



Innovation Strategy in Small Firms

Innovation and Strategic Decision Making within Small to Medium Enterprises

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Executive Summary

Small to medium enterprises (SME) are frequently associated with high levels of innovation. However, it is difficult for the entrepreneurial managers of such SME to fully assess the merits of a particular innovation, particularly in relation to its risk-return trade off.

To address this need, CEREN – ESC Dijon, in conjunction with LINEN – HEC and INPI commenced in 2002 the development of a screening tool designed to assist entrepreneurs evaluate the risk-return profile of future innovation investment. The preliminary model developed measures the anticipated ‘rent’ or financial return expected from a particular investment in an innovation.

During 2003 CEREN – ESC Dijon collaborated with CEMI – GSM, UWA to further explore the way managers anticipate the rent expected from an innovation and to relate it to the relative influences of Attitude and Subjective Norm on their decision making process. A questionnaire was distributed to around 550 SME (less than 100 employees, with $\frac{3}{4}$ of them being under 20 employees, over 80 percent had turnover less than AUD\$5 million, with the average around AUD\$1 million) identified as highly innovative and registered with the WA State Government Department of Industry and Resources (DOIR). A total of 57 usable responses were returned (10% response rate). The majority of respondents were both executive managers and owners.

The firms in the sample were characterised by their use of formal business plan within the previous three years (over three quarter of them), a surprisingly high level of export activity (80% of them in comparison to the usual 4% of exporting Australian firms), a poor level of investment in managerial training (one quarter for the managers to one third for the key employees). Regarding their strategic choices, one half had entered into some form of joint venture with leading customers, one half with other companies, but only one quarter with key suppliers. In the sample innovation was a rather structured process (over one half indicated that they had a formal process for innovation). Product-service innovations were the most common, market development innovations were the next most common. Almost all of respondent firms said that they planned to introduce a new innovation within the next three years, and more than two thirds said that usually generate it alone.

The study found that short-term, capital intensive innovations were most common with most firms seeking to secure long-term sustainable returns from future investments. Firms that reported having a formal or systematic approach to new product development or innovation were more likely to generate superior innovations from a commercial perspective than did their counterparts without such systems.

Customer adoption rates and the benefits of the proposed innovation to customers were key considerations for decisions relating to investment in future innovations. Firms were uncertain over their strategic environment with apparent difficulties in identifying the potential behaviour of customers, suppliers, complimentors, potential competitors, institutional environment and existing competitors. Regarding the estimated power of customers and suppliers, there was a fair degree of uncertainty over these issues. This may suggest some difficulty by firms in assessing the power

of suppliers and customers in this regard. More than one half of the firms considered that the bargaining power was in favour of customers. With respect to the value complimentary actors might offer, 60 percent considered that their value would be high and one half of the firms considered that these complimentary actors would be larger and stronger firms.

The findings suggest that a small firm seeks moderate growth, a lowering of transfer and sunk costs and lowering very high barriers to entry when innovating. Most of the firms were strongly technically oriented with a willingness to seek partnerships or strategic alliances with other firms in order to secure access to missing resources.

Protection of the innovation was primarily considered via patents with less focusing on the use of branding and trademarks as means of protection for intellectual property. There was evidence of a degree of 'over protection' of IP within these firms.

Key strategic decision making authority rested largely with the firm's Chief Executive Officer (CEO), who was also frequently the firm's owner or principal equity holder. Attitudes toward strategic decision making were found to be largely similar across all firms, with the exception of those where the CEO was not an owner or principal shareholder. Executive Managers that own equity in the company are not surprisingly more confident of their capacity to make strategic decisions than those that are employees.

The influence of other people on the decision making of the respondent's was also examined. The most influential actors upon the CEO were the customers, followed by the other senior managers of the firm. Less attention was apparently given to the views of third party advisers such as accountants, lawyers or other specialists. Where the firm's ownership was held in private hands and owner-managed, the influence of family members was not surprisingly stronger than in firms that were more professionally structured.

Several linear regression models were developed to test the relationship between the firm's assessment of the strategic market environment and its anticipated return on investment in the innovation. These models suggest that the firm's assessment of the RENT returns from their innovation may be influenced more by their anticipation of the value it is likely to deliver to the customer, the customer's expected use of the innovation to generate new sales, and the ease of integrating the new innovation into the customer's existing technologies. Such findings are consistent with those of earlier research that highlights the importance of the relative advantage of the innovation to the customer or adopter, and the compatibility of the innovation to existing processes.

The findings from a second regression analysis suggest that the small innovator firms in the sample were willing to form strategic alliances with third party complimentors where collaboration will assist in reducing customer perceptions of risk in the adoption of the innovation, while enhancing the customer's understanding of the innovation. However, the firm must be confident that the alliance will allow them to retain control over quality of the final outcome to their customer.

SECTION 1

Introduction

The following report outlines the findings of a pilot study of the strategic decision making undertaken by small to medium enterprises (SMEs) in Western Australia in relation to future investments in new product or process innovations. It builds upon initial work undertaken in France with SME investigating the risk-return trade offs such entrepreneurs make when assessing the merits of future innovation investment strategy.

The study was a collaborative research project conducted by the Centre for Entrepreneurial Management and Innovation (CEMI) of the University of Western Australia's Graduate School of Management (UWA-GSM), and the Centre for Business Research (CEREN) of the Group ESC, Dijon Bourgogne, France. The project was supported by the Western Australian Department of Industry and Resources (DOIR), who assisted with data collection.

The research program, of which this pilot study forms a part, aims to validate a measurement instrument developed to assess the risk and return profile of innovations within small to medium enterprises and to examine this within the context of the strategic decision making within these firms.

The principal aims of the study were to:

- Validate the innovation risk-return measurement tool
- Explore the nature of innovation risk assessment profiles within small firms
- Explore the nature of strategic decision making within innovative small firms

SECTION 2

Initial Research and Theoretical Framework

Innovation is recognized as a key driver for economic and social development and a critical element in the future success of industry (Senge, Carstedt, and Porter, 2001). As a process within organisations, innovation is about new product or process leading to the enhancement of value for customers and shareholders (Drucker 2002). Innovation requires change, both to the customer and the supplier, as well as to the firm that drives the initiative. Such change can be incremental in nature, or highly radical and disruptive (Tushman and Nadler 1986).

Due to the potentially disruptive nature of innovation it is an activity containing inherent risk, with uncertainty in future technical, commercial and financial returns to the initial investment required (Catignon and Robertson 1993; Dziura 2001). An important consideration in the decision to invest in future innovations is therefore the trade off between risk and return.

For small firms (e.g. those with less than 100 employees), the ability to assess risk and evaluate potential returns is frequently difficult. While such firms are frequently viewed as having an important role to play in the generation of new innovations (Freel 2000; Hansen, Sondergard and Meredith 2002; Moguee 2000). It has been estimated that around 67 percent of all inventions and 95 percent of radical inventions patented in the United States since 1945 were attributed to small entrepreneurial firms (NCOE 2000). The role of small firms in Europe (European Commission 2003) and Asia (APEC 2003) has also been noted.

Despite the importance of small firms to enhancing innovation, it remains difficult for the entrepreneurs associated with such businesses to fully assess the relative merits of their innovation in relation to risk-return trade offs. Successful diffusion of an innovation frequently involves consideration of a range of variables associated with market forces, including the relative power of competitors, suppliers and customers and regulatory agencies. For most small business operators, the evaluation of these many factors remains complex and difficult. Thus an evaluation tool designed to assist owner-managers of small firms assess the merits of their innovations is likely to be of significant value.

The Concept of Rent

While financial models (e.g. Net Present Value) can offer a guide to the potential attractiveness of innovations, these measures are limited in their capacity to fully assess the non-financial variables likely to impact on the investment, such as the

competitive reactions of the environment.¹ Moreover the innovator might be convinced of the value of its innovation but unable to analyse it or even prove its reality. There can be three main reasons to explain this.

First an innovator often places more emphasis on the anticipated absolute value of the innovation without considering the potential difficulties associated with its launch (Martin and Hartley 2000). This evaluation can frequently be overly optimistic either because the anticipated interest is overestimated, or because it does not take into account the erosion of the rent due to the bargaining power of such environmental actors as suppliers and customers, and due to the effects of competition.

Second the innovator may have had an unstructured way of reasoning, thus they may act on an intuition rather than on a rational reasoning (Mockler 2003). This is a high probability among small firms where the owner-manager is relatively isolated and lacks the support of an evaluation team with the skills to conduct appropriate feasibility analysis. Third, the innovation frequently involves a complex, non-linear process in which feedback over progress is difficult to anticipate. A risk assessment tool able to overcome these problems is therefore highly desirable for small firms.

The Importance of Entrepreneurial Leadership

As with many other aspects of how small firms operate, the way an innovating SME evaluates the risks related to its innovation as well as the way the process of innovation itself is run can be highly idiosyncratic. An important part of the difference relies on the personality of the owner manager of the SME (Smallbone, Leigh and North 1995; Autio and Lumme 1998), and this can even be a criterion to analyse the behaviour of SMEs owner-managers (Ajzen and Fishbein 1980). The personality of the owner-manager, and the way it influences their decision making in relation to the innovation management process is therefore important. Questions of specific interest might include: whether or not they use tools to help them make decisions? To whom do they turn to for advice? And would their main advisors themselves use a screening tool to help them analyse the situation?

To address this need, and following a request of INPI (*Institut National de la Propriété Industrielle – French Institute for Intellectual Property*), CEREN – ESC Dijon, in conjunction with LINEN – HEC, commenced the development of a screening tool designed to assist entrepreneurs from small firms quickly evaluate the risk-return profile of future innovation investment opportunities (Santi, et.al. 2003). This tool is designed to help an innovator or its advisor to choose an adapted strategic choice for the innovation: to launch or not, to protect or not, to share the innovation with suppliers, customers, competitors, or not. In this paper we will first present the screening tool and its logic, and then present the past, current and future analysis of the interest of this tool and its potential use by SMEs managers.

¹ For more details see the review made by Beaudoin and St Pierre, 1999.

The screening tool developed by CEREN – ESC Dijon and LINEN – HEC

The model developed by CEREN-LINEN in France measures the anticipated 'rent' or financial return anticipated from a particular investment in an innovation (Miles, Paul and Wilhite 2003). In order to help the innovator not only to correctly assess the initial anticipated value of its innovation but also the erosion effects it will face when launched on the market, the process of analysis follows several steps (Santi et al 2003) (see Figure 1):

1. Analysis of anticipated rent (the 'potential rent'), related to the kind of innovation and the number and size of the potential using markets;
2. Analysis of the characteristic of the environment of the potential using market, and the related erosion effects;
3. Analysis of the competitive strengths the innovation will have to face, leaving only a 'residual rent'; and
4. Analysis of the competitive situation of the SME and its ability to launch the innovation, able to catch an 'appropriable rent'.

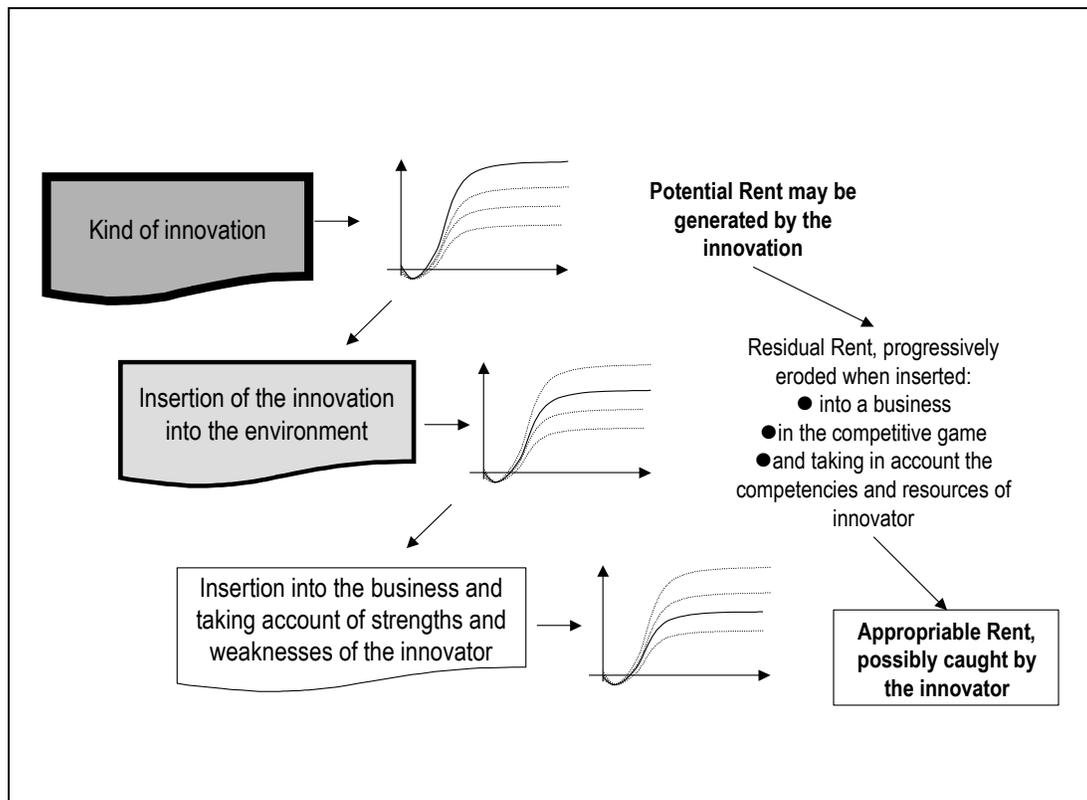


Figure 1: Logic of the Analysis Process (Santi et al 2003)

Innovation is in the economic theory a potential source of competitive advantage (Nemeth 1997). The rent associated to this competitive advantage is the condition for its success and further development. An innovator is thus going to develop a new resource or competence or going to create a new combination of existing resources and competencies (Schumpeter 1934). A firm with a competitive advantage should be able to generate a rate of profit higher than the mean rate of profit in its industry and even more to keep this rate higher during a given period. In many cases of innovation the durability of the advantage can be protected thanks to the patent system.² The innovator is then the only legal user of the innovation for a twenty-year period securing a legal monopoly and creating a sustainable competitive advantage. This emulates the concept of Ricardian rent.³

The model of assessment of risk

The potential rent

To analyse the interest of an innovation it is then necessary to measure the amount of rent it would be likely to generate. This amount will be the combination of three components, which will vary independently one from the other:

- **Volume** – as measured by volume of sales over one year;
- **Rate of Margin** – as measured by profits generated from the innovation;
- **Length** – or duration or life cycle of the innovation.

Thus: RENT = VOLUME X RATE X LENGTH.

² For a complete analysis see "Revue d'Économie Industrielle" number 99, 2nd trimester 2002.

³ For more details on the concept of rent, see Schumpeter [1912], Lewin and Phelan "Rent and Resources: an Austrian perspective", University of Dallas, 2002, Dagnino, Giovanni Battista; "Understanding the Economics of Ricardian Chamberlinian and Schumpeterian Rents: Implications for Strategic Management"; Rivista Internazionale di Scienze Economiche e Commerciali, Jan.-March 1996, v. 43, iss. 1, pp. 213-35.

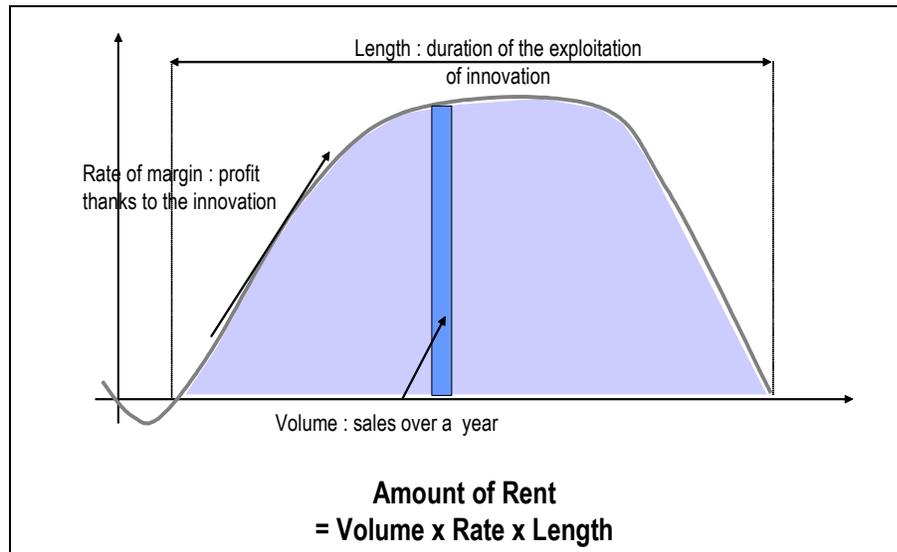


Figure 2: Components of the Rent (Santi et al. 2003)

As the combination of these three variable components, a rent can be characterised by its extreme profile: large/small volume; high/low rate of margin and short/long life cycle. With two possibilities for each variable the total number of combinations is eight.

Prior to introducing the innovation to the market a first step for the SME would be to first analyse the expected amount of potential rent. Measuring the volume, rate and length of the anticipated rent to be generated by the innovation before any interaction with market forces is therefore a desirable initial stage. The indicators proposed by Santi et al (2003) for this analysis are presented in Table 1.

Table 1: measure of potential rent (Santi et al. 2003)

Volume	Rate of margin	Length
The volume is calculated on the basis of the mean potential annual sales on the whole market possibly interested by the innovation	The rate of margin is related to the value and size of the competitive advantage created by the innovation	The length or duration of the life cycle of the innovation is related to the durability and sustainability of the innovation in the using sectors
<u>Indicators</u>	<u>Indicators</u>	<u>Indicators</u>
Potential of sector diffusion	Process of generation of the innovation	Technological basis of the innovation
Potential of geographic diffusion	Kind of innovation	Innovative intensity of the using sector
Size of user markets	Kind of prior protection	Copiability of the innovation (legal and technical)
Limits due to prior patents		

To characteristics that are of particular importance to the assessment of the innovation, and that might have an influence on the rest of the evaluation processes are:

- The stand alone or systematic character of the innovation (kind of innovation, with possible effect on recommendations); and
- The existence of one or more sectors of application of the innovation (sectorial potential of diffusion).

The research undertaken by CEREN and LINEN identified six configurations among the eight associated with these variables.⁴ These are illustrated in Figure 3, where the options are shown with their various trade-offs of volume, rate and length within the rent equation.

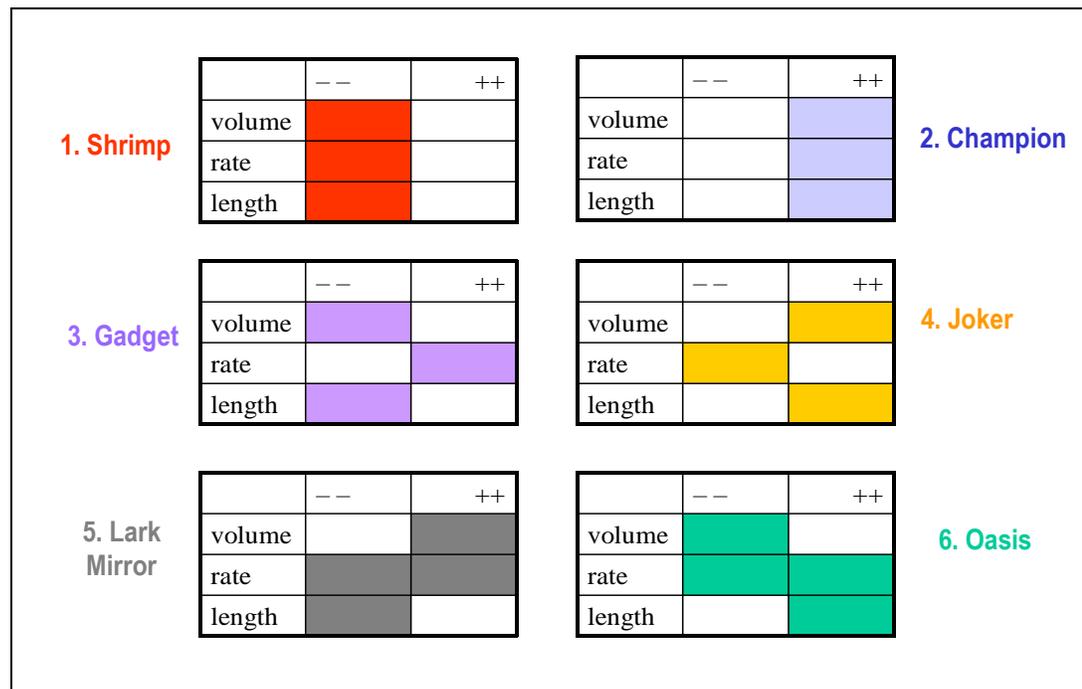


Figure 3: Typology of configurations of rent of an innovation (Santi et al. 2003)

Each configuration involves different levels of volume, rate and length thereby determining the anticipated rent to be derived from the innovation. As shown in Figure 3 these configurations are labelled: 'Shrimp', 'Champion', 'Gadget', 'Joker', 'Lark Mirror', or 'Oasis'. These may be further described in the following terms:

⁴ the configurations #5 and #6 group the cases of high and low rate of margin, because the length and volume effects were evaluated as determinant.

- **Shrimp** – a configuration offering low rent potential due to its modest levels of volume, rate and length, as such it is unlikely to be of much interest;
- **Champion** – a configuration with high potential rent;
- **Gadget** – a configuration offering low volume and length but high rate, leading to little interest overall. Such a configuration would not justify significant investment;
- **Joker** – configuration with high volume and length but low rate making it little better than the ‘Gadget’ despite its apparent attractiveness;
- **Lark Mirror or “Flash in the Pan”** – a configuration with good volume but poor length and may experience both high or low rate, making it challenging for the investor that may need to outlay substantial capital to secure the return over the short life cycle; and
- **Oasis** – a configuration that offers good length but low volume and high or low rate.

The CEREN and LINEN study suggested that even if the “Champion” configuration seems the most suitable, the “Oasis” configuration is more adapted for an SME because of the smaller and more tractable volume of sales (Santi et. al, 2003). It was also found that the rent might be eroded following the introduction of the innovation into the market. A distinction must therefore be made between the potential amount of rent (before any market introduction) and residual rent (after insertion in an economic environment).

Erosion of the rent: the residual rent

The actual experience of many innovators is the need to convince potential users to adopt their innovation and to face the market dynamics associated with the bargaining power of suppliers and customers. Additional challenges may be associated with the activities of competitors who may threaten to erode any competitive advantage with imitation or substitution innovations. These market forces (Porter 1980) are likely to impact on any new innovation delivering an erosion of competitive advantage and effecting anticipated rent.

The customer

Assessing the power of the customer requires evaluation of their generic propensity to adopt the innovation within the targeted market sector. If they have a low adoption propensity the anticipated volume of rent is likely to be diminished. The *trade off* made by a potential user is between what the innovation is likely to provide, and what its adoption will require them to risk or abandon. This process of trading off by a potential adopter is described as the “customer perceived utility value” (CPUV). If the CPUV is low the volume of rent will be eroded within the market.

The Porterian bargaining power

In a market where the bargaining power of customers or suppliers is strong the rate of profit derived from the innovation may be significantly eroded because such actors may either capture the profit for themselves, or hinder the diffusion process. A better awareness of this risk might help the innovator to make the appropriate choice: either to make an association with the more powerful actor, stop to work on the innovation project or even restrict the niche to face a less competitive situation.

An analysis of the threat of potential substitutes to the innovation can also assist in estimating whether the duration of the rent might be short or long. How the industry in which the innovation is located is regulated should be assessed to determine its impact on the diffusion process. Innovators rarely consider this aspect of how industry regulation may help or hinder the development of the innovation.

Additionally it may be important to study the need of complimentary actors (Hax and Dean 2001) especially in the case of a systematic innovation, because the innovation will have to be inserted into an existing system, or into a system to be created, possibly mastered by a powerful actor, that may not be ready to share the rent.

The power of the competitors

One of the most important parts of the model is the assessment of the power of competitors. Further, it is an aspect frequently underestimated by the innovator. According to analysis by the Boston Consulting Group⁵, the erosion effect on the potential rent is dependent on the competitive intensity within the targeted industry and the type of competitive system found there. It is also imperative to know if the business that will be impacted by the innovation is a core or a marginal business for the competitor because their reaction will be very different (Rafii and Kampas 2002).
Captation of the rent: Appropriable rent

Eventually the model of evaluation requires careful analysis of the innovating small firm's possession of the resources necessary to successfully launch the innovation. This analysis might reveal the need for rare technical resources or the requirement to seek external commercial or financial resources (e.g. consultants or venture capital). However, it is common for many owner-managers within small firms to resist seeking help or external support (Mazzarol 1999; Bougrain 2002; Katila 2003).

Innovation and the Small Firm

A key point in the research of CEREN – LINEN was that not every innovation has the same value for a firm, and in the case of small firms, not every configuration of rent is valuable. The relative lack of resources available to the average SME led CEREN and LINEN to consider that the best configuration for a small firm seeking a long and regular development was that of the “Oasis” type (e.g. one of small volume, to be able to supply, high or low rate of margin, and long length). All the other

⁵ The Boston Consulting Group designed a typology of competitive systems following the existence of entry barriers and the price elasticity in the sector.

configurations present one or more specific dangers for the SME. For example, the “Shrimp” is unattractive for any firm while the “Gadget” offers only a short length leading to a ‘take the money and run’ strategy. The other three configurations – “Lark Mirror”, “Joker” and “Champion” – are all characterised by high volume and may not be easily followed by small firms with limited capacity to commit to such production.

Validation of the model (experts, then managers)

The model constructed by CEREN – ESC Dijon and LINEN – HEC proposed an adapted strategic recommendation while providing advice on industrial property following the progressive erosion of the potential rent anticipated for the innovation.

Drawing on a panel of intellectual property experts, this evaluation tool was constructed and then piloted with a small sample of 15 small business owner-managers in France during 2002. The study led by CEREN and LINEN for the INPI has shown that this process of analysis was a good way to evaluate the risk taken by an innovator (Santi et al, 2003). However, the question remains of whether and how the small business managers usually assess the risk they incur when launching an innovation. CEREN in collaboration with the UWA-GSM CEMI aims to answer that point via the further development to be undertaken.

SECTION 3

Overview of the WA Pilot Study

Innovation is recognized as a key driver for economic and social development and a critical element in the future success of industry (Senge, Carstedt, and Porter, 2001). As a process within organisations, innovation is about new product or process leading to the enhancement of value for customers and shareholders (Drucker 2002). Innovation requires change, both to the customer and the supplier, as well as to the firm that drives the initiative. Such change can be incremental in nature, or highly radical and disruptive (Tushman and Nadler 1986).

During 2003 CEREN collaborated with CEMI to further develop the tool with a pilot survey of small innovative firms in Western Australia and interviews with local WA entrepreneurs engaged in technology innovations. The aim of this part of the study was to test that the tool developed in France was not so specific to France that other SMEs managers would not understand it.

Development of the Survey Instrument

To address this need CEREN and CEMI designed a survey based on the French tool, with questions following the steps of the model, asking the respondent to evaluate from 1 to 5 the degree of his/her responses. The survey was piloted with two owner-managers in Western Australia, known for their high level of innovation investment in new products. One company was engaged in high technology medical training equipment, the other was operating in the information and telecommunications industry. These owners assisted the CEREN and CEMI research staff to evaluate the new survey instrument and provided valuable advice on the wording of questions.

In addition to this categorisation of risk-return, the survey also contained additional questions designed to investigate the owner-manager's decision-making environment. Question items drawn from Ajzen and Fishbein's (1980) research into the Theory of Reasoned Action (TRA) were employed. This component of the study seeks to determine the relative influences of Attitude (e.g. beliefs and rational evaluation) and Subjective Norm (e.g. normative beliefs and motivation to comply with external influences). The final questionnaire contained 51 question items.

Past research suggests that small firm entrepreneurs are likely to be influenced more by Attitude than Subjective Norm,

indicating that external influences are likely to be weak in comparison with entrepreneur's own self-belief and judgement (Thompson 1999). However, the uncertainty of many innovation investments would suggest that weak reference to the opinions of external advisors could be detrimental to success.

Sampling and Methodology

During late 2003 the questionnaire was distributed to around 550 SME identified as highly innovative. These firms were registered with the WA State Government Department of Industry and Resources (DOIR), who facilitated the data collection process. A total of 550 firms were surveyed drawing from the database of innovator companies held by the Western Australian Government. Mailed questionnaires with accompanying covering recruitment letters were sent to all these firms and a total of 57 usable responses were returned (10% response rate).

The questionnaire was targeted at persons within the firms who could report on behalf of the entire organisation. Within the final sample 42 percent were owner-managers, 23 percent were executive managers and principal shareholders, 25 percent were executive manager, shareholders, and 10 percent were executive managers without shareholdings. Thus the majority of respondents were both executive managers and owners.

All firms within the sample had less than 100 employees, with the majority (75%) being small. The final distribution of firms by size was:

- 1) 35.0 percent - Micro-enterprises (e.g. less than 5 employees)
- 2) 40.5 percent - Small enterprises (e.g. 5-20 employees)
- 3) 14.5 percent - Medium-sized enterprises (e.g. 21-200 employees).

Annual turnover ranged from less than AUD\$0.5 million to over AUD\$20 million, however 83 percent had less than AUD\$5 million, with the average around AUD\$1 million. Other key features of the sample were that were examined in the survey were:

Evidence of formal business planning

The majority (76%) of respondent firms indicated that they had prepared a formal business plan within the previous three years. This compares with other research that suggests less than half of most small firms do not have a formal business plan (ABS 2002). While the possession of a formal business plan is no

guarantee of enhanced performance (Pearce, Freeman and Robinson 1987), the possession of a written plan suggests an attempt by the firm to formally address strategic planning (Mazzarol 2001).

High levels of export activity

While the majority of small firms in Australia are not engaged in exporting⁶ the firms captured in this sample were highly international in their focus with 80 percent indicating that they had already commenced exporting or had some international market engagement in the previous three years.

Management Education and Training

Successful growth of a small firm is frequently associated with the managerial capacity of the owner-manager and their key staff (Gibb and Scott 1985). Despite the high levels of innovation activity, formal business planning and international orientation among these firms there was only limited investment in education and training within the firm. Only 24 percent of the senior managers or entrepreneurs who responded to the survey had undertaken any formal managerial training in the previous three years. Furthermore, only 36 percent of firms had provided any formal managerial training for their key employees in the same time period.

Strategic Networking

The capacity to establish strategic alliances and networks with customers, suppliers or other firms to achieve access to new market opportunities, acquire access to additional resources or defend established market positions is recognized as important in the strategic development of the small firm (Jarrett 1998). However, many small firms seek to avoid formal or even informal alliances due to fear of losing control or losing valuable intellectual property (IP) (Dean, Holmes and Smith 1997).

Within the sample, 51 percent indicated that they had entered into some form of joint venture with leading customers, but only 25 percent had entered into any formal joint ventures with key suppliers. Almost half the sample (47%) indicated that they had entered into a joint venture with other companies. This suggests an above average level of strategic alliance building within these firms, which is consistent with highly innovative small companies (Mazzarol 2003).

Formal systems of Commercialization

Commercialization is a process of taking an innovative idea or

⁶ Discussions with AUSTRADE suggest that only 4 percent of Australian firms actively export.

invention to market. It comprises a variety of actors both within the firm and within the firm's wider network. Such actors might include lead customers, key suppliers, and providers of venture capital, law firms and specialist advisors. To achieve a successful commercialization, the firm will need to move the innovation through a interrelated stages of product and market development (ISR 2001).

A high proportion of the sample firms (58%) indicated that they had a formal process for innovation or new product development established in their organisation. This is consistent with similar studies of WA-based High Technology firms (Mazzarol 2003). However, only 31 percent had attempted to raise venture capital requiring equity sharing within the previous three years.

Although the majority of firms had not sought venture capital, the sample displayed a high proportion of firms that had done so when compared to the typical small firm. This was also the case for formal innovation or new product development systems, with the majority claiming to have such a process.

Industry classifications

The sample firms were classified into nine broad areas of activity based on a question that asked them to indicate what was their principal business activity. Table 2 shows these findings.

Table 2: Industry Classifications of Sample Firms

Industry activity	N	% of sample
ICT, computing or electrical engineering	13	23.6
Engineering general	6	10.9
Agricultural & farming	6	10.9
Manufacturing, design & construction	11	20.0
Mining sector	1	1.8
Retailing & product distribution	2	3.6
Research, development & innovation	8	14.5
Health & medical science	7	12.7
Banking & finance	1	1.8

It is difficult to determine how representative this sample is of the types of firms that comprise highly innovative sectors in Western Australian industry. However, it is consistent with the pattern of R&D commercialisation grants applicants as measured by the Australian Government within WA.⁷

The Nature of Innovation within the Firm

Firms were asked to indicate if they had introduced a range of innovations within the previous three years, as well as the frequency of such innovations and the level of investment involved in these innovations. These innovations were classified into five types as originally identified by North and Smallbone (2000).

- 4) **Product-service innovations** - e.g. new products developed from research or introduced to market
- 5) **Market development innovations** - e.g. entering new markets with existing products, exporting
- 6) **Marketing innovations** - e.g. development of a new brand or use of databases for marketing
- 7) **Process technology innovations** - e.g. application of new tools or methods, use of computer controlled manufacture
- 8) **Administrative innovations** - e.g. application of computer systems to office management

The level of investment in such innovations ranged from nil to around 100 percent of annual turnover, with the average around 24 percent for product-service innovations.

Table 3 illustrates the findings where it can be seen that product-service innovations were the most common with an average of 4 such innovations having been introduced in the previous three years. Market development innovations were the next most common among with just over half the firms indicating that they had introduced such an innovation within the past three years. There was an even spread of activity across the other types. Marketing innovations were the least common type of innovation reported by the sample.

⁷ Based on data provided by AusIndustry (2003).

Table 3: Innovation by Type and Intensity

Type of innovation	% Introduced	Average number of innovations past 3-years	Average % of annual turnover invested per year
Product-Service innovations	84.2	4.0	24
Market development innovations	52.6	2.5	16
Marketing innovations	31.6	1.5	13
Process technology innovations	40.4	2.0	20
Administrative innovations	40.4	2.0	9

Plans for New Innovations

The majority (96.5%) of respondent firms said that they planned to introduce a new innovation within the next three years. When asked about the nature of this innovation:

- 9) 38.6 percent had innovations that were designed to work alone
- 10) 43.9 percent had innovations that were designed to integrate into a system
- 11) 17.5 percent had innovations that were able to do both.
- 12) 28.6 percent felt their innovation would substitute an existing product
- 13) 53.6 percent felt their innovation would create a new market
- 14) 17.9 percent felt their innovation would both substitute and existing product and create a new market
- 15) 55.4 percent indicated that their innovation would be compatible with existing products and processes

- 16) 37.5 percent indicated that their innovation would create a new standard or system
- 17) 7.1 percent felt that their innovation might be both compatible with existing products and process and create a new standard or system.

When asked about the way in which the innovation was generated 64 percent said that it was generated alone, while 21 percent indicated they generated the innovation in conjunction with lead customers. Only 4 percent said that they generated the innovation in conjunction with key suppliers, and only 6 percent generated the innovation in conjunction with research centres (e.g. CSIRO or universities) and a further 6 percent attributed the creation of the innovation as a process of their having collaborated with wider network.

Such findings are unsurprising. The smaller innovator firm is more likely to be working alone or via interaction with lead customers. This low level of interaction with research centres (e.g. at universities or via government funded centres) is consistent with findings from other studies (Mazzarol 2003).

| SECTION 4 .

Estimating Potential Rents

The survey asked respondent firms to indicate the potential volume of sales and rates of profit for the innovation, as well as relative complexity of the innovation to develop or replicate. These questions were designed to assess the level of rent anticipated from the innovation by the firm. It will be recalled that the equation measuring rent was:

$$\text{RENT} = \text{VOLUME} \times \text{RATE} \times \text{LENGTH}.$$

Where:

Volume = volume of sales over a given year

Rate = rate of profits generated from the innovation

Length = duration or estimated life cycle

Potential Volume of Sales for the Innovation

The firms were asked to assess the potential market adoption rate for their planned innovation. A total of 18.5 percent of firms considered their innovation would be very widely adopted, while 37 percent felt that it would be wide, and 22 percent medium. A further 22 percent felt that their innovation would have only limited market diffusion.

In terms of the potential geographic diffusion of the innovation the majority (59%) felt that it was destined for a global market, 20 percent were targeting a national market, 16 percent were targeting developed overseas markets, 4 percent were targeting developing overseas markets and only 2 percent were focused solely on the local market.

Firms were asked to indicate their potential annual sales for the innovation on a worldwide basis within the first year and then after three years. As shown in Table 4 the majority of firms felt that their innovation would generate only modest returns in the first year, but their confidence increased as they projected sales over the next three years.

Table 4: Potential Annual Sales of Innovation Worldwide

Sales volume	Year 1	By Year 3
<\$10 million	90.4%	46.0%
\$10-\$20 million	7.7%	28.0%
\$21-\$50 million	1.9%	10.0%
\$51-\$100 million		10.0%
>\$100 million		6.0%

Estimated Rate of Profits from Innovation

In terms of profits, 56 percent considered their innovation would generate a high or very high rate of profit, while 38 percent felt that profits would be medium, and 5.5 percent considered their innovation would generate only small rates of profit.

The Potential Length of Time the Innovation would require

In terms of the time anticipated time to commercialize the innovation the study looked at three key aspects: 1) the technical base supporting the innovation; 2) the innovation intensity of the industry sector being targeted by the innovation, and 3) how easily the innovation could be copied.

With respect to the technical base supporting the innovation 36.5 percent felt that it would require a new arrangement of existing technologies, while 25 percent felt that it offered a new technical platform and 19 percent felt that it was a simple process. A further 11.5 percent felt that it offered a new dominate design and 7.7 percent felt that it was a new scientific paradigm.

With respect to the innovation intensity of industry sector targeted by the innovation 10.7 percent felt that it was very high, 25 percent felt that it was high, 39 percent felt that it was medium, 17.9 percent felt that it was low and 7.1 percent felt that it was very low.

With respect to the ease with which the innovation could be copied, only 1.9 percent felt that it would be very easy to copy and only 9.3 percent felt that it would be very hard to copy. 22 percent felt that it would be easy to copy, 37 percent felt that it would be neither easy nor hard to copy, and 29.6 percent felt that it would be hard to copy.

Typology Configurations of Rent

Analysis of the relationship between these variables and the Volume, Rate and Length model of Rent of an Innovation, focused on three survey items:

The Potential Annual Sales on a worldwide basis

As shown in Table 4, respondents were asked to indicate their forecasts of the potential annual sales for their innovation on a worldwide basis. This item was selected as a measure of VOLUME and was separated into a derived variable divided into two groups. Table 5 shows the distribution of these low and high Volume firms within the sample. It can be seen that the separation of the sample into two broadly equal groups was at the \$10 million per annum level.

Table 5: Volume of worldwide sales by Year 3

	Frequency	Percent
Low (<\$10m per year)	23	40.4
High (>\$10m per year)	34	59.6
Total	57	100.0

Potential Rate of Profit for the Innovation

As shown in Table 6 the sample separated into two groups with 42 percent considering that their innovation would only generate small to modest profits, and around 60 percent who felt that their innovation would generate medium to very high profits.

Table 6: Rate of potential profit for the innovation

	Frequency	Percent
Low rate of potential profit	24	42.1
High rate of potential profit	33	57.9
Total	57	100.0

Length of Lifecycle of Innovation

To measure the length of the lifecycle of the innovation the item selected was that relating to the ease with which an innovation could be copied. The assumption used in this analysis was that the easier it is to copy the innovation the shorter the lifecycle over which the rent can be secured by the innovator. Table 7 shows the division of the sample into short and long lifecycles, where short relates to innovations that were very easy or easy to copy, and long relates to hard or very hard to copy.

Table 7: Length of lifecycle of innovation

	Frequency	Percent	Valid Percent
Short lifecycle	33	57.9	60.0
Long lifecycle	22	38.6	40.0
Total	55	96.5	100.0
System missing	2	3.5	
Total	57	100.0	

Rent of Innovation

The development of the Rent variable comprised a summation of the means of the three independent variables measuring Volume, Rate and Length. These created a derived variable labelled RENT that was in turn developed into a dichotomous dependent variable divided on the 50th percentile. Table 8 illustrates the division of the sample into low and high Rent sub-categories.

Table 8: Measure of RENT of Innovation

	Frequency	Percent	Valid Percent
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Low Rent	25	43.9	44.6
High Rent	31	54.4	55.4
Total	56	98.2	100.0
Missing	1	1.8	
Total	57	100.0	

Developing the Rent of Innovation Typologies

Having created these variables it was now possible to classify the sample into the six-typology configurations of rent as originally identified by CEREN (Santi et.al, 2003). These classifications are shown in Table 9. It can be seen that the most common type was that of the "Lark Mirror", followed in turn by the "Champion" and "Shrimp", with the Joker being the least common type.

It should be remembered that these types were derived from the responses of the respondents and were therefore self-reported classifications. The relatively high proportion of "Lark Mirror" innovations is worth noting given that this type is frequently capital intensive over a short lifecycle. The low number of "Gadget" and "Joker" innovations in the sample is also unsurprising given their lack of attractiveness to future investment. However, the low number of "Oasis" innovations is also noteworthy as these are theoretically a more suitable investment for small firms.

Table 9: Innovation Typology

	Volume/Rate/Length	Frequency	Percent
Shrimp	Low/Low/Low	10	17.5
Champion	High/High/High	12	21.1
Gadget	Low/High/Low	7	12.3
Joker	High/Low/High	4	7.0
Lark Mirror	High/Low-High/Low	18	31.6

Oasis	Low/Low-High/High	6	10.5
Total		57	100.0

Demographic profile of the Innovation Rent Typologies

Having identified the six innovation Rent profiles the next stage of the analysis was to examine any significant differences that might exist between them in relation to firm or innovation demographics. Chi-square tests were used to measure any differences at the 0.05 level of confidence. This analysis found some differences and many similarities.

Nature of Executive Management

No significant differences were found between the six types in relation to the nature of the firm's executive management, with owner-managed firms classified in a similar manner to firms managed by non-shareholding executive managers. This suggests that the typologies may not be related to the nature of the firm's executive leadership.

Size of Firm

A significant difference was found in relation to size of the firms and the classification of their innovation into the six types. "Gadget" and "Joker" type innovations were found to be more common among the medium size firms (e.g. 20-100 employees).

For example, 90 percent of "Shrimp", 83 percent of "Champion", 78 percent of "Lark Mirror" and 100 percent of "Oasis" innovations were found associated with firms with less than 20 employees. By contrast 57 percent of "Gadget" and 75 percent of "Joker" innovations were found amongst the firms with over 20 employees. Given that the "Gadget" and "Joker" innovations are considered to be the least attractive due to their poor potential returns to investment, this is an unusual finding.

A similar pattern was found in terms of the firm's annual turnover (which is usually correlated with the firm's employment base). For example, 100 percent of all "Shrimp" and "Oasis" innovations, and 83 percent of all "Champion" and "Lark Mirror" innovations were found among firms with less than AUD\$5 million in annual turnover. By comparison 43 percent of "Gadget" and 50 percent of all "Joker" innovations were found among firms with over AUD\$5 million in annual turnover.

Business Activities and Innovations

No significant differences were found between these different innovation types and such things as the possession of a formal written business plan, engagement in exporting, or investment in training for managers or employees. This was also the case for these innovations and whether the firm participated in a joint venture relationship with customers, suppliers or other parties.

Formal Commercialization Systems

One area in which there was a significant difference found between the innovation types was the possession of a formal process of innovation and new product development. For example, 92 percent of "Champion" innovations and 100 percent of the "Oasis" innovations were found within firms that had such a formal process of innovation management.

Table 10 shows the cross tabulation of the six innovation typologies in terms of those firms that had a formal process for innovation or new product development. It can be seen that the majority of "Shrimp" and "Lark Mirror" innovations were to be found in firms without formal innovation management systems. For the "Gadget" and "Joker" innovations there were as many firms with such formal innovation management systems as there were those without.

Table 10: Cross tab – Innovation Type by Possession of Formal Innovation Process

Innovation Typology	Does your firm have a formal process for innovation or new product development?		Total
	yes	no	
Shrimp	3	5	8
	37.5%	62.5%	100.0%
Champion	11	1	12
	91.7%	8.3%	100.0%
Gadget	3	4	7
	42.9%	57.1%	100.0%
Joker	2	2	4
	50.0%	50.0%	100.0%
Lark Mirror	7	11	18
	38.9%	61.1%	100.0%

		Oasis	6	6
			100.0%	100.0%
Total			32	23
			58.2%	41.8%
				100.0%

SECTION 5.

Bringing the Innovation to Market

The process of bringing the innovation to market was examined by the survey with several questions that examined the adoption rate of new innovation by the industries targeted by the innovation. It also explored how the innovator viewed the overall value that their proposed innovation might offer to customers.

Estimated rates of market adoption

The majority of respondent firms (73%) indicated that they felt customers were usually slow to adopt new innovations. However, when such customer firms within the targeted markets did adopt, the proportion of adopting firms was viewed as normal by 70 percent of respondent firms, with 16 percent claiming that only a small number would adopt and 14 percent feeling that either all or none would adopt.

The potential benefits of the Innovation to Customers

Firms were also asked to indicate the level of benefits their proposed innovation would be likely to bring to customers. Overall 98 percent of the respondent firms considered that the benefits their customers would obtain from adopting their proposed innovation would be high. Additional assessments of the benefits were measured in terms of value, price, and ease of adoption and evaluation prior to adoption (Davis 1989). Table 11 shows the findings from these items.

It can be seen from Table 11 that most firms considered customers would obtain relatively high value from their proposed innovation with fairly high prices. They generally felt that their new innovation would be relatively easy to understand and to test both before and after adoption, with a fairly high level of compatibility with existing technologies.

Table 11: Potential Benefits of the Innovation to Customers

	Mean	Std. Deviation
1 = extremely low; 7 = extremely high		

Customers will be offered value that is high or low	5.75	1.049
Customers will be offered a price that is high or low	3.93	1.245
Customers will view the innovation as easy/hard to understand	2.66	1.297
Customers will find the innovation easy to test/evaluate prior to adoption	2.64	1.432
Customers will find the innovation easy to test/evaluate after adoption	2.09	1.133
Customers will view the innovation as compatible with existing technologies.	5.31	1.527

Comparison of Innovation Typologies

Analysis of the relationship between these perceived potential benefits and the six innovation typologies were undertaken using one-way ANOVA tests at the 0.05 level of significance. This found several differences that appear somewhat revealing in terms of the six typologies (Santi et.al. 2003).

Value of the Innovation to the Customer

The ANOVA tests found a significant difference between the "Shrimp" and "Champion" innovations in terms of their value offer to future customers. The "Champion" innovation was viewed as having the most potential value for customers with a mean score of 6.50 and a standard deviation of only 0.522. By comparison the "Shrimp" innovations had the lowest mean score (5.10) with a standard deviation of 1.107. No significant differences were found in relation to the other potential customer benefits and the six typologies.

Potential costs of the innovation to customers

The potential cost of the innovation to customers was considered to be low by 96 percent of firms. When examined in more detail the findings outlined in Table 12 show how these costs were estimated. It can be seen that most firms considered the risks and transfer costs would be modest. Time savings were viewed as

high as would new opportunities, while complexity, ease of understanding and ease of measurement would be positive.

Table 12: Potential Costs of the Innovation to Customers

	Mean	Std. Deviation
1 = extremely low; 7 = extremely high		
Customers would view adopting the innovation as low or high risk.	3.04	1.372
Customers would view the innovation having low or high transfer costs	2.83	1.051
Customers would view the innovation as resulting in low/high time savings	5.00	1.427
Customers would view the innovation as creating low/high complexity	2.89	1.340
Customers would view the innovation as creating new opportunities	4.87	1.676
Customers would view the innovation as easy/difficult to understand	2.62	1.457
Customers would view the innovation as easy/difficult to measure	2.11	1.138

Comparison of Innovation Typologies

No significant differences were found between the six innovation types and the level of costs to customers of adopting the new innovation.

Power of Customers and Suppliers in relation to the Innovation

The survey examined the respondent’s perceptions of the power key suppliers or lead customers might have on the capacity for the firm to introduce the proposed innovation. These issues examined the influences of suppliers and customers over quality and cost control, switching costs and the ability of customers and suppliers to integrate up or down stream.

As shown in Table 13, there was a fair degree of uncertainty over these issues with mean scores between 4 and 5 on a 7-point

scale and standard deviations all above 1.5. This may suggest some difficulty by firms in assessing the power of suppliers and customers in this regard.

Table 13: Customer-Supplier Influence over quality and cost control

	Mean	Std. Deviation
1 = extremely weak; 7 = extremely strong		
The influence that key suppliers have over quality in this industry is weak/strong	4.57	1.744
The influence that key suppliers have over cost control in this industry is weak/strong	4.69	1.680
The influence that lead customers have over quality in this industry is weak/strong	4.72	1.867
The influence that lead customers have over cost control in this industry is weak/strong	4.39	1.653
The influence that firms such as mine have over quality in this industry is weak/strong	4.67	1.923
The influence firms such as mine have over cost controls in this industry is weak/strong	4.20	1.927

As shown in Tables 14 and 15 the firms were generally unsure over their customers and suppliers control over switching costs and ability to move up or down stream within the industry.

Table 14: Customer-Supplier Influence over Switching Costs

	Mean	Std. Deviation
1 = extremely weak; 7 = extremely strong		

The influence that lead customers have over the switching costs within this industry is weak/strong.	4.34	1.761
The influence that key suppliers have over the switching costs within this industry is weak/strong.	4.02	1.604
The influence that firms such as mine have over switching costs within this industry is weak/strong..	3.89	1.637

Table 15: Customer-Supplier ability to Integrate up/down stream within the industry

	Mean	Std. Deviation
1 = extremely low; 7 = extremely high		
The capacity that key suppliers have to integrate up/down stream within this industry is low/high	3.34	1.517
The capacity that lead customers have to integrate up/down stream within this industry is low/high	3.70	1.694
The capacity that firms such as mine have to integrate up/down stream within this industry is low/high.	4.00	1.868

The Relative Bargaining Power of Suppliers and Customers

The power of suppliers and customers to bargain is viewed as a key element of industrial markets (Porter 1980). The relative bargaining power of suppliers and customers in relation to the firm was examined with 58 percent of firms considering that the bargaining power was in favour of customers and 29 percent feeling that it lay with firms such as their own. Only 13 percent considered that the bargaining power lay with suppliers.

Table 16: Importance of Potential Sales Turnover to Customer-Supplier

	Mean	Std. Deviation
1 = extremely low; 7 = extremely high		
The relative importance of potential sales turnover to key suppliers low/high	4.50	1.673
The relative importance of potential sales turnover to lead customers is low/high	4.80	1.494
The relative importance of potential sales turnover to firms such as mine is low/high	5.52	1.440

Threats of Substitutions

Another key element of market dynamics is the threat of substitutes and of new market entrants (Porter 1980). The majority (74.5%) of respondents felt that there were not many substitute products or alternative technologies under development that would be likely to threaten their innovation. In relation to the lead-time they felt they might have over such potential substitutes 58 percent felt that they had a long lead-time, while 42 viewed this lead-time as short. Overall the sample did not view their innovation as being strongly threatened with 32 percent considering such threats to be low, 67 percent considering them to be moderate and only 2 percent feeling that threats were high.

|SECTION 6.

Complimentary Actors, Government Regulation and Competitors

The role of complimentary actors able to assist the firm in the development and diffusion of the innovation was examined along with the role of the government in regulating or assisting the firm and the impact of competitor action.

Complimentary Actors

Other firms that can assist the innovator to develop their market through complimentary activities are considered an important part of the diffusion process (Brandenburger and Nalebuff 1995). In terms of the number of potential complimentary actors that might be involved in the diffusion of the innovation, the firms could identify:

- 18) 69.6 percent could identify 1-2 partners
- 19) 21.4 percent could identify 3-5 partners
- 20) 8.9 percent could identify over 6 partners

With respect to the value such complimentary actors might offer, 60 percent considered that their value would be high and 40 percent low. Further, 51 percent of the firms considered that these complimentary actors would be larger and stronger firms, while 49 percent identified their complimentary actors as smaller and more dispersed.

Impact of Government Regulatory or Legal Threats on the Innovation

The survey examined the firm's perceptions of a range of government, regulatory and legal threats to the innovation's ability to become adopted. In relation to government regulation 57 percent of firms did not foresee any threat at all, but 7 percent considered such regulation to be likely to have a highly deterrent effect. By comparison, 36 percent of firms felt that government regulation might have a highly positive or enabling effect.

Compliance and Authorizations

The need to secure compliance or authorisations for their innovation was viewed by 46 percent of firms as having no impact. However, 18 percent considered such compliance requirements to be highly deterrent in their impact. By comparison 36 percent considered such compliance might have a highly positive or enabling effect.

Adoption processes

In relation to adoption processes within the targeted industry, 46 percent of firms viewed these as likely to have a highly positive impact, and 46 percent of firms as having no effect at all. Only 8 percent felt that such adoption processes would have a negative impact.

Operating standards

In a similar manner the impact of operating standards required by each firm within the production chain was considered by 54 percent to have no impact on the adoption of the innovation. By contrast 43 percent thought such operating standards would be positive in their influence and 4 percent thought they would be negative.

Overall assessment of institutional risk

Overall 62 percent of firms did not consider institutional risk or 'amplification effects' associated with their innovation to be likely to have any impact, while 31 percent viewed such issues as likely to have positive effects. Only 7 percent considered such issues as likely to have negative effects.

Competitor Analysis

Firms were asked to value the impact of the innovation on the growth, market concentration, transfer costs, competitors, sunk costs and exit barriers within their industry. The impact of the innovation on these things both prior to and after the introduction of the innovation was examined. Table 9 illustrates these findings where it can be seen that a significant difference was found between the before and after proportions for these six items.

With respect to the competitor's business portfolios the proposed innovation was viewed as a core business by 65 percent of respondents and a marginal business by 35 percent.

Competitor Barriers to Exit and Entry

With respect to barriers to entry and exit in an out of the industry for their competitors:

- 21) 19.6 percent viewed their entry/exit barriers as very low
- 22) 49.0 percent viewed their entry/exit barriers as moderate
- 23) 31.4 percent viewed their entry/exit barriers as very high

Competitor Profitability

With respect to profitability of competitors:

- 24) 20.4 percent viewed their competitors profits as very low
- 25) 67.3 percent viewed their competitors profits as

moderate

- 26) 12.2 percent viewed their competitors profits as very high

Potential Competitors

With respect to the potential competitors:

- 27) 7.9 percent viewed their competitors as having strong legal resources
- 28) 26.3 percent viewed their competitors as having strong technologies resources
- 29) 36.8 percent viewed their competitors as having strong financial resources
- 30) 28.9 percent viewed their competitors as having strength in all three areas

Impact of the innovation on firm competitiveness

Respondent firms were asked to make an assessment of the impact of the innovation on their competitiveness. A series of items examined the impact the innovation would have on the firm's growth, market share, diversity, transfer costs, sunk costs and exit barriers.

Impact on growth

In terms of the impact that the innovation was anticipated to have on the growth of the firm most firms considered that their growth would be greater following the innovation. As shown in Table 17 a significant number considered that their growth would be very high following the introduction of the innovation.

Table 17: Impact of the Innovation on Firm Growth*

Growth rate of firm is...	Prior to innovation	With the innovation
Very high	11.3%	34.6%
Moderate	60.4%	61.5%
Very low	28.3%	3.8%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Impact on market share

The impact of the innovation on the concentration of market share within the industry was examined. As shown in Table 18 there was a view that the innovation would be likely to have an impact on the level of market concentration although this was still somewhat subdued.

Table 18: Impact of the Innovation on Market Share*

Market share in industry is...	Prior to innovation	With the innovation
Very high	21.2%	30.8%
Moderate	40.4%	46.2%
Very low	38.5%	23.1%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Impact on diversity of competitors

The impact of the innovation on the diversity of competitors facing the firm in its industry was examined. As shown in Table 19 there was a view that the innovation would be likely to slightly reduce the diversity of competition in the industry, although this did not appear to affect those who already had very low levels of diversity of competition.

Table 19: Impact of the Innovation on Diversity of Competitors*

Diversity of competitors in industry is...	Prior to innovation	With the innovation
Very high	17.3%	11.5%
Moderate	48.1%	53.8%
Very low	34.6%	34.6%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Impact on transfer costs in the industry

The impact of the innovation on the transfer costs within the industry was examined. As shown in Table 20 there was a strong perception that the innovation would have positive impact on the transfer costs in the industry.

Table 20: Impact of the Innovation on Transfer Costs*

Transfer costs in your industry are...	Prior to innovation	With the innovation
Very high	16.6%	8.3%
Moderate	64.6%	62.5%
Very low	18.8%	29.2%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Impact on sunk costs in the industry

The impact of the innovation on the sunk costs within the industry was examined. As shown in Table 21 there was a strong perception that the innovation would have positive impact on the sunk costs in the industry.

Table 21: Impact of the Innovation on Sunk Costs*

Transfer costs in your industry are...	Prior to innovation	With the innovation
Very high	36.6%	24.4%
Moderate	53.7%	48.8%
Very low	9.8%	26.8%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Impact on barriers to exit in the industry

The impact of the innovation on the barriers to exit within the industry was examined. As shown in Table 22 there was a strong perception that the innovation would have positive impact on the

exit barriers in the industry, but only in terms of lowering very high barriers.

Table 22: Impact of the Innovation on Exit Barriers*

Barriers to exit in your industry are..	Prior to innovation	With the innovation
Very high	22.4%	10.2%
Moderate	49.0%	61.2%
Very low	28.6%	28.6%

*Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

Resources and Competencies

The resources and competencies possessed by the firms in relation to their potential competitors were assessed in terms of whether they were technical, commercial or both. In response to these questions:

- 31) 44.2 percent felt their strengths were technical
- 32) 9.6 percent felt their strengths were commercial
- 33) 42.3 percent felt their strengths were both technical and commercial, and
- 34) 3.8 percent felt they possessed no strengths in relation to competitors.

Technological resources

In relation to the technological resources and competencies necessary to launch and protect their innovations:

- 35) 67 percent felt that they already had these
- 36) 33.3 percent did not already possess them but felt that they could develop them alone.
- 37) 38.6 percent did not already possess them but felt that they could develop them via a partnership with another firm.

Commercial resources

In relation to the commercial resources and competencies necessary to master the critical success factors of the using market:

- 38) 42 percent felt that they already had these
- 39) 28 percent did not already possess them but felt that they could develop them alone.
- 40) 47 percent did not already possess them but felt that they could develop them via a partnership with another firm.

Financial resources

In relation to the financial resources necessary to launch and develop the innovation:

- 41) 50 percent felt that they already had these
- 42) 24 percent did not already possess them but felt that they could develop them via a partnership with another firm.

Protection for the innovation

In terms of protection for the innovation:

- 43) 12.5 percent could identify no protection
- 44) 16.7 percent felt that protection could be maintained through secrecy
- 45) 25 percent sought protection via branding and trademarks
- 46) 27 percent sought protection via patents
- 47) 19 percent sought to protect their innovation via a combination of these.

Analysis of these forms of protection and the innovation typologies found few significant differences between the six innovation types and the level of protection available. However, it was not worthy that the "Shrimp" type innovations were largely found among firms that could not identify any protection at all.

SECTION 7.

Strategic Decision Making in the Firm

Firms were asked to comment on the nature of strategic decision-making particularly as it related to the owner-manager or CEO who was completing the questionnaire. Of interest was the level of personal power that the respondents considered they possessed over strategic decision-making, and then the level of influence that other persons might have on their decisions.

Personal Views on the Merits of the Innovation

Respondents were asked to rate the level of power they felt that they possessed within their firm over the introduction of the proposed innovation. They were also asked to indicate the likelihood of the innovation proceeding and the impact that it was expected to have on the business and the influence of other people on their decision-making.

Table 23 shows the results of the first five questions that examined the respondent's perception of their level of power in determining the future of the innovation, and the impact of the innovation on their industry. All responses were rated on a 7-point Likert-type scale. Table 23 shows the means and standard deviations of these responses.

From Table 23 it can be seen that most respondents considered that they possessed a lot of power in determining whether their proposed innovation proceeded. Analysis of variance tests found that all respondents viewed this item in the same way, except for the Executive Manager/Non-Shareholders, who were significantly less likely to view their power as high. This difference also held true for the second item, but there were no differences found over the 3rd, 4th and 5th items.

Table 23: Strategic Decision Making in the Firm – Senior Manager Power & Industry Impact

	Mean	Std. Deviation
How much power do you personally have		

with your firm over whether this innovation will be undertaken? [1=not very much power; 7=a great deal of power]	5.91	1.607
How likely are you to decide to proceed with this innovation? [1=extremely likely; 7=extremely unlikely]	6.26	1.094
The impact of this innovation on the industry is likely to be... [1=extremely harmful; 7=extremely beneficial]	6.04	1.068
The impact of this innovation on my firm is likely to be... [1=extremely risky; 7=extremely rewarding]	5.76	1.319
The implementation/execution of this innovation is likely to be... [1=extremely difficult; 7=extremely easy]	3.84	1.360

Influence of Others on Decision Making

The influence of other people on the decision making of the respondent's was also examined with a series of questions the results of which are outlined in Table 24. Here it can be seen that most respondents believed that other people within their firm also considered that the proposed innovation was beneficial, rewarding and achievable.

Table 24: Strategic Decision Making in the Firm – Influence of Others within Firm

	Mean	Std. Deviation
Other people within my firm consider pursuing this innovation to be... [1=extremely harmful; 7=extremely beneficial]	5.87	1.029
Other people within my firm consider pursuing this innovation to be... [1=extremely risky; 7=extremely rewarding]	5.40	1.432
Other people within my firm consider pursuing this innovation to be... [1=extremely difficult; 7=extremely easy]	3.96	1.387
Generally speaking, how much notice do you take of the views of other people within your firm... [1=not at all; 7=very much]	5.84	1.075

As with the items outlined in Table 24, one-way ANOVA tests found significant differences between Executive Manager/Non-shareholders and the other respondents in terms of these items. This was specifically in relation to items 1 and 2 in Table 23, where Executive Manager/Non-shareholders were less likely than their counterparts to agree indicate that other people in the firm considered the innovation beneficial or rewarding.

Influences of Persons External to the Firm

The influences of people external to the firm were also examined in the questionnaire and these results are shown in Tables 25 and 26. It can be seen that overall the level of such influence was lower than for people within the firm. Once again the Executive Manager/Non-shareholder was found to be the respondent that was most different in their responses, with these individuals being less likely to express the view that those external to the firm with whom they consulted considered the innovation to be beneficial (item 1, Table 25).

Such differences were not found to have a significant relationship with such demographics as size of firm or turnover. Suggesting that the type of executive leadership within the firm is likely to have an impact on the nature of strategic decision making in the organization. Executive Managers that own equity in the company are not surprisingly more confident of their capacity to make strategic decisions than those that are employees.

Role of customers

In Table 25 it is interesting to note the high level of importance placed on the influence of customers to decision making in relation to innovation. This is consistent with other research.

An examination of how these items were responded to by different types of Executive Manager and firm was undertaken using chi-square tests. This analysis found the following:

- 48) No significant differences between executive manager types in relation to customer or supplier influence.
- 49) Significant differences between owner-managers and others over the influence of Boards of Directors - such executive managers generally did not have such boards.

Table 25: Strategic Decision Making in the Firm – Influence of Others external to Firm

	Mean	Std. Deviation
Other people external to my firm who I turn to for advice consider this innovation to be...		

[1=extremely harmful; 7=extremely beneficial]	5.82	0.993
Other people external to my firm consider this innovation to be... [1=extremely risky; 7=extremely rewarding]	5.22	1.595
Other people external to my firm consider this innovation to be... [1=extremely difficult; 7=extremely easy]	4.11	1.343
Generally speaking, how much notice do you take of the views of other people to whom you my turn to for advice? [1=not at all; 7=very much]	5.53	1.136

Table 26: Influence of Key Stakeholders on Strategic Decision Making

Relative influence on decisions...	Weak	Strong	Not Apply
Customers, particularly leading	3.5%	91.2%	5.3%

customers			
Suppliers, particularly key suppliers	43.9%	38.6%	17.5%
Directors of your management board	7.1%	73.2%	19.6%
Equity partners/shareholders in the firm	5.3%	64.9%	29.9%
Other senior management staff within the firm	8.8%	68.4%	22.9%
General rank and file staff in the firm	46.4%	33.9%	19.6%
Family members (e.g. partners, close relatives)	35.1%	40.4%	24.6%
Friends and social contacts	51.8%	16.1%	32.1%
Other business people with whom you have contact	41.1%	50.0%	8.9%
Accountants	47.4%	22.8%	29.8%
Lawyers or legal advisors	47.4%	22.8%	29.8%
Bankers or providers of debt financing	36.8%	38.6%	24.6%
Providers of venture capital financing	24.6%	33.3%	42.1%

* Chi-square test found significant differences (at 0.05 level) between prior to and after innovation

50) Significant differences between owner-managers and others over the influence of Equity Partners/Shareholders - such executive managers generally did not have such equity partners.

51) No significant differences between executive manager types in relation to the influence of senior managerial staff.

- 52) Significant differences between owner-managers and others over the influence of general rank and file staff - such executive managers either placed greater importance on the influence of such people, or considered such employees as not applicable to their decision-making.
- 53) Owner-managers and Executive manager/Principal shareholders were more likely than their counterparts to place importance on the influence of family, while Executive manager/Shareholders rated family influence of least importance.
- 54) No significant differences between executive manager types in relation to the influence of friends and social contacts or other business people, accountants or lawyers or providers of venture capital.
- 55) Owner-managers and Executive manager/Non-shareholders were more likely than their counterparts to rate the importance of bankers as strong.

|SECTION 8.

Exploratory Factor Analysis of Key Measures

The findings from the survey were subjected to a series of principal component (factor analyses) designed to both reduce the total number of variables for use in subsequent analysis, and to examine the presence of any underlying variables within the data. Items were selected for this analysis on the basis of having met measures of sampling adequacy (e.g. Kaiser-Meyer-Olkin and Bartlett's test of sphericity).

The Kaiser-Myer-Oklin (KMO) measure of sampling adequacy (Kaiser 1974), which is acknowledged as one of the best measures of determining the suitability of a set of data for subsequent factor analysis (Stewart 1981), was used to examine the data in order to determine whether a factor analysis should be undertaken. Small measures of sampling adequacy (MSA) suggest that a factor analysis should not be undertaken. According to Kaiser (1974) MSA's above 0.90 are 'marvellous', those above 0.80 'meritorious', above 0.70 'middling', in the 0.60's 'mediocre', and 0.50's 'miserable'. Any result below 0.50 is unacceptable.

A principal components factor analysis procedure with Varimax rotation was used in all cases to provide the "simple structure" needed for interpretation. In keeping with the usual principal components approach, only factors with eigenvalues greater than one were returned (Hair, Anderson, Tatham and Black 1992).

Potential Benefits of the Innovation to Customers

Six items measuring the respondent's perceptions of the potential benefits of the innovation to customers were selected for examination. These items measured the anticipated value, cost, ease of adoption, ease of testing prior to and after adoption and its compatibility with existing technologies. Such items have been viewed as important in the diffusion of an innovation (Rogers 1962; Davis, Bagozzi and Warshaw 1989).

Factor Analysis #1

The measures of sampling adequacy (MSA) were all found to indicate suitability for future analysis (KMO = 0.562; Bartlett's $p = <0.000$). Three factors (components) were produced with eigenvalues greater than 1, which explained 73 percent of the variation in data. A varimax rotation was employed to create a simple structure for subsequent analysis, and items with less

than 0.4 factor loadings were excluded to further facilitate analysis. The final factor model converged through the varimax rotation after 4 iterations.

Trial-ability

Three items loaded onto the first factor with factor scores ranging from 0.828 to 0.692. This factor comprised items relating to the customer's ease of understanding of the innovation and their ability to undertake testing and evaluation of the innovation prior to and after adoption. This factor was therefore labelled "**Trial-ability**" in keeping with the original framework offered by Rogers (1962). Scale reliability testing found that these three items had a strong alpha score (0.74) suggesting good reliability. Table 27 shows these findings.

Table 27: Rotated Component Matrix of the Factor Analysis #1

	Component		
	1	2	3
Factor 1: Trial-ability			
Q26 customer post test evaluation	.828		
Q24 customer ease of understanding	.822		
Q25 customer prior test evaluation	.692		
Factor 2: Relative Advantage			
Q23 price offer to customer		.756	
Q22 value offer to customer		.731	
Factor 2: Compatibility			
Q27 customer compatibility of technology			.966
Eigenvalues	2.13	1.23	1.00
Percent of variance explained	35.5	20.5	16.7
Cumulative percentage	35.5	56.1	72.8
Cronbach alpha reliability coefficients	0.74	0.35	-

Relative Advantage

Two items loaded onto the second factor with factor scores of 0.756 and 0.731. These two items related to the price or cost of the innovation to customers, and value such an innovation would deliver to the customer. It was labelled "**Relative Advantage**". As shown in Table 27, the scale reliability of

these two items was not strong.

Compatibility

The final item loaded onto the third component with a factor loading score of 0.966. This item was a measure of the compatibility of the innovation with the customer's existing technologies. This was therefore labelled "**Compatibility**".

Potential Costs of the Innovation to Customers

Seven items measuring the respondent's perceptions of the potential costs of the innovation to customers were selected for examination. These items measured the anticipated risk, transfer costs, time saved, complexity, opportunities created by the innovation, ease of understanding and easy of measurement.

Factor Analysis #2

The measures of sampling adequacy (MSA) were all found to indicate suitability for future analysis (KMO = 0.64; Barlett's $p = <0.000$). Three factors (components) were produced with eigenvalues greater than 1, which explained 71 percent of the variation in data. A varimax rotation was employed to create a simple structure for subsequent analysis, and items with less than 0.4 factor loadings were excluded to further facilitate analysis. The final factor model converged through the varimax rotation after 4 iterations.

Complexity

Three items loaded onto the first factor with factor scores ranging from 0.851 to 0.680. This factor comprised items relating to the customer's views of the complexity of adopting the innovation, their ease of understanding it and ease of measuring its results. This factor was therefore labelled "**Complexity**" in keeping with the original framework offered by Rogers (1962). Scale reliability measurement found that Q36 had to be removed to enhance the alpha score.

Table 28: Rotated Component Matrix of the Factor Analysis #2

	Component		
	1	2	3
Factor 1: Complexity			
Q33 customer views of complexity	.851		
Q35 customer ease of understanding	.828		
Q36 customer ease of measuring results*	.680		

Factor 2: Opportunities			
Q32 customer view of time saving		.877	
Q34 customer view of opportunities		.863	
Factor 4: Risk & Cost			
Q30 customer views of risk		.881	
Q31 customer views of transfer costs		.799	
<hr/>			
Eigenvalues	2.43	1.56	1.01
Percent of variance explained	34.7	22.3	14.4
Cumulative percentage	34.7	57.0	71.4
Cronbach alpha reliability coefficients	0.82	0.68	0.63

*Q36 not included in final factor.

Opportunities

Two items loaded onto the second factor with factor scores ranging from 0.877 to 0.863. This factor comprised items relating to the customer's views of the timesavings and opportunities that this new innovation would yield. This factor was therefore labelled "**Opportunity**". Scale reliability measurement found that the alpha score was 0.68.

Risk & Cost

The final two items loaded onto the third factor with factor scores ranging from 0.881 to 0.799. This factor comprised items relating to the customer's views of the risk and transfer costs associated with the innovation. This factor was therefore labelled "**Risk & Cost**". Scale reliability measurement found that the alpha score was 0.63.

Bargaining Power of Customers and Suppliers

Six items measuring the respondent's perceptions of the potential power of customers and suppliers to influence the quality and cost control within the industry were examined in a third factor analysis.

Factor Analysis #3

The measures of sampling adequacy (MSA) were all found to indicate suitability for future analysis (KMO = 0.50; Barlett's $p = <0.000$). Three factors (components) were produced with eigenvalues greater than 1, which explained 82 percent of the variation in data. A varimax rotation was employed to create a

simple structure for subsequent analysis, and items with less than 0.4 factor loadings were excluded to further facilitate analysis. The final factor model converged through the varimax rotation after 5 iterations.

Table 29: Rotated Component Matrix of the Factor Analysis #3

	Component		
	1	2	3
Factor 1: Customer Power			
Q40 customer power over quality	.929		
Q41 customer power over cost control	.901		
Factor 2: Firm Power			
Q43 firm power over cost control		.921	
Q42 firm power over quality		.913	
Factor 3: Supplier Power			
Q39 supplier power over cost control			.897
Q38 supplier power over quality			.768
Eigenvalues	2.20	1.73	1.01
Percent of variance explained	36.7	28.8	16.8
Cumulative percentage	36.7	65.5	82.3
Cronbach alpha reliability coefficients	0.85	0.82	0.62

Customer Power

Two items loaded onto the first factor with factor scores ranging from 0.929 to 0.901. This factor comprised items relating to the customer's power to influence quality and cost control in their industry. This factor was therefore labelled "**Customer Power**". Scale reliability measurement found that the alpha score was 0.85.

Firm's Power

Two items loaded onto the second factor with factor scores ranging from 0.921 to 0.913. This factor comprised items relating to the firm's power to influence quality and cost control in their industry. This factor was therefore labelled "**Firm's Power**". Scale reliability measurement found that the

alpha score was 0.82.

Supplier Power

Two items loaded onto the second factor with factor scores ranging from 0.897 to 0.768. This factor comprised items relating to supplier's power to influence quality and cost control in their industry. This factor was therefore labelled "**Supplier's Power**". Scale reliability measurement found that the alpha score was 0.62.

Nature of Strategic Decision Making in Firm

Thirteen items measuring the respondent's perceptions of the nature of strategic decision-making within their firm were selected for examination. These items measured the respondent's perception of their power to make decisions, how they felt other's within and outside the firm saw the innovation, and how much attention they gave to such views.

Factor Analysis #4

The measures of sampling adequacy (MSA) were all found to indicate suitability for future analysis (KMO = 0.727; Barlett's $p = <0.000$). Three factors (components) were produced with eigenvalues greater than 1, which explained 66 percent of the variation in data. A varimax rotation was employed to create a simple structure for subsequent analysis, and items with less than 0.4 factor loadings were excluded to further facilitate analysis. The final factor model converged through the varimax rotation after 6 iterations.

Table 30: Rotated Component Matrix of the Factor Analysis #4

	Component			
	1	2	3	4
Factor 1: External Views				
Q89b External view of reward (Nb)	.798			
Q89a External view of benefit (Nb)	.783			
Q90 Notice taken of external views (mc)	.699			
Q84 Benefit of innovation on industry (e)*	.452			
Factor 2: Internal Views				
Q87a Internal view of benefit (Nb)		.820		
Q88 Notice taken of internal views (mc)*		.741		

Q87b Internal view of rewards (Nb)		.667			
Q85 Reward of innovation to firm (e)		.556			
Factor 3: Ease of Implementation					
Q86 Difficulty of implementation (e)		.854			
Q87c internal view of difficulty (Nb)		.809			
Q89c External view of difficulty (Nb)		.676			
Factor 4: Personal Power					
Q82 Personal Power to Act				.897	
Q83 Likely to proceed with Innovation (BI)				.522	
<hr/>					
Eigenvalues	4.43	1.98	1.16	1.04	
Percent of variance explained	34.1	15.2	8.9	8.0	
Cumulative percentage	34.1	49.3	58.2	66.2	
Cronbach alpha reliability coefficients	0.73	0.82	0.73	0.36	

*Q84 & Q88 excluded from factor due to alpha score

External Views

Four items loaded onto the first factor with factor scores ranging from 0.798 to 0.452. This factor comprised items relating to the respondent's perception of the views of others external to the firm (e.g. customers, suppliers) in relation to the rewards and benefits associated with the innovation, as well as the respondent's propensity to take notice of such views. A third item examined the respondent's own assessment of the benefits of the innovation to the industry (e.g. external parties). This factor was labelled "**External Views**". Scale reliability testing found that three of the four items had a strong alpha score (0.74) suggesting good reliability. The fourth item (Q84) was retained as a separate item. Table 30 shows these findings.

Internal Views

Four items loaded onto the second factor with factor scores ranging from 0.820 to 0.556. This factor comprised items relating to the respondent's perception of the views of others internal to the firm (e.g. board of directors, senior managers) in relation to the rewards and benefits associated with the innovation, as well as the respondent's propensity to take notice of such views. A third item examined the respondent's own assessment of the benefits of the innovation to the firm. This factor was labelled "**Internal Views**". Scale reliability testing found that three of the four items had a strong alpha score (0.82) suggesting good reliability. The second item (Q88)

was retained as a separate item. Table 30 shows these findings.

Ease of Implementation

Three items loaded onto the third factor with factor scores ranging from 0.854 to 0.679. This factor comprised items relating to the respondent's perception of the views of others both internal and external to the firm in relation to the ease of implementing the innovation, as well as the respondent's own evaluation of this. This factor was labelled "**Ease of Implementation**". Scale reliability testing found that three of the four items had a strong alpha score (0.73) suggesting good reliability.

Personal Power

Two items loaded onto the fourth factor with factor scores ranging from 0.897 to 0.522. This factor comprised items relating to the respondent's perception of the amount of personal power they had over the implementation of the innovation and their view as to the likelihood of the innovation proceeding. This factor was labelled "**Personal Power**". Scale reliability testing found that the two items had a weak alpha score (0.36) suggesting poor reliability. It was decided not to link them together into a new variable.

SECTION 9.

Exploratory Regression Analysis

The findings from the survey were also examined via a series of linear regression models designed to explore the relationships between variables.

Independent Variables

Independent variables selected for this analysis included those shown in Table 31.

Table 31: Independent Variables used in regression models

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

Predictors of RENT

The first regression model selected as the dependent variable the item RENT (see Section 4). Of interest was the influence of

the variables measuring the firm's assessment of the strategic market environment on the anticipated RENT return from the proposed innovation.

Regression Analysis #1

The analysis used a stepwise methodology that produced a model after three steps as shown in Table 32. It can be seen that this model had an adjusted R-square of 0.432 suggesting that the model explains around 43 percent of the variation in the data. This model suggests that the predictors of RENT were:

- 56) The level of value likely to be offered to those who adopt the innovation.
- 57) The relative importance of potential sales turnover to lead customers.
- 58) The compatibility of the innovation to the existing technologies operated by customers.

Table 32: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.685	.469	.432	.57296

Predictors: (Constant), Q22 value offer to customer, Q51 importance of sales turnover to customers, Q27 customer compatibility of technology

Dependent Variable: RENT

Coefficients

Model		B	Std. Error	Beta	t	Sig.
3	(Constant)	1.091	.555		1.964	.056
	Q22 value offer to customer	.341	.079	.487	4.345	.000
	Q51 importance of sales turnover to customers	.184	.058	.358	3.201	.003
	Q27 customer compatibility of technology	-.160	.054	-.329	-2.946	.005

Dependent Variable: RENT

Discussion of the Findings

The regression model outlined above suggests that the respondent's assessment of the RENT returns from their

innovation may be influenced more by their anticipation of the value it is likely to deliver to the customer, the customer's expected use of the innovation to generate new sales, and the ease of integrating the new innovation into the customer's existing technologies. Such findings are consistent with those of Rogers (1962) who highlighted the importance of the relative advantage of the innovation to the customer or adopter, and the compatibility of the innovation to existing processes.

As noted in Section 7, the most important influence on the decision making of these firms appears to be the customer. Small firms are likely to focus on their leading customers as a priority due to their ability to provide immediate sales revenues for the innovation. Sundbo (2001) has also shown the importance of close interactions between the firm and its lead customers as a means of enhancing innovation.

While still tentative, these findings indicate that the small innovator firm is likely to gauge the merits of their proposed innovation largely in terms of how it will be received by their leading customers. This is not surprising and supports other findings of the way in which small; high technology firms interact within their industry (Mazzarol 2003).

Research into the innovativeness of small firms has placed emphasis on the role of the entrepreneur, the market and the firm itself (de Jong and Brouwer 1999). Such firms will need to have internal cultures in which there is a close relationship between the entrepreneurial leadership and the employees, in which quality and the willingness to strive for continuous improvement are manifest (Mazzarol 2002).

The role of the customer as a driver of innovation within small firms might be explained in terms of the prospecting behaviour of the entrepreneur (Kickul and Gundry 2002). The findings from this present study support this and point to the need for the small innovator firm to have entrepreneurial management that is closely in touch with leading customers and able to adapt its innovations to suit their needs and deliver value in terms of new sales growth, but without having to make significant changes to their existing technology base.

The most important of the predictors to the determination of RENT appears to be the potential value the innovation offers to the customer, as reflected in the beta for this item. Interesting the beta for the item relating to the compatibility of the innovation with the customer's existing technologies was negative. This may reflect the lower rental from an innovation that is more incremental than radical within the industry.

Importance of Complimentary Actors to the Innovation

In determining the capacity of a small innovator firm to effectively diffuse its innovation within a selected market, the role of complimentary actors (e.g. firms able to assist or facilitate the innovation) needs to be examined (Brandenburger and Nalebuff 1995). The second regression model therefore selected as the dependent variable the item Q60 "The relative importance of complimentary actors to my proposed innovation".

Regression Analysis #2

The second regression analysis used a stepwise methodology that produced a model after five steps as shown in Table 33. It can be seen that this model had an adjusted R-square of 0.420 suggesting that the model explains around 42 percent of the variation in the data. This model suggests that the predictors of the importance of complimentary actors to the innovation were:

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

Discussion of the Findings

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

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

Birley 1994).

Table 33: Model Summary

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

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

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

Coefficients

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

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

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

The findings from this second regression analysis suggest that the small innovator firms in the sample are considering such a process. Where customer's perception of risk is high and their understanding of the innovation is low collaboration is likely.

However, the small innovator firm must also be confident that

they have an innovation that can offer customers good opportunities and one that will integrate readily into their existing technology base. Finally, the small innovator firm should feel that it could control the quality of the product or innovation within the industry. This last point is likely to be important, because this is likely to provide the small innovator firm with a degree of control over the end result. Should they feel that they couldn't control the quality, they are likely to be vulnerable when engaging complimentary actors who might adversely influence the final outcome. The beta score of Q24 "firm power over quality" is not surprisingly the largest within the model.

Strategic Decision Making within the Firm

As noted in Section 7, the influence of various internal and external stakeholders on the strategic decision making of the senior management within the small innovator firms was examined. This phase of the study was guided by the theory of reasoned action (Ajzen and Fishbein 1980).

Figure 4 illustrates the Theory of Reasoned Action (TRA) in which the best predictor of an individual's future action or behaviour is their stated Behavioural Intention (BI). This is itself mediated through the combination of their attitudes (Aact) toward the behaviour, and the influence of third parties as measured by subjective norm (SN). Of these, the attitude (Aact) toward the behaviour is a product of the individual's beliefs (b) about the merits of the behaviour and their evaluation (e) of this behaviour as an appropriate course of action. The subjective norm (SN) is determined by the normative beliefs (Nb) that the individual has in relation to the expectations or opinions of others in relation to the intended behaviour, and their motivation to comply (mc) with such social pressure or expectation (Ajzen and Fishbein 1980).

The study examined several variables that address elements of the TRA model, although it did not seek to measure a complete model. The key items that comprise elements of the TRA framework are outlined in Table 34. These comprised the independent variables for use in the final regression model. Some were combined into factor variables following the findings from the factor analysis undertaken in Section 8.

The dependent variable selected was Q83 "How likely are you to proceed with Innovation?" a measure of behavioural intention (BI).

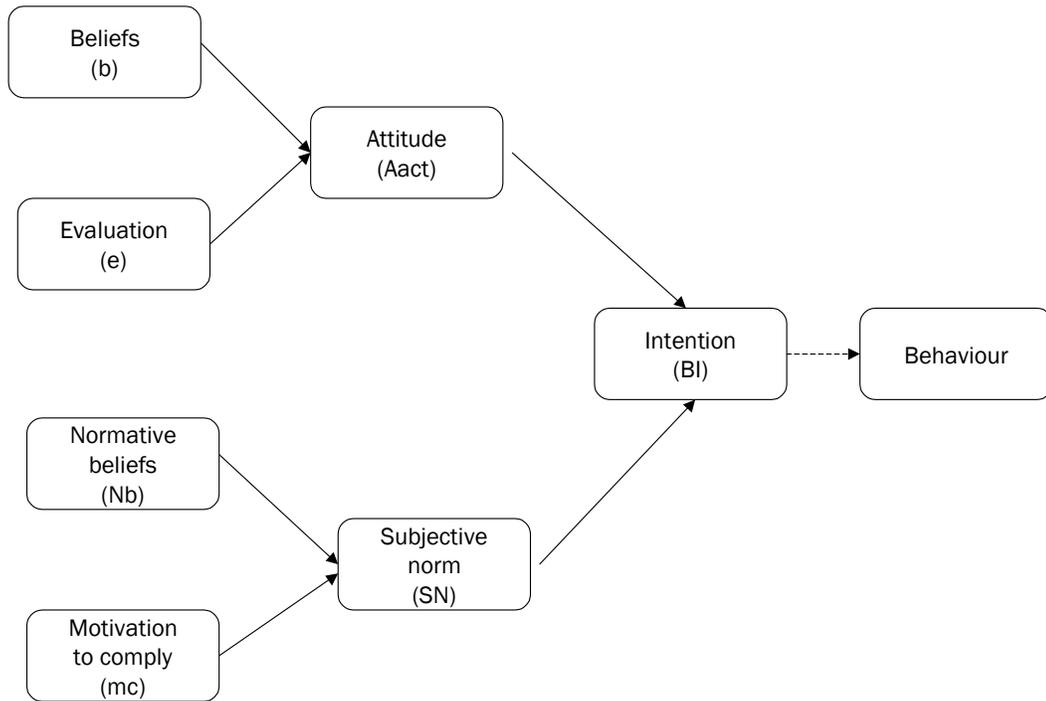


Figure 4: Theory of Reasoned Action (Ajzen & Fishbein, 1980)

Table 34: Independent Variables used in 3rd Regression Analysis

<i>External Views (Factor)</i>	<i>Internal Views (Factor)</i>
<ul style="list-style-type: none"> • Q89b External view of reward (Nb) • Q89a External view of benefit (Nb) • Q90 Notice taken of external views (mc) 	<ul style="list-style-type: none"> • Q87a Internal view of benefit (Nb) • Q87b Internal view of rewards (Nb) • Q85 Reward of innovation to firm (e)
<i>Ease of Implementation (Factor)</i> <ul style="list-style-type: none"> • Q86 Ease of implementation (e) • Q87c internal view of difficulty (Nb) • Q89c External view of difficulty (Nb) 	Q84 Benefit of innovation on industry (e) Q88 Notice taken of internal views (mc) Q82 Personal Power to Act

Regression Analysis #3

The third regression analysis used a stepwise methodology that produced a model after two steps as shown in Table 35. It can be seen that this model had an adjusted R-square of 0.278 suggesting that the model's predictive power was not strong. However, the model suggests that the predictors of the influence of various internal and external factors on strategic decision-making with respect to the innovation were:

- 64) The influence of the views of persons external to the firm in relation to the rewards and benefits of the innovation and the respondent's propensity to take notice of such views.
- 65) The respondent's own personal power to determine whether or not the innovation proceeds.
- 66) The influence of the views of persons internal to the firm in relation to the rewards and benefits of the innovation and the respondent's view of how rewarding the innovation will be to their firm.

Table 35: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.564	.318	.278	.798

Predictors: (Constant), External Views, Q82 Personal Power to Act, Internal Views

Dependent Variable: Q83 Likely to proceed with Innovation (BI)

Coefficients

Model		B	Std. Error	Beta	t	Sig.
3	(Constant)	2.654	.760		3.490	.001
	External Views	.245	.134	.250	1.831	.073
	Q82 Personal Power to Act	.161	.067	.277	2.391	.020
	Internal Views	.240	.120	.272	2.008	.050

Dependent Variable: Q83 Likely to proceed with Innovation (BI)

Discussion of the Findings

The regression model outlined above suggests that the principal predictors of whether or not an innovation proceeds are the power the entrepreneurial manager has to go ahead with the innovation, and their evaluation of the views of others both within and without the firm.

However, the beta scores suggest that the personal power to act may be the strongest of these predictors, followed by the views of persons internal to the firm. Further, as shown in the factor analysis undertaken in Section 8 (see Table 30) the construct *Internal Views* comprised views of those within the firm in relation to the benefits and rewards of the innovation, and the respondent's own assessment of the innovation's reward to the firm.

By contrast the construct *External Views* comprised the views of those external to the firm in relation to the rewards and benefits of the innovation, and the propensity of the respondent (the entrepreneurial leader of the firm), to take notice of such views.

This model - despite its relatively weak predictive power - suggests that strategic decision making within the small innovator firm is contingent on the level of power of the entrepreneurial leader (e.g. owner-manager or principal entrepreneur) to make the final decision as to whether the new innovation goes ahead. While this is hardly surprising, the model also indicates that their decision may be mediated by the influences of internal and external views. Such views (as shown in Table 26) are likely to be primarily:

- 67) **External** - customers (91%) and other business people (50%)
- 68) **Internal** - directors of the company board (73%), other senior managers within the firm (68%) and equity partners and shareholders in the firm (65%).

The entrepreneurial manager of the small innovator firm is likely to weight these internal and external views against their own evaluation of the merits of the innovation.

Conclusions from the Regression Analysis

These regression models are exploratory in nature and do not seek to provide definitive findings. Further research is required with a larger sample and some adjustment to the questionnaire before any strong conclusions can be shown.

Tentatively this analysis highlights the importance of the leading customer for small innovator firms in relation to RENT returns particularly the ability of the innovation to offer value to customers, and customers who place high value on sales turnover. However, enhanced RENT may accrue where the innovation is more radical than incremental in nature.

In seeking to bring the innovation to market the findings suggest that the small innovator firm is likely to seek collaboration with complimentary actors where the innovation

offers opportunities to the customer and can integrate with the customer's existing technologies, but where customer considers the risk associated with the innovation to be high and the customer has some difficulty understanding the innovation. Under these conditions, but where the small innovator firm feels that it can control the quality of the outcome, collaboration more likely.

Finally, the small innovator firm's decision to proceed with the innovation is likely to be determined by the level of power of the entrepreneurial manager leading the firm. Their decision will be mediated to a degree by the views of persons external and internal to the firm including the customer, other business owners and the firm's Board of Directors or senior managers.

These findings support those of de Jong and Brouwer (1999) who suggest that the determinants of innovation in small firms are the characteristics of the entrepreneur, the innovation infrastructure that exists within the firm (e.g. culture, systems, resource), and the market's acceptance or demand for innovation. Within these findings the importance of the top entrepreneurial manager is highlighted, as is their focus on the needs of the leading customer and the ease with which they can get such a customer to adopt the innovation.

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Figure 1: Title
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Table 1: Title

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Metro BEC	52%	10%	42%
Regional BEC	48%	90%	58%

Total dollars	\$395,145	\$125,990	\$521,135
Average:			
Metro BEC	\$22,822	\$1,389	\$24,211
Regional BEC	\$6,598	\$6,460	\$13,058

Source: BECWA-SBDC, 2002

Table 2: Government Start Up Support Programs

Department/Agency	Program(s)	Form of Assistance
SBDC (WA)	Small Business Workshops Small Business Mentor Scheme On-line advisor	Training workshops Mentor support Assistance and guidance
Department of Employment and Workplace Relations (Federal)	The New Enterprise Incentives Scheme Indigenous Small Business Fund	Training, business advice and mentoring Funding for business plans, financing and support services

Recommendation – Implement a Strategic Planning Framework:

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- 1) text
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Terms of Reference

Terms of Reference

^[2] Sponsor Agreement, The Business Enterprise Centre Network Scheme 2001-2002.

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