

Chapter 2

Commercialisation in SMEs

Case studies from Australia, New Zealand and the United States

TIM MAZZAROL, DELWYN CLARK, NEWELL (SANDY) GOUGH, PHILIP OLSON AND SOPHIE REBOUD

INTRODUCTION

This chapter examines the process of commercialisation in small to medium enterprises (SMEs) from the perspective of 13 case studies drawn from Australia, New Zealand and the United States. It examines these cases longitudinally by interviewing them at two points in time, the first during the early stage of their commercialisation of a new product, and then six years later. The objective of this research was to gain first-hand knowledge of the process of commercialisation that SMEs undertake, and to understand the key factors that impact on this process. Also of interest was the decision making of the entrepreneurial leaders of these firms and the role played by various internal and external forces to the firm. For the purposes of our study we define an SME as one that has fewer than 250 employees (OECD, 2004).

Small firms are often viewed as the engine room of new innovative ideas (Kuratko and Hodgetts, 2004). Recent developments by the OECD include an innovation strategy which recognises the significance of SMEs as a driver of economic growth (OECD, 2009; 2010a; 2010b). Rather than just focussing on Research and Development (R&D) and breakthrough innovations, this strategy notes the importance of incremental innovations carried out by 'ordinary' SMEs. This also reflects a broader view of innovation beyond science and technology to include new products and services, new marketing methods and changing ways of organising business. In aggregate, innovations by small and entrepreneurial firms

can contribute significantly to productivity and economic performance (OECD, 2009; 2010a; 2010b).

Adams, Bessant and Phelps (2006), in a review of the literature relating to innovation management, observed that commercialisation within SMEs had not received much attention in the academic literature. Our own review of the literature since their paper's publication found over 1,300 peer reviewed papers had been published between 2006 and 2014 that contained the words 'commercialisation' and 'SMEs'. However, of these only 25 dealt specifically with the process of commercialisation and SMEs, and only five had conducted studies that specifically examined, via survey or case study SMEs active in the process (Kim, Lee, Park and Oh, 2011; Conceicao, Fontes and Calapez, 2012; Youtie, Hicks, Shapira and Horsley, 2012; Knockaert, Vandenbroucke and Hughe, 2013; Hemert, Nijkamp and Masurel, 2013). This lack of attention to the process of commercialisation within SMEs was also noted by Hemert *et al.* (2013) who suggested that it had been 'neglected', particularly in relation to the development of regional innovation systems. They also noted the need for follow up case study interviews in order to provide more validation of the findings drawn from survey instruments.

Only two of the more recent studies, Kim *et al.* (2011) and Hemert *et al.* (2013), examined the interrelationships between multiple elements within the firms' innovation management processes such as new product development, commercialisation and strategic decision making. Further research to understand the challenges for entrepreneurial SMEs taking new ideas to market and successfully managing growth is required. In addition, theories as to the key factors influencing the returns from new innovations are also needed. This chapter contributes to these issues from a series of longitudinal case studies of innovative SMEs. It provides evidence of the importance of adopting a systematic approach to commercialisation and innovation management, plus the need for 'isolating mechanisms' such as intellectual property (IP) rights protection.

The research questions this study sought to address were:

1. What key factors impact on the process of innovation commercialisation within SMEs in relation to success or failure?
2. How do entrepreneurial leaders from SMEs make decisions in relation to future investments in the commercialisation of innovation, and what is the relative importance of:
 - a) the use of formal or systematic commercialisation processes?
 - b) the existence of sufficient resources to allow the firm to proceed alone?
 - c) the characteristics of the firm's management team?
 - d) the level of uncertainty in the firm's task environment?
 - e) the level of complexity in the innovation's commercialisation?

Previous research into commercialisation in SMEs

In the following section we overview the literature that relates to innovation management, new product development (NPD) and commercialisation within SMEs. We also discuss the important issue of how the leadership of these innovator SMEs assess the potential value of the innovations that they seek to commercialise.

Innovation management

Innovation management encompasses all of the processes involved in turning ideas into useful and marketable products. Following a systematic review of the academic literature, Adams, Bessant and Phelps (2006) proposed a framework with seven categories: i) inputs; ii) knowledge management; iii) innovation strategy; iv) organisational culture and structure; v) portfolio management; vi) project management; and vii) commercialisation. Given the broad scope of these processes, it is not surprising that they found a diversity of approaches and fragmentation in the prior research. However, the lack of consistent definition and coherent conceptual foundations, means that the field remains disjointed (Tidd, 2001; Ernst, 2002). Commercialisation was found to be the least developed area within the innovation management literature, and further development of theory and measures was recommended as a priority given the importance of achieving commercially viable outcomes (Adams, Bessant and Phelps, 2006). Our study aims to contribute to an increased understanding of commercialisation by entrepreneurial SMEs.

Innovation strategy and formal structure are key drivers of SME performance according to a study of Australian manufacturers (Terziovski, 2010). Adopting a strategic approach to innovation has also been demonstrated to be important in a multi-industry OECD study of innovation processes in SMEs (Mazzarol and Rebound, 2011). There are different types of innovation (product, process and marketing, organisational) which require different information sources (Varis and Littunen, 2010). Adding to the complexity, SMEs vary in the approach they take to innovation. This was shown in a study of adoption of new design technologies for product and process innovations in which three clusters of firms were identified (Panizollo, 1998). Further, the system of relationships within the customer-buyer-supplier area and the network of support services offered to the SMEs were critical factors for this technology innovation. Open innovation can assist SMEs with market-related activities such as meeting customer demands or keeping up with competitors, albeit while creating additional challenges of dealing with increased external contacts (van de Vrande, deJong, Vanhaverbeke and de Rochemont, 2009).

New product development

NPD is a key process within innovation management. Although it was not a specified category in the review by Adams, Bessant and Phelps (2006), NPD activities were recognised as fundamental to innovation. New products are very

important, but are only one of the many types of innovation defined in the OECD's (2009) Oslo Manual; other types are process, marketing or organisational innovations. NPD includes the activities and decisions that move a product from idea to launch. There are several definable stages through which the NPD process moves before reaching full production (Cooper and Kleindschmidt, 1986). These can be sorted into three sequential phases (e.g. ideation, development and production), and differentiated into the technical/engineering and the marketing/business development activities (Mazzarol, 2012). Taking products through a staged pipeline from ideation to production using a systematic approach has been advocated for many reasons including reducing risk, averting failure and improving performance (see: Cooper and Kleindschmidt, 1986; Brown and Eisenhardt, 1995; Deeds, Decarolis and Coombs, 2000; Ernst, 2002; Eng and Quaia, 2009).

A major review of empirical work into critical success factors for NPD by Ernst (2002) grouped the key factors into five areas: i) NPD process; ii) organisation; iii) culture; iv) management; and v) strategy. These factors demonstrate the importance of managerial issues beyond the NPD process including project organisation, senior management support, and a strategic framework connecting specific products to long-term firm performance. The support and leadership shown by senior managers, as well as the openness of communication between project team members and the use of cross-functional teams has been advocated for product development success (Brown and Eisenhardt, 1995). Key factors for success in NPD include systematic control over project selection, product strategies, market research and in particular project management e.g. process controls and metrics (Dooley, Subra and Anderson, 2002).

Research into the success of NPD in SMEs has found that they tend to execute *technology-related activities* (e.g. product-development, in house product testing and preliminary technical analysis) very well. However, they do not perform the *marketing-related activities* (e.g. market study, market testing, and preliminary market analysis) as effectively (Huang, Soutar and Brown, 2002). This research found that it was the marketing-related activities that best differentiated the successful from the unsuccessful products. This is therefore an important area for SMEs to incorporate within their product development planning and resourcing. In fact when SMEs engage in commercialisation they may narrowly focus on R&D issues without investing sufficiently in marketing capabilities (Kim *et al.*, 2011).

Since the key relationship in many small firms is between the owner-manager/entrepreneur and their lead customers (see: Gibb and Scott, 1985; Choi and Shepherd, 2004; Mazzarol and Reboud, 2005; Eng and Quaia, 2009), this task of obtaining input from customers is not likely to be onerous or difficult. However, in SMEs the commitment of resources to specific projects often represents a trade-off from other tasks, yet this investment clearly acts as a catalyst for successful new developments.

Commercialisation

Commercialisation 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). As this is where the business recovers, or fails to recover, the investment made in the innovation and commercialisation is one of the most important activities associated with the management of innovation (Akgun, Lynn and Byrne, 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). Networks that include open environments for the free flow of ideas and information exchange with universities and larger firms may also play a key role in facilitating the process of commercialisation (Hemert *et al.*, 2013; Knockaert *et al.*, 2013). However, such collaboration often focuses on the firm's technological capability via R&D exchange, than it does upon activities such as marketing which are critical to successful commercialisation (Kim *et al.*, 2011). This may be determined by nature of the market into which its products are being targeted (Knockaert *et al.*, 2013).

Most extant studies covering commercialisation and SMEs have concentrated on high-tech industries and their interaction with either large firms (Gans and Stern, 2002; 2003; Lee *et al.*, 2010; Conceicao *et al.*, 2012; Youtie *et al.*, 2012; Knockaert *et al.*, 2013), or universities (Milton-Smith, 2001; Leisyte, 2011; Politis, Gabrielson and Shveykina, 2012). Research has also focused on the role of strategies such as licencing (Kollmer and Dowling, 2004). SMEs tend to be opportunistic in their approach to NPD and commercialisation rather than strategic and systematic (Lindman, 2002). The technology based firms may find a need for third-party support services in areas such as financing, marketing and technical development (Knockaert *et al.*, 2013).

Within manufacturing industries, SMEs 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 a firm's ability to respond to customer or market trends has also been shown to be important (Liao and Rice, 2010). There are also differences between low and high-tech firms in relation to their investments in product or process R&D (Raymond and St-Pierre, 2010).

Creating and appropriating value

The expectation of commercialisation is the creation of economic value above the costs to produce and market the innovation, and the appropriation of at least

some of these returns by the entrepreneurial firm (Alvarez and Barney, 2001; 2004; 2005; Alvarez, 2007). However, estimating the potential return from an innovation is not necessarily a straightforward calculation as conventional financial models of net present value may not be quantifiable. The approach for estimating the potential returns depends on whether the investment context is risky or uncertain. According to Knight (1921) these two are distinguished on the basis of whether or not the probability distribution of outcomes are known (risk) or not (uncertain) before the decision is made (Alvarez, 2007).

The ability of entrepreneurial firms to generate and appropriate economic rents¹ from new market opportunities is summarised by Alvarez and Barney (2004) as determined by resource controls, type of knowledge, and the effectiveness of 'isolating mechanisms' (see: Rumelt, 1984) to prevent imitation (such as patents on key technologies, use of trademarks and copyrights, non-compete clauses, etc.). When the entrepreneurial firm controls all of the resources needed to generate the potential rents from an innovation, there is no need to take steps to contract or partner with others to obtain them. However, when the firm does not control all of the resources needed, governance choices impact the ability to realise the potential from the opportunity. These governance choices depend on whether the knowledge is tacit or explicit, and also on the ability to restrict information flows to competitors (Alvarez and Barney, 2004; 2005).

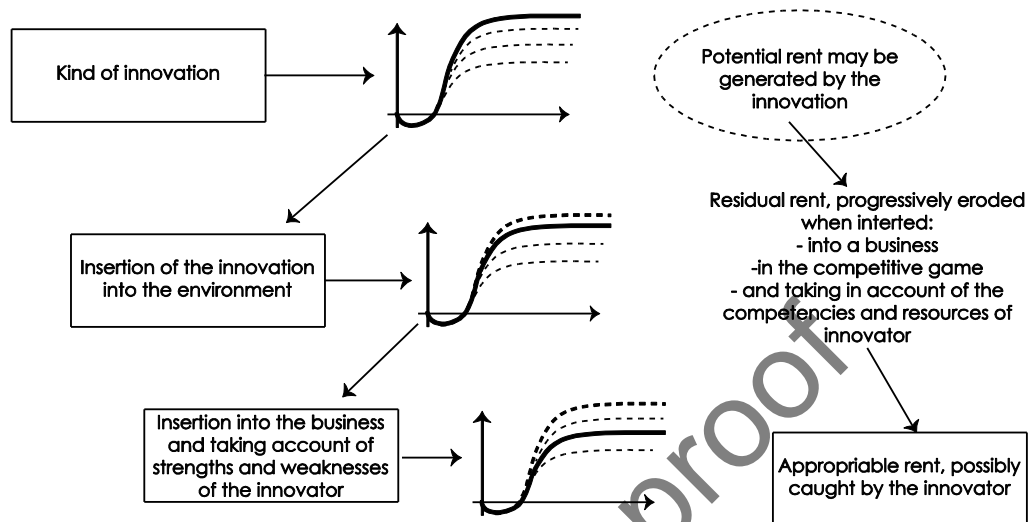
Research to develop measures to calculate anticipated rents from innovations has been conducted by Santi, Reboud, Gasiglia and Sabouret (2003). A three stage model was proposed to estimate the rent that could be generated from an innovation. This is illustrated in Figure 2.1 where it can be seen that the initial step is to form an estimate of the 'potential rent' that can be secured from an innovation. This is based not on the entrepreneur's ability to undertake a financial analysis, but their ability to make general assumptions about the potential volume of sales that they feel might be made over a given time frame, the potential rate of profit that might be generated and the potential length of the lifecycle of the innovation before its competitive advantage is eroded by market effects.

This type of innovation rent is what Alvarez (2007) refers to as 'entrepreneurial rents', where the innovation has been created through the combination of resources in new or different ways, but where the value of these resource configurations remains unknown. Such rents are created under conditions of uncertainty without clear validation within the market. In the second stage of the process the entrepreneur takes the innovation to the market and seeks to determine a 'residual' rent that is based on customer feedback and a more concrete assessment of the likely sales that can be generated. It also considers whether the firm can proceed with the commercialisation of the innovation alone, or if it needs to partner with others either via formal or informal arrangements.

¹An economic rent is generally defined as a payment to a factor of production in excess of that factor's payment in its next best alternative use. According to Robert Tollison (1982), economic rents are "excess returns" above "normal levels" that take place in competitive markets. More specifically, it is "a return in excess of the resource owner's opportunity cost".

Other considerations in this stage are the likely impacts of competitor action, substitution threats and compliance or regulatory controls.

Figure 2.1 Generation and appropriation of economic rents



Source: Santi and Reboud 2003.

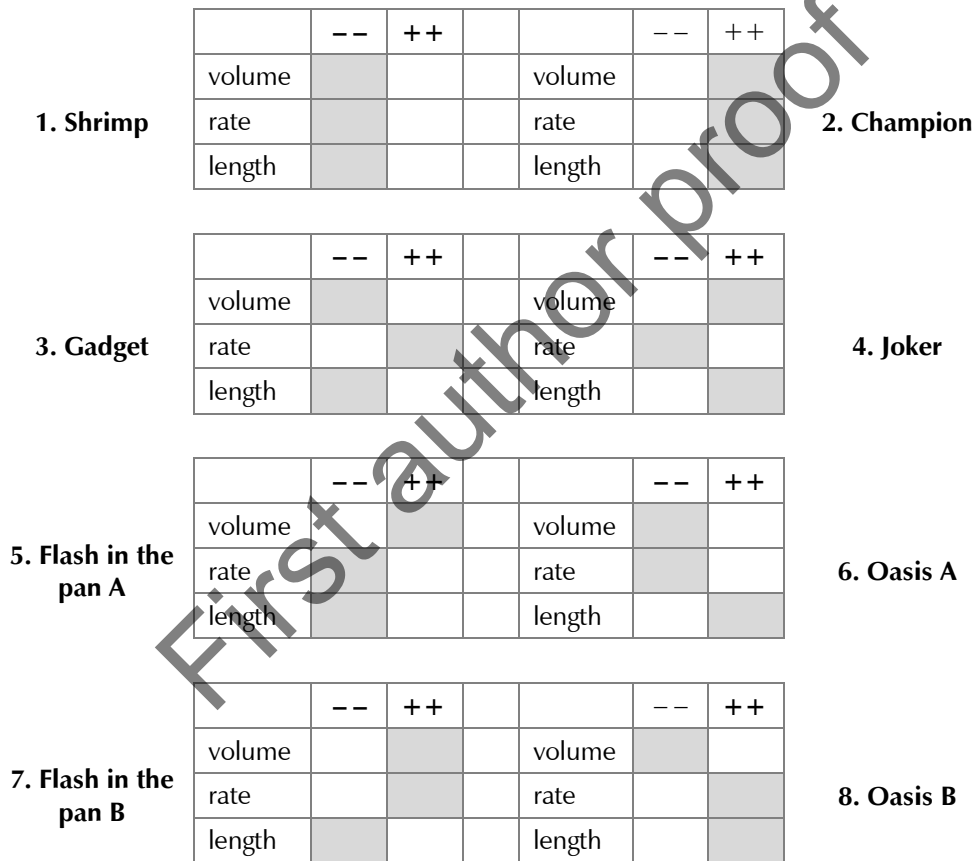
According to Alvarez and Barney (2004) the firm that can proceed to commercialisation without third party help should do so as this can enable them to arbitrage the rent and secure relatively fast returns without the need to share any profits. However, where the firm is unable to proceed alone (because they don't control all necessary resources), the key factors for consideration are whether or not the intellectual property underlying the innovation is based on explicit or tacit knowledge (Polyani, 1957). Here the ability to take explicit knowledge and build isolating mechanisms that provide the firm with greater capacity to control the key resources provides greater bargaining power. Yet if the knowledge underlying the innovation is largely tacit in nature there is little bargaining power and the firm's ability to appropriate rents is weak.

This 'residual' rent is broadly similar to what Alvarez (2007) defines as 'quasi-rents', which are those that are created where various parties (e.g. the firm and customers) engage in the market to make transactions relating to specific investments. They are created under conditions of risk but less uncertainty. Finally, the innovation is moved towards commercialisation and the necessary resources required to fully bring it to market are allocated generating an 'appropriable' rent. Key issues will be the ability of the firm to control all the resources and the realities of the market and competitive forces impacting on the firm.

Mazzarol and Reboud (2005; 2006) undertook further work to develop this framework with a particular focus on the first stage of estimating the potential rent. The volume of sales is estimated by indicators of potential geographic diffusion within a sector, potential diffusion within one or more market segments, and the potential annual sales volume on a worldwide basis after three years. The

rate of profit margin is influenced by the process of generation of the innovation, the types of innovation, and the kind of prior protection from competitors. The duration of the life cycle depends on the technology used and the ease of copying the product or service (Santi *et al.*, 2003; Mazzarol and Reboud, 2005, 2006; 2011; Do, Mazzarol, Volery and Reboud, 2014). From this analysis, a series of alternative rent configurations can be identified by classifying the three factors as high or low (Mazzarol and Reboud, 2011). These are shown in Figure 2.2 where it can be seen that a typology of eight potential rent configurations is possible. These include the 'Champion', 'Shrimp', 'Gadget', 'Joker', 'Oasis' and 'Flash in the Pan'. The last two of these have the potential to generate either high or low rates of profit depending on circumstances.

Figure 2.2 The rent typology



Source: Mazzarol and Reboud 2011.

By understanding the estimated relative performance in advance of the investment decision to proceed with a specific innovation, the SME owner-manager/entrepreneur is able to adopt strategies to address issues identified in the analysis or choose not to proceed with the innovation. Hence, this is a potentially valuable diagnostic tool for SME owner-managers/entrepreneurs.

Mazzarol and Reboud (2005; 2006; 2011) also developed a screening tool designed to assess the degree to which the firm's management of its commercialisation

process was being undertaken in a systematic or formal manner. Known as the *Innovation Diagnostic Diamond* (IDD) the tool comprises 40 questions arranged into four groups of 10 items that focus on marketing, innovation, resources and strategy within the firm. The relative shape of the IDD 'diamond' (generated by how an ideal score will create a diamond shape when graphed as a plot between the four indices of the IDD), provides a quick screening measure to examine how well the firm has been organising its resources to apply to the systematic commercialisation of the innovation.

Research methodology

This chapter provides a longitudinal analysis of 13 case studies of SMEs engaged in the process of commercialising new products. It draws on the rent assessment framework developed by Santi *et al.* (2003) as well as the subsequent work of Mazzarol and Reboud (2005; 2006; 2011). Four cases were selected from Australia, five from the United States and four from New Zealand. All firms chosen were actively engaged in innovation and commercialisation and were initially selected using a theoretical rather than random sampling approach as recommended by Eisenhardt (1989). Initially the cases were selected as part of a major study of 567 firms across 11 OECD countries (Mazzarol and Reboud, 2011). They were interviewed due to their having demonstrated that they were engaged in the commercialisation of new products or services, processes or other significant types of innovation. These firms were also SMEs with fewer than 250 employees and annual turnovers of below €5 million (OECD, 2004).

As recommended by Yin (1989) each case was initially interviewed in 2006 using a common case study protocol. However, it also included a case study survey in the form of diagnostic assessment tool operating in an EXCEL spread sheet. This tool allowed the senior manager (typically the CEO and/or owner-manager) to get immediate feedback on his/her approach to innovation management and commercialisation and helped to stimulate further discussion within the interview. A diagnostic report was also provided to each participant.

Final case study selection and follow-up interview

A final selection of cases was then undertaken based on the ability of the firms to still be trading, still have the original owner or manager who had completed the questionnaire in the initial interview, and willing to participate in a second interview. In 2012 these firms were interviewed again using the same diagnostic tool and a review made of their progress in commercialising the innovation they had been engaged with over the previous 6 years. 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).

Table 2.1 The cases general description

Case	Nature of innovation – successful cases
AUS Champion 1	University spin-out established 7 years focused on high-tech spatial mapping technology for mining and industrial applications. Annual turnover increased from A\$1.5m to over A\$4.5m, and employees from 5 to 30 in 6 years. Invests 30% of annual turnover into R&D. Owned jointly by university, inventors and venture capital financiers. CEO is professional non-owner, non-shareholder. Has secured 30 to 40 customers across 12 countries.
AUS Champion 2	Designer and manufacturer of specialist outdoor clothing and equipment established 36 years. Annual turnover shrank from A\$3m to A\$1m and employees from 25 to 5 in 6 years. Invests 10% of annual turnover into R&D. Owned and operated by a single entrepreneur.
US Champion 1	Owner-operated firm established 7 years focused on design of process innovations in field of dental technologies. Annual turnover increased from US\$100,000 to US\$350,000 while employment increased from 2 to 2.5 over 6 years. Invests around 10% of annual turnover into R&D. Owner is female entrepreneur who has a board but they play a limited role described as 'cheerleaders'.
US Champion 2	Web-based software development company established 6 years. Annual turnover remained static at US\$100,000 while employees grew from 6 to 8 over 6 years. Invests 50% of annual turnover into R&D. Owner-manager is a 'one man shop' who employs sub-contractors as needed.
US Champion 3	A software support and web development, online marketing firm established 10 years. Annual turnover increased from US\$150,000 to US\$700,000 with employment static at 2-3 staff over 6 years. Invests 20% of annual turnover into R&D. Owned and managed by founder with junior partner.
US Champion 4	Designer and manufacturer of small precision cables and variable gear transmissions established 7 years. Annual turnover grew from US\$500,000 to US\$3.1m and employees from 5 to 22 in 6 years. Invests 30% of annual turnover into R&D. Is an owner-managed firm with single owner.
NZ Champion	Family business established 21 years engaged in design and manufacture of stainless steel products for transport sector. Annual turnover increased from NZ\$5.4m to over NZ\$12m and employees from 55 to 96 over 6 years. Invests around 2% of annual turnover into R&D but has commercialised over 10 products. Has secured a long-term supply contract with a major international customer.
AUS Flash in Pan	Software development firm focused on data management

interviews, as well as a review of the interview discussion transcripts collected during these visits. The diagnostic tool provided the necessary coding structure with the rent typology and IDD results forming a core part of the data analysis along with other items used in the case study protocol. These included the interviewee's assessment of the external environment and their own explanation of the factors that had helped or impeded their firm's ability to commercialise the innovation.

Description of the cases

As noted above, the 13 cases examined for this study were classified as Champion, Shrimp, Flash in the Pan or Oasis depending on the configuration of their original anticipated rent assessment. Table 2.1 provides a general description of each case where it can be seen that most firms were very small and independently owned and operated by one or two people.

Analysis of the cases

Our analysis of the cases focused on five units of analysis: i) the nature of the innovation, particularly the level of complexity in the innovation; ii) how formal or systematic the commercialisation process was; iii) the existence of sufficient resources to allow the firms to proceed alone without third party involvement; iv) the perception of uncertainty in the firms' task environment as determined by the leadership team, and v) the characteristics of the firm's management team.

These firms' innovations were also examined to see how they had performed over the 6-year time interval between our interviews. Our analysis identified 6 'successful', and 7 'problematic' innovations. We deliberately refer to these as problematic because it was not appropriate to describe them as unsuccessful. In the following sub-sections we examine each of the units of analysis in relation to the patterns emerging from across the successful and problematic cases.

Nature of the innovation

The innovations being commercialised by these 13 firms were examined in relation to whether they were predominately technological product or process in nature. No clear pattern emerged. Four of the six successful cases were engaged in the commercialisation of predominately technological process innovations, while five of the seven problematic cases were engaged in predominately technological product innovations. However, half of the successful cases and four of the seven problematic cases also had both product and process innovations that were part of their commercialisation project. Table 2.2 details these innovations for the successful cases and Table 2.3 for the problematic cases.

One area where the two groups were found to be differentiated was in relation to the ease with which their innovation could be copied. The majority (4 out of 6) of the successful cases described the technical base of their innovation as complex. By contrast the majority (4 out of 7) of the problematic cases described their

innovation as having a simple technical base. This translated into how easily the innovation could be replicated from a technical and legal perspective. Where an innovation was fairly simple from a technical perspective it can be easily copied. By contrast, an innovation is hard to copy from a legal perspective if its intellectual property (IP) rights have been protected by patents, design registrations or other formal protections.

Table 2.2 Profiles of the cases type of innovation – successful cases

Case	Nature of innovation – successful cases
AUS Champion 1	High technology laser scanning system serving as an IP platform for a range of products with an industrial application. Easy to copy technically, but with strong formal IP rights protection via patents for a global market.
US Champion 3	Online web-based marketing software, not high-tech and difficult to protect with formal IP rights systems such as patents. However, difficult to copy technically due to its complexity. Product has a wide geographic market and a high profit margin.
US Champion 4	Design and manufacture of high-tech fibre optic brake cabling for 'high-end' Italian bicycle makers. Has a global market and the potential to create a new industry standard with high profit margin. Moderately difficult to copy from a technical and legal perspective.
NZ Champion	A high-tech engineering design for attaching stainless steel barrels to trucks in a seamless and cost effective way saving around 45% of the cost of existing fixing systems. Has the potential to create a new industry standard. Moderately difficult to copy from a technical and legal perspective.
US Oasis	A WIFI-based software solution that followed a 'technology push' model. The innovation creates a better system without changing the dominant design and is considered very hard to copy from both a technical and legal perspective.
NZ Oasis 2	Involves a technological process innovation, with some product technology. It integrates into a system and substitutes existing products and processes creating a new standard or system. The innovation was created alone within the company. Considered to be hard to copy from a technical perspective, but only moderately protected from a legal perspective. Company had planned to licence the system to other firms, but decided to retain it in house.

Five of the six successful cases reported their innovation to be difficult to copy from a technical perspective, and all these cases reported it was difficult to copy from a legal perspective. After six years all the firms in the successful group, that had originally classified their innovation as having a Champion configuration, continued to view it this way (e.g. AUS Champion 1, US Champion 3, US Champion 4, and NZ Champion). By contrast the NZ Oasis 2 case had originally classified their innovation as having an Oasis B configuration (with a high rate of

profit), but this had now become an Oasis A (with lower rate of profit), which reflected their decision not to sell the idea but keep it in-house. Thus, the rate of profit to be earned from it had fallen. The US Oasis case had originally classified its innovation as an Oasis B, but later reconfigured it to be a Champion on the entrepreneur's optimistic assessment of how the market responded to his product.

Table 2.3 Profiles of the cases type of innovation – problematic cases

Case	Nature of innovation – problematic cases
AUS Champion 2	A specialist harness and backpack system suitable for military and para-military use including special forces. Had been tested by the SAS, Antarctic Research Division and the Police emergency services. Despite this success the cost of getting the product into mainstream military use was considered too high so the product was shelved.
US Champion 1	Involved both technological product and process innovation for dental technologies. Had a very large potential market and good profit potential. The innovation was considered to be very hard to copy from a legal perspective due to patents, but moderately easy to copy from a technical perspective. However, the owner did not proceed with commercialisation due to concerns over copying.
US Champion 2	A software product that was protected only with copyright, but was easily copied. It involved the use of a software code developed for one customer to be re-used in a modified form for new customers to 'capture the economies'. The commercialisation of the technology was impeded by changes to his customers forcing him into 'fixed price bidding contracts against other firms across the internet'.
AUS Flash in Pan	Data management software system targeted at large companies. The original product was not proceeded with due to changes in the market that were assessed as making the innovation non-viable from a commercial perspective.
NZ Oasis 1	A market innovation relating to the importation of specialist bathroom products sold with a 'no frills' pricing via a new retail outlet. The initial plan had been to establish a franchise system with multiple retailers. Did not proceed due to difficulties in securing premises, increased costs of stock, a downturn in the building industry and problems setting up the franchise model.
AUS Shrimp	A commercial hay bailing system for farmers capable of sorting and removing weed seeds. It was fully developed and ready for sale, but a down turn in the market price for bailing hay led the firm to shelve the innovation until market conditions improved.
NZ Shrimp	Involved a snack food product for distribution via retail chains. Launched successfully in New Zealand its primary target market was Australia. However, this needed the firm to find a suitable commercial partner and to overcome regulatory and food safety issues associated with food export into Australia. The product commercialisation did not proceed due to insufficient resources for a small firm.

By contrast the problematic cases were more likely to have innovations that were easily replicated. For example, four of the seven cases described their innovations as easy or potentially easy to copy from a technical perspective. In relation to the level of IP rights protection only two of the problematic cases reported having innovations that were hard to copy due to legal reasons. A common feature of the problematic cases was their relative difficulty in creating isolating mechanisms around their innovations with most being fairly easily copied. Another common characteristic was the need for these firms to find strategic partners to help them complete the commercialisation process. For example, the AUS Shrimp case did not need outside help to proceed with their commercialisation. However, they had suspended this process due to the market outlook. A further factor that was a common feature for these firms – with the exception of AUS Shrimp – was that they were quite heavily dependent on a single owner-manager to do most of the work associated with the NPD and the commercialisation process. These factors appear to have played a greater role in the fortunes of the firm's innovations than their level of investment in R&D (which averaged 20% of annual turnover compared to 24% among the successful cases).

Level of formality or 'system' used in the commercialisation process

The issue of formality in the process of NPD and commercialisation was examined in the case studies. Formal processes are generally marked by the presence of formally established teams or procedures, plus the possession of written plans, or market and financial assessments. Where a formally documented process may not exist, the firm can still demonstrate that it has a systematic approach to commercialisation. These issues were explored during the interviews.

Formal or systematic behaviours in the commercialisation processes used by these firms were examined via a range of questions found within the IDD. Sixteen questions were asked during the interviews that explored these issues. These related to the amount of research the firms had undertaken to investigate the customers' likely adoption of the new technology, including pricing strategy, its compatibility with existing technologies and customer perspectives over cost-benefit, risk and trial-ability. Also examined were whether the firm had a formal NPD process, and whether it had a formal business plan and comprehensive financial model for the innovation. Formal IP rights protection via patents, with help from IP lawyers, the use of confidentiality agreements and the securing of all the necessary compliances and authorisations were also examined.

The pattern that emerged from this analysis found a range of behaviours without any evidence that formal or systematic management of the commercialisation process was uniform across either the successful or problematic cases. An interesting finding was that the successful cases had slightly less formality or systematic management of the process of commercialisation than the problematic cases. For example, the problematic cases were more likely than their successful counterparts to have formal NPD processes, written business plans, comprehensive financial models or formal IP rights protections.

- Politis, D., Gabrielsson, J., and Shveykina, O. (2012) "Early-stage finance and the role of external entrepreneurs in the commercialization of university-generated knowledge", *Venture Capital*, **14**(2): 175-198.
- 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.
- Rumelt, R. (1984) "Towards a strategic theory of the firm", in Lamb, R. (Ed), *Competitive Strategic Management*, Upper Saddle River, N.J.: Prentice Hall, 556-570.
- Santi, M. and Reboud, S. (2003) *Model of valorisation and protection of an innovation, the case of SMEs: a synthesis*, LINEN (HEC) and CEREN Groupe ESC Dijon, for Institut National De La Propriete Industrielle (INPI), France.
- Santi, M., Reboud, S., Gasiglia, H. and Sabouret, A. (2003) *Modèle de valorisation et de protection intellectuelle des innovations des PEI*. July, HEC/INPI: 63p.
- Terziowski, M. (2010) "Innovation practice and its performance 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, organisation and performance" *International Journal of Management Reviews*, **3**(3): 169-183.
- van de Vrande, V., deJong, J.P.J., Vanhaverbeke, W. and de Rochemont, M. (2009) "Open innovation in SMEs: Trends, motives and management challenges", *Technovation*, **29**(6/7): 423-437.
- 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.
- Youtie, J., Hicks, D., Shapira, P., and Horsley, T. (2012) "Pathways from discovery to commercialisation: using web sources to track small and medium-sized enterprise strategies in emerging nanotechnologies", *Technology Analysis & Strategic Management* **24**(10): 981-995.

- Lee, S., Park, G., Yoon, B., and Park, J. (2010) "Open innovation in SMEs - An intermediated network model", *Research Policy*, **39**(2): 290-300.
- Leisyte, L. (2011) "University commercialization policies and their implementation in the Netherlands and the United States", *Science and Public Policy*, **38**(6): 437-448.
- Liao, T.-S., & Rice, J. (2010) "Innovation investments, market engagement and financial performance: A study among Australian manufacturing SMEs", *Research Policy*, **39**(1): 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 NPS in SMEs", *European Journal of Innovation Management*, **5**(4): 224-237.
- Mazzarol, T. (2012) *Predicting the innovation rent: How to assess future returns to investment in innovation when conventional financial assessments don't apply*, Presentation to the Entrepreneurship & Innovation Group, University of Western Australia, Perth, Western Australia, 27 November 2012.
- 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. (2008) "The Role of Complementary Actors in the Development of Innovation in Small Firms", *International Journal of Innovation Management*, **12**(2): 223-253.
- Mazzarol, T., and Reboud, S. (Eds) (2011) *Strategic Innovation in Small Firms: An international analysis of innovation and strategic decision making in small and medium enterprises*, Cheltenham UK: Edward Elgar.
- 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.
- 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 (2004) *SME Statistics: Towards a more systematic statistical measurement of SME behaviour. Promoting Entrepreneurship and Innovative SMEs in a Global Economy*, Istanbul, Turkey 3-5 June, Organisation for Economic Co-operation and Development, Paris.
- OECD (2009) *Innovation in Firms: A Microeconomic Perspective*, Paris, Organisation for Economic Co-operation and Development.
- OECD (2010a) *SMEs, Entrepreneurship and Innovation*, Paris, Organisation for Economic Co-operation and Development.
- OECD (2010b) *The OCED Innovation Strategy: Getting a Head Start on Tomorrow*, Paris, Organisation for Economic Co-operation and Development.
- Panizzola, R. (1998) "Managing innovation in SMEs: A multiple case analysis of the adoption and implementation of product and process design technologies", *Small Business Economics*, **11**(1): 25-42.
- Polanyi, K. (1957) *The Great Transformation*. Boston, Beacon Press.

- Do, T.H., Mazzarol, T., Volery, T. and Reboud, S. (2014) "Predicting anticipated rent from innovation commercialisation in SMEs", *European Journal of Innovation Management*, **17**(2): 183-208.
- 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.
- 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.
- Ernst, H. (2002) "Success factors of new product development: A review of the empirical literature", *International Review of Management Reviews*, **4**(1): 1-40.
- Flanagan, J.C. (1954) "The critical incident technique", *Psychological Bulletin*, **51**(4): 327-358.
- Gans, J. S., Hsu, D.H., and Stern, S. (2002) "When does start-up innovation spur the gale of creative destruction?" *RAND Journal of Economics*, **33**(4): 571-586.
- Gans, J.S. and Stern, S. (2003) "The product market and the market for 'ideas': Commercialization strategies for technology entrepreneurs", *Research Policy*, **32**(2): 333-350.
- Gibb, A. and Scott, M. (1985) "Strategic awareness, personal commitment and the process of planning in small business", *The Journal of Management Studies*, **22**(6): 597-632.
- Hemert, P., Nijkamp, P., and Masurel, E. (2013) "From innovation to commercialization through networks and agglomerations: analysis of sources of innovation, innovation capabilities and performance of Dutch SMEs", *The Annals of Regional Science*, **50**(2): 425-452.
- 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.
- Kim, S. K., Lee, B.G., Park, B.S. and Oh, K.S. (2011) "The effect of R&D, technology commercialization capabilities and innovation performance", *Technological and Economic Development of Economy*, **17**(4): 563-578.
- Knight, R. (1921) "Cost of production and price over long and short periods", *Journal of Political Economy*, **29**(1): 332.
- Knockaert, M., Vandenbroucke, E., and Huyghe, A. (2013) "Unravelling the need for innovation support services in new technology-based firms: The impact of commercialization strategy", *Science and Public Policy*, **40**(1): 85-96.
- 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. (2004) *Entrepreneurship: Theory, Process, Practice*. 6th Edition, Mason, Ohio: Thomson South-Western

- To benefit from their innovations, SMEs should prioritize efforts to build 'isolating mechanisms' so their new idea (product, process, etc.) cannot be easily copied.
- As obtaining the resources to increase scale is one of the critical phases in commercialisation of SME innovations, decisions on the rate of growth are very important for success.

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. (2007) "Entrepreneurial rents and the theory of the firm", *Journal of Business Venturing*, **22**(3): 427-442.
- Alvarez, S.A., and Barney, J.B. (2001) "How entrepreneurial firms can benefit from alliances with large partners", *Academy of Management Executive*, **15**(1): 139-148.
- 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 Barney, J.B. (2005) "How do entrepreneurs organise firms under conditions of uncertainty?" *Journal of Management*, **31**(5): 776-793.
- Brown, S., and Eisenhardt, K. (1995) "Product development: Past research, present findings and future directions", *Academy of Management Review*, **20**(2): 343-378.
- 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.
- Conceicao, O., Fontes, M., and Calapez, T. (2012) "The commercialisation decisions of research-based spin-off: Targeting the market for technologies," *Technovation*, **32**(1): 43.
- Cooper, R.G. and Kleinschmidt, E.J. (1986) "An investigation into the new product process: Steps, Deficiencies and Impact", *Journal of Product Innovation Management*, **3**(2): 71-85.
- Cooper, R.G., and Kleinschmidt, E.J. (1995) "Benchmarking the firm's critical success factors in new product development", *Journal of Product Innovation Management*, **12**: 374-391.
- 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.

party to develop their innovation, with the resulting loss of appropriation; especially when dealing with larger lead customers. Finally, in terms of management, there is also a paradox due to both the need of support and leadership shown by senior managers, and the danger of dependence on only one person.

The findings outlined here remain tentative and the data requires further analysis. This preliminary overview of the cases suggests that the success or failure of innovation within SMEs is not easily attributed to any single factor.

Our study has confirmed a number of results from earlier research. First, that adopting a strategic approach to innovation gives a better chance of success. Similarly, that a systematic approach of the successive steps leading from ideation to production is likely to result in enhanced success. However, the decision to abandon or 'shelve' a promising innovation due to a systematic assessment of the market conditions should not be viewed as a failure; rather it is simply good business sense. In terms of management, this study provides further evidence of the importance of marketing-related activities. Finally, this study underlines the crucial importance of 'isolating mechanisms' and of IP protection.

Implications for policy and practice

There are implications from this longitudinal commercialisation research project for policy and practice. In terms of policy, our findings suggest:

- Using the level of investment in R&D as a proxy to assess the level of innovation in firms is unsatisfactory for SMEs as it does not adequately capture the nature, scale or success of SME innovations.
- Policies to create the context for economic growth via successful commercialization of innovations by SMEs need to consider a wider range of resources rather than just access to venture capital.
- As IP protection and the ability to choose the right solution in terms of protection of IP (secret, patent, licence, trademark...) is crucial for SMEs, policies and programmes to support SME innovations need to both facilitate access to IP protection and also help SMEs to design an appropriate IP strategy.

For practicing managers and owners of SMEs, these case studies demonstrate the complexity of commercialisation and provide some key lessons on this process including:

- The success or failure of innovation by SMEs is influenced by a whole set of decisions which span the firm's strategy, marketing and management practices.
- Adopting a strategic approach to innovation is important for success, as well as using a systematic approach from ideation to production which includes evaluating risk and returns.

match its technical capacity with marketing and business development capacity (Santi *et al.*, 2003; Alvarez, 2007).

The role of formality or 'system' in the NPD and commercialisation process has been highlighted by many in the extant literature (e.g. Brown and Eisenhardt, 1995; Deeds *et al.*, 2000; Ernst, 2002; Dooley *et al.*, 2002; Eng and Quايا, 2009; Terziowski, 2010). Our analysis has shown that most of the SMEs in this study were not without some system of NPD and commercialisation, but it was more likely to be informal and intuitive in nature. A key constraint for many of the firms was the resources required to undertake the technical development and marketing activity. Yet most of the successful firms had sufficient competencies to fully commercialise their innovation without outside support. Few firms were interested in venture capital funding and most did not seek to explore assistance from government programs. Apart from the spin out case AUS Champion 1, the other cases had relatively little contact with universities and R&D centres.

These findings also suggest that the level of investment in R&D, and the level of formality or systematic management in the process of innovation commercialisation is no guarantee of success. While such formality and system was clearly important for some of the high performing firms (e.g. AUS Champion 1, NZ Champion) it was not by itself sufficient. What was also required was a strong entrepreneurial leadership team with the capacity to build a reliable project team to support them in the NPD and commercialisation process. Uncertainty and complexity within the firm's task environment also plays a role in the management team's ability to fully predict the rent that might be generated from an innovation. In seven out of the 13 cases the 'anticipated' rent was revised as a result of seeking to develop the innovation within its environment leading to a 'residual' rent outcome. In the majority of the problematic cases there was a revision of this anticipated rent, with most either abandoning or shelving their innovation as a result. By comparison most of the successful innovations retained their original estimate of the rent configuration.

This study also provides insights into the way SMEs approach commercialisation, and the trade-offs that must be made between anticipated return to investment and the allocation of scarce resources. The cases 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 or CEOs have competence in these areas. However, as firm size and complexity increase there may be a need for more formality and system in the NPD portfolio management processes.

Our research project has helped to improve understanding of the complexity of innovation management in SMEs. Comparison of these results with the literature, leads to identification of a series of paradoxes and also a set of confirmations. Among the paradoxes, our study has suggested a tension between formality and agility in turbulent environments. Another paradox is that the successful firms were developing rather sophisticated technological innovations or innovations with complex applications, although this gives rise to greater complexity and thus more risk. A third paradox is the difficulty for SMEs of needing help from a third

uncertainty of having the innovation copied by competitors despite the existence of patents.

Characteristics of the firms' management teams

All the firms examined in this study were SMEs and most were owned and managed by either a small team or a single individual. Several were family owned and operated. Only AUS Champion 1 had a professional management team due to its history as a university spin-out. Only three of the successful cases (AUS Champion 1, NZ Champion and NZ Oasis 2) had management boards to provide guidance. Among the problematic cases, only two firms (US Champion 1 and AUS Shrimp) had boards. However, the owner of US Champion 1 described her board as being 'cheerleaders' who play only a limited role. The decision over whether or not to proceed with the commercialisation of the innovation was principally in the hands of the firms' entrepreneurial leaders.

The majority of cases, whether or not they successfully commercialised their innovation, saw the generation of innovation as a major focus of their business. For the firms in the successful group of cases the two patterns that emerged to distinguish them from their problematic counterparts were their active involvement of employees in the development of new innovations. By contrast in the other firms it was the owner-manager(s) who had this role, serving as inventor entrepreneurs. The successful firms also were more likely to have an experienced project management team, this was particular the case for AUS Champion 1, US Champion 3, US Champion 4, NZ Champion and NZ Oasis 2.

Discussion and conclusion

As outlined in the introduction of this chapter, the purpose of this study was to investigate the process of commercialisation in SMEs with attention given to firms that may not be overly high-tech in nature. Our research questions related to the factors that impact on success or failure in commercialisation within SMEs, and the decision making undertaken by the entrepreneurial leaders of these firms in relation to commercialisation.

In relation to the first research question, the findings from these cases suggest that any assessment of success or failure in commercialisation within SMEs is unlikely to be a clear or straightforward issue. As illustrated by the problematic cases, the decision not to proceed with the commercialisation could not be seen as a failure, but more a rational business decision to either abandon the innovation, or in many cases simply place the technology 'on the shelf' pending an improvement in the market conditions.

In relation to the second research question, the cases support the findings of earlier studies (e.g. Huang *et al.*, 2002; Kim *et al.*, 2011) that highlight the importance of marketing capabilities to the commercialisation process. Although technical capabilities are important, the ability to convert the innovation's potential rent value into an attractive appropriable rent value requires the firm to

management teams. A lack of resources was the primary obstacle to further commercialisation for the cases of AUS Champion 2, NZ Oasis 1 and NZ Shrimp.

Table 2.5 Challenges relating to the availability of resources

Challenges	Representative data examples
Relating to resources	<p>'My top three resource issues are, cash flow, the size of the company and the limited human resources we have available.'</p> <p>'High marketing costs.'</p> <p>'Finding adequate staff, as the business gets bigger it is harder to find good staff.'</p> <p>'We don't have a dedicated product or project development team, so there is no one to hand it over to.'</p> <p>'In the short term the need to sell our time doing other things is in conflict with the need to devote time to new product development opportunities.'</p> <p>'The need to build a new base of technical expertise, plus having the expertise to enter new markets. The speed of innovation forces changes and resources are needed to do this.'</p>

Perception of uncertainty in the task environment

The firms' perceptions of their task environment and the level of uncertainty that might be found there in relation to their innovation were assessed with a range of questions that were drawn from within the IDD framework. In particular seven areas were examined that relate to the assessment that had been undertaken of the bargaining power of customers and suppliers, plus the reaction of competitors and complementary partners. Also examined were the threat of alternative technologies and the threat of potential changes in government regulations likely to impact on their innovation. Finally, they were asked if they had undertaken a risk assessment of these potential threats.

Overall the firms within the problematic group of cases were found to be more likely than their counterparts in the successful group to have devoted more time to assessing these issues. For example, three of the successful cases (US Champion 3, NZ Champion, and NZ Oasis 2) had not undertaken a risk assessment of likely threats in any substantial way. This contrasted with the problematic group where four (US Champion 1 US Champion 2, AUS Shrimp, and NZ Shrimp) of the seven firms had done this assessment.

However, the decision by the problematic cases not to proceed with the commercialisation of their innovations were generally taken within the context of a change to conditions within the firms' task environments that increased the level of perceived uncertainty and risk over future commercialisation. This was evidenced the cases of US Champion 2, AUS Flash in the Pan, NZ Oasis 1 and AUS Shrimp, which faced major changes to their market conditions. US Champion 1 was also unwilling to proceed with commercialisation due to the

combination of finding the money, people and time to get the NPD and commercialisation work completed. Formal IP rights registration was also expensive, plus the need to keep pace with often rapidly changing technologies. In the development of commercialisation strategies, the main challenges were related to finding the necessary resources, information and expertise to implement the strategy.

Availability of resources and capacity to proceed alone

The resource index in the IDD framework was used to explore the issue of whether the firms felt that they had sufficient technical, financial, physical and human resources to complete the commercialisation alone. Also examined was whether the firms' had identified venture capital funding or support from government assistance programs for commercialisation. Once again there were few clear patterns that suggested differences between the cases based on whether they were successful or problematic. However, four areas stood out.

The first of these was in relation to financial resources. Here the successful cases were found to have more confidence that they possessed the necessary financial resources to undertake the commercialisation. Five of the six successful cases reported that their financial resources were adequate. This compared to the problematic cases where three of the seven firms reported insufficient financial resources to allow the future development of the innovation.

Other areas of difference were in the possession of sufficient technological resources to create a prototype, and the competencies to fully commercialise the innovation without outside help. All the successful cases reported having the technological resources to create a prototype, while at least two of the seven problematic cases did not have such resources. However, in relation to the possession of sufficient competencies to fully commercialise the innovation without outside support, all but one of the successful cases reported that they had no difficulties in this regard. By contrast three of the seven problematic cases did not feel that they had these competencies.

It is worth noting that venture capital funding was not viewed as being particularly important to the majority of these firms. Only one of the successful cases (AUS Champion 1) and three of the problematic cases (US Champion 2; AUS Flash in Pan; AUS Shrimp) had identified venture capital funding sources. Of these only US Champion 2 considered such funding to be particularly important to the success of future commercialisation of their innovation. However, one other successful case (NZ Champion), and one other problematic case (US Champion 1) also felt that venture capital funding would be important. Most firms had funded their commercialisation process with retained profits and some debt financing.

As the comments listed in Table 2.5 suggest, most of the resource issues were associated with the need to stretch resources away from activities that were generating income from existing products and services, to invest in new, potentially risky innovations. SMEs such as those in the study were generally too small to have much spare capacity for this either within their workforce or

Table 2.4 Challenges relating to the management of the commercialisation process

Challenges	Representative data examples
Marketing the innovation	<p>“The cost of commercialisation is a major challenge. The benefits may not be enough reward to justify the investment.”</p> <p>“There is the possibility of a short term gain, but it will cost us in the long term.”</p> <p>“Customer relationship management.”</p> <p>“The need to market to national associations and attend trade shows, plus the need to create new instructional and promotional materials.”</p> <p>“The level of competition, plus the need to develop alliances and develop a product range.”</p> <p>“Avoiding any overlap with existing product range and the pricing strategy.”</p> <p>“Explaining the product to the customer.”</p> <p>“Finding enough sales force to get to the market.”</p> <p>“Customers impose a high workload and finding the time to trial the new product.”</p>
Managing the innovation	<p>“The ability to make the time available to take things to the next stage.”</p> <p>“Our customers are demanding our innovation expertise within their business.”</p> <p>“Finding enough skilled designers.”</p> <p>“The cost of IP protection is expensive and not always available.”</p> <p>“Product development and the need to keep up with changes in digital technology.”</p> <p>“Having the cash resources to bring it to market and the management time to do the work.”</p>
Developing a commercialisation strategy	<p>“This is a potential distraction form our core business.”</p> <p>“We don’t fully appreciate what is required so we would have to learn as we go.”</p> <p>“We don’t want to risk handing our competition an advantage that has taken us several years to develop.”</p> <p>“The competitive data we need is not readily available.”</p> <p>“Building the strategic knowledge of our team.”</p> <p>“Finding the management resources to fully commercialise, and ensuring the funding is in place and you have the time to do the complete strategy.”</p>

As shown in Table 2.4, the issue of marketing was a major challenge for many of the firms. Dealing with customers, expanding the range of customers and market segments, plus finding the additional resources needed to undertake the necessary marketing and sales effort were key concerns for most cases. Major challenges in the management of innovation typically revolved around a