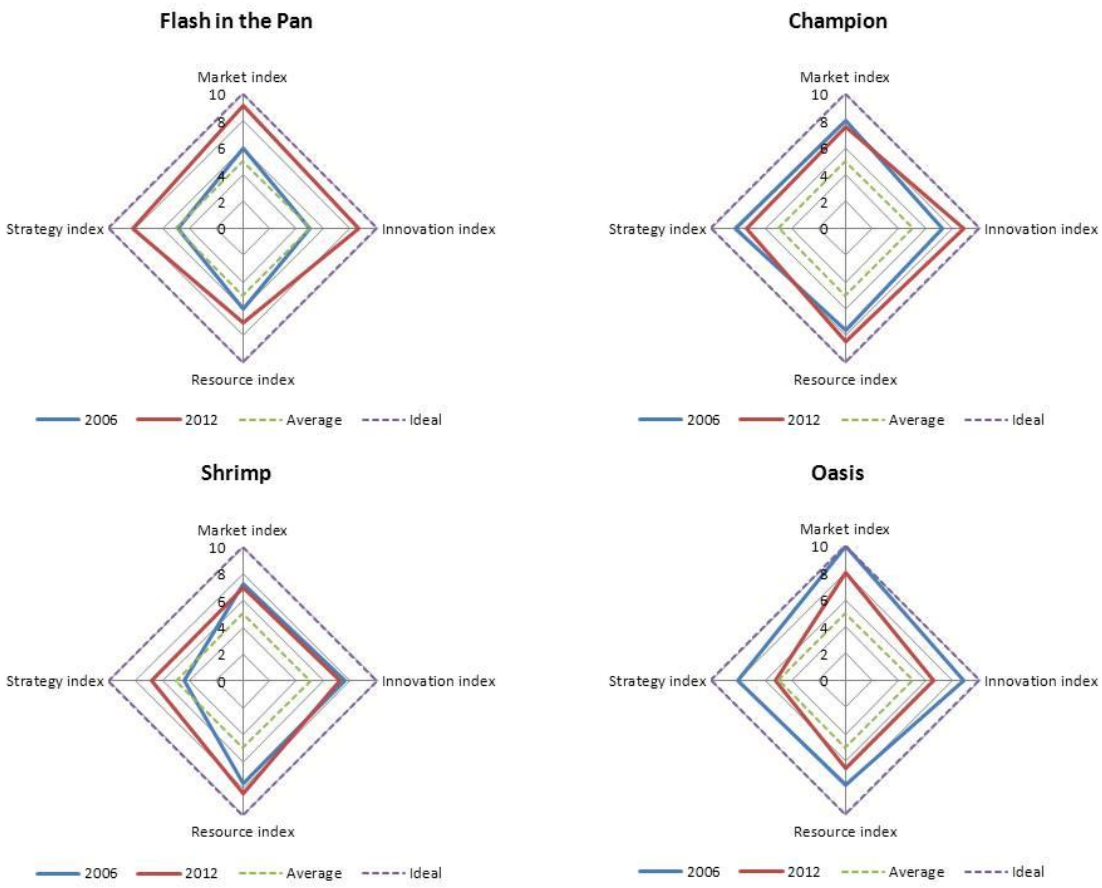

Figure 2: The IDD Framework for all cases 2006 and 2012 periods

Table 2: Case Study Firms Characteristics of Commercialisation Management

Case	Description
CHAMPION	Formal and systematic in its commercialisation management with high IDD indices and well-developed strategies for NPD and future target markets. The firm maintains close contact with lead customers who are primarily in the mining and resources sector, and seeks to co-develop new products. Employees are also closely involved in NPD. However, as the firm has grown in size its systematic approach to commercialisation has struggled to keep pace, placing pressure on the CEO. The CEO had become more focused on the firm's future NPD and target market strategies. His reliance on outside advisors had diminished. He admitted to poor management of NPD projects in the early years, caused by inexperienced teams. This had required the firm's growth to be slowed while systems were developed. More formality in planning had been required as the firm's product portfolio expanded. Despite improvements in resources and innovation, the firm still lacked the required strength in marketing. This had led to the addition of technical people to the marketing team. Market fragmentation was emerging as a problem and so was the need to find and retain good people. The company held an extensive IP patent portfolio, and was actively seeking to strengthen this within overseas markets (e.g. the USA).
FLASH IN PAN	This firm had introduced a large number of new products over the period from 2006 to 2012 and was working on a new "champion" innovation. Significant growth and rapid NPD were characteristics of the business. However, in 2006 the firm's IDD scores were quite low although this had changed over the intervening years, particularly in the areas of the strategy, market and innovation indices. The firm had expanded both nationally and internationally with new products and a sales agent network. This has led the owner to adopt a more systematic approach to planning and managing NPD and the process of commercialisation. The owner demonstrated a strong strategic awareness of key trends in his industry. He had sold the business to venture financiers and US business interests, but their failure to make the business work had led to him returning to take over control on two occasions. The owner had a strong track record in successfully starting up four new ventures before this one. He claimed that his MBA had helped him apply systems to the business in its early years, but that this had become more intuitive as his experience developed. The short lifecycle of the firm's product seems to have influenced the short term strategic focus of the owner and his more intuitive approach.
OASIS	The firm had only the owner as an employee and had not successfully commercialised despite some small scale sales. To achieve the level of commercialisation the owner required needed the firm to secure a major contract with the Australian Defence Force procurement office (DMO). This was a long term process and one that required significant time and effort by the owner. Considerable paperwork, the employment of an extra six employees, trial production and testing and some strategic partnering with US military equipment suppliers, were all requirements for the successful development of the product via this target route. This overstretched the limited resources of the owner. The original IDD scores for this firm reflected the owner's past experience in manufacturing and sales, and also the anticipated entry into a major market. The intervening years and lack of success reflect an overly optimistic outlook by this owner. Despite this lack of success the owner had widened his network of contacts, strengthened alliances and opened new retail channels including a website for online sales.
SHRIMP	This firm had not successfully commercialised their innovation and its annual turnover had remained static over the six years between interviews. It has also seen its annual turnover decline significantly from the three years prior to the first interview in 2006. The lack of success in commercialisation was attributed to the poor state of the agricultural market rather than any inherent problem with the firm's product. The firm's owner saw his role as bridging a divide between R&D and end-user farmers, but noted that the farming community was "very conservative". The innovation that had been the focus for future commercialisation in 2006 was only one of many products developed and sold by the firm. Its lack of success had little impact on the firm's overall performance. The strategy score on the IDD index was found to reflect the firm's relative lack of systematic strategy for the specific innovation rather than any inherent lack of general strategy. The firm's owner was well aware of market trends and the strategy for his business overall. Little change had taken place in the firm between 2006 and 2012 and this was reflected in the IDD scores for all but the strategy index. Since 2006 the firm had introduced more systematic approaches to strategy for NPD and commercialisation which is also reflected in the IDD results. The business did not deal directly with end users, relying instead on feedback from its distributors. Customer feedback comes from participation at agricultural field days and some networks.