

UNIVERSITY OF SOUTHERN QUEENSLAND

A QUALITATIVE STUDY INTO THE INNOVATION  
AND TECHNOLOGY TRANSFER PROCESS OF A  
MICRO-MANUFACTURER WITHIN A UNIVERSITY-  
INDUSTRY COLLABORATION CONTEXT IN  
REGIONAL SOUTH-EAST QUEENSLAND

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## **Abstract**

Small-Medium-Enterprises (SMEs) play a critical part and are an important contribution to the economy in Australia, and the imperative to innovate has been greater than ever in a globalized economic setting. This research explored a number of questions surrounding SMEs, their innovation practices and the policy that influence them. This research builds on prior studies and addressed a significant gap within the literature in a descriptive and explanatory way.

The statistics captured on innovation often provide a mixed view on the greater benefits in the form of increased productivity and higher value for the goods and services we produce. Though the value of statistical information and analysis is beneficial, it does not provide an in-depth view of the effects and benefits on small businesses, their owner(s) and the resultant innovation outcomes. The question may be posed, “what actually happens and how does it (innovation) actually work in reality?”

Each agent in the innovation process brings its own capabilities and strengths to this process. Broadly speaking, business brings the commercial and technological know-how, capital and access to distribution and markets, educational institutions the intellectual capital and linkages (a key driver for this research), while the key inputs from government are policy leadership, strategic focus, and overarching vision that enable these other agents and their capabilities to be ‘joined together’ into a coherent whole. In principle, these resultant interactions between these variables (business, education institutions, government) mentioned above must have delivered some contribution towards effective innovative solutions and practices in SMEs.

This research reviewed and identified, through a case study approach with a series of in-depth qualitative data collection, analyses and discussions, barriers to innovation in micro-regional SME in Australia, and outlines recommendations for how these can be overcome. In essence, the research aims to provide a deeper insight into what actually happens and why it happens; factors affecting innovation and technology transfer (I&TT) in regional micro-manufacturers, and describes an intervening investigation into the I&TT process in the SME sector

within a University-Industry collaboration context. It is evidenced that this research field is well contributed by the large number of published research articles. However, the literature suffers from a lack of understanding of the meaning and reasons for the drivers for innovation. Hence, the principle purpose for this research to be undertaken.

Four research questions were developed and these are presented in the form of propositions:

- Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy (ie. systematically grasping opportunities in the midst of change while minimising failures)?
- Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs (such as research, education and business support)?
- Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?
- Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?

In doing so, it explores and reflects on the innovation and technology transfer experience within a micro-manufacturer, obtained through embedment of one of the authors in an SME firm. The research initially focused on the manufacturing factors such as increasing productivity through work study and work-flow analysis, and introducing semi-automation and flexible manufacturing methodology. As the project progressed, however, several non-manufacturing factors were identified as major influences in the I&TT process within the targeted micro-manufacturer. The ability for firms to progress in improving the manufacturing factors is often dependent on these factors, which are categorized as very personal and business related (rather than technical related).

The underlying project on which the work described is based involved a SWOT analysis on the business, learning and discovering the obstacles and barriers for

I&TT, seeking and proposing ways to reduce it, and modeling the overall I&TT process within micro-manufacturers in regional areas, and termed **Regional Knowledge Diffusion (RKD)** model. This model developed through this research can be used as a conceptual framework for developing future policies for encouraging innovation and technology transfer within a university-industry context within the Small-Medium-Enterprise sector.

Future research should aim at extending this qualitative research to a more diverse group of SMEs and importantly gaining a better understanding of the value systems, across a range of industries in a range of geographical locations in Australia and elsewhere, in order to evaluate the extent of and commitment of this sector to innovation at a wider level, and to better understand how this industry sector might benefit from closer links with universities and researchers.

## Certification of Dissertation

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

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Signature of Steven Chingnam Goh

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Date

### ENDORSEMENT

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Signature of Dr David Thorpe

(Supervisor)

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Date

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Signature of Mr Bob Fulcher

(Associate Supervisor)

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Date

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“Honey, it is done!”

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# CHAPTER 1 INTRODUCTION

## 1.1 Overview

As world leaders navigate through the aftermath of the Global Financial Crisis (GFC), the underlying drivers for the future growth and prosperity of Australia will depend on our ability to find new ways to innovate. Australia's aging population, growing inflationary pressure, skills shortages, and the emergence of strong global competition mean that innovation is becoming increasingly important as a source of economic growth and sustainability, and as a determinate of international competitiveness. We also face great challenges such as climate change and the persistence of social inequality (Raskin et al. 2002).

Through innovation, Australia as a nation can and has in some way made a contribution to addressing these challenges. In a global and domestic economy where services and knowledge-based production is becoming increasingly important, the use, development and application of knowledge is now as important to economic growth as efficiencies in production. Since there are absolute limits to lifting productivity growth through increased labour-force participation and work intensification, Australia must find new ways to sustain high levels of economic growth. Whilst efficiencies in production became the primary determinate of economic prosperity in the 20<sup>th</sup> century, innovation in turn is becoming the main catalyst for economic growth in the 21<sup>st</sup> century. Indeed, with improvements to productivity, from the last two decades of microeconomic reform, beginning to fade, innovation will be critical to keeping productivity growth on par with accelerating inflation in the future.

This trend is being further amplified by the changing nature of global competition. Increasing competition, particularly from low-cost emerging economies, and the steadily increasing rate of technological change means that competing through efficiencies delivered by structural reform is no longer enough for developed economies such as Australia. In short, the changing nature of our economic circumstances is pushing to the fore the importance of innovation for future economic prosperity in Australia. That is why governments, together with the private sector, have made innovation a national economic priority (Cutler 2009). Even though a stream of government policies have been released and implemented to realize the innovation potential of Australia, there little evidence that it is of any benefits to the Small-to-Medium Enterprise (SME) sector, and of particular interest in this study, micro-manufacturers in regional settings.

The statistics captured on innovation often provide a mixed view on the greater benefits in the form of increased productivity and higher value for the goods and services we produce. Though the value of statistical information and analysis is beneficial, it does not provide an in-depth view of the effects and benefits on small businesses, their owner(s) and the resultant innovation outcomes. Specifically, most research undertaken in evaluating the outcomes of innovation policy often do no more than broad and in some cases, industry specific statistical analyses, surveys and short interviews. The question may be posed, “what actually happens and how does it (innovation) actually work in reality?”

Each agent in the innovation process brings its own capabilities and strengths to this process. Broadly speaking, business brings the commercial and technological know-how, capital and access to distribution and markets, educational institutions the intellectual capital and linkages (a key driver for this research), while the key inputs from government are policy leadership, strategic focus, and overarching vision that enable these other agents and their capabilities to be ‘joined together’ into a coherent whole.

In principle, these resultant interactions between these variables (business, education institutions, government) mentioned above must have delivered some contribution towards effective innovative solutions and practices in SMEs. This research endeavored to review and identify, through a case study approach with a series of in-depth qualitative data collection, analyses and discussions, barriers to innovation in micro-regional SME in Australia, and outlines recommendations for how these can be overcome.

This research is an exploration and reflection of the innovation experience of a regional micro-manufacturer through embedment of the researcher in a specific micro-manufacturing firm as a case-officer from a regional university, in an analogue to an anthropological type (ethnographic) study. The case study involved learning and discovering the obstacles and barriers for innovation, seeking and proposing ways to reduce them, and improving the overall innovation process within micro-manufacturers in regional areas.

During the experience, the researcher embedded within the firm provided advice and analysis, and at times, physical labor on the process transformation for the micro-manufacturing firm via process improvements, semi-automation, and systemization of the business operation, and in the process initiated preliminary study into the innovation process in regional micro-manufacturing sector. The intention in this chapter is to focus on the innovation experiences to gain an understanding of the influencing factors that affect it.

The approach to the overall case study is separated into three different components:

- Study of the business & working owner
- Study of the manufacturing processes
- Study of the innovation processes

The background of the firm is restricted by the ethic clearance and research participants' conditions to remain anonymous. The firm was founded and owned by an individual based at the regional township located within a 50km radius from Toowoomba in Queensland, Australia. The operation started off as a commercial flower growing business focusing on organic and medicinal herbs. However it revolved, now it specializes in and manufactures a range of high-quality organic/pure "chemical-free" soap, shampoo and skin care products. The business has been in operation for about 15 years. Along with a good domestic distribution, it also exports to New Zealand, the United Kingdom and Asia. The products that it manufactures are varied and include:

- Soap-based products (over 200)
- Hair care products
- Skin care products
- Natural "Bush" products
- Medicinal based products
- Miscellaneous products (e.g. Hemp).

The research initially focused on the manufacturing factors such as increasing productivity through work study and work-flow analysis, and introducing semi-automation and flexible manufacturing methodology. As the project progressed, however, several non-manufacturing factors were identified as major influences in the innovation process within the targeted micro-manufacturer. The ability for firms to progress in improving the manufacturing factors is often dependent on these factors, which are categorized as personal and business related. The underlying project on which the work described is based on involved: (1) a SWOT (strengths-weaknesses-opportunities-threats) analysis on the business, (2) learning and discovering the obstacles and barriers for innovation, (3) seeking and proposing ways to reduce it, (4) and modeling the overall innovation and technology transfer (I&TT) process within micro-manufacturers in regional areas, and termed regional knowledge diffusion (RKD) model.

## **1.2 Innovation vs R&D in Australia**

It is also noted through this study for SME and many others that it is very difficult to value innovation in a business though you may attempt to forecast cash-flow returns from innovation then apply standard business-valuation techniques such as discounted cash-flow. But in reality, it's mostly impossible to analyse markets or productivity gains that don't yet exist.

Given this, it is problematic to equate business innovation with business R&D expenditure. R&D involves the creation of new knowledge which can be an important, but is not a necessary component in the innovation process. Moreover, R&D is associated only with the creation of a specific type of knowledge, while innovative activities can involve the creation and use of a broader range of knowledge. While R&D is an indicator of scientific knowledge creation it says little about how that knowledge is applied to create value and wealth.

R&D is undoubtedly an important innovative activity in business, but the above analysis calls into question the usefulness of business R&D expenditure as an indicator of total business innovation. This point is borne out in a number of studies that have found little correlation between business R&D expenditure and the level of reported innovation within firms (Business Council of Australia 2006b).

Australia does not have a large high-technology manufacturing sector and therefore is unlikely to achieve high overall levels of business R&D expenditure intensity. The fact that Australia's industry structure leads to internationally low levels of business R&D expenditure intensity does not suggest that Australian businesses are less innovative. This point has recently been confirmed by the Australian Bureau of Statistics (ABS) report *Innovation in Australian Business*, released in February 2005, which found the vast majority of business innovation spending in Australia was non-R&D expenditure (Business Council of Australia 2006b).

Innovation as the application of knowledge to create additional value and wealth can entail a wide variety of activities other than traditional R&D. These can include activities such as: undertaking market research and using market information to tailor products and services to create additional value for customers; purchasing and using capital goods and equipment in production processes; integrating or recombining existing forms of knowledge and technology to create new product and service offerings; as well as business R&D activities.

SME firms in Australia will tend to innovate in ways other than through traditional R&D. The wide variety of possible innovative activities undertaken by businesses emphasises the need to better understand the innovation process within Australian businesses.

### **1.3 Aims and Objectives**

The aim of this dissertation is to explore the barriers to innovation in micro-regional SMEs.

The research objectives are as follows:

1. *To review existing research and published ideas relating to innovation and technology transfer, and specifically in SME.* Chapter 2 explores existing literature in the research topic and seeks to provide relevant propositions.
2. *To review existing research approaches and methodologies relating to innovation and technology transfer, and specifically in SME.* Chapter 3 explores existing research methodologies and establishes a methodological framework for this research.
3. *To document the qualitative data and artifacts collected.* Chapter 4 documents the relevant qualitative data and artefacts collected in the research.
4. *To describe and analyze the qualitative data and artifacts collected.* Chapter 5 reports on the research journey and provides an analysis.
5. *To discuss the research findings in the barriers to innovation in SMEs.* Chapter 6 and 7 discusses the research findings and recommends a model for addressing the barriers to innovation in SMEs.

### **1.4 Research Approach & Style**

The research approach undertaken in this dissertation uses case study based qualitative research methods. The approach is somewhat analogical to action-based research where an anthropologist is researching and living within a community collecting artifacts (data) while experiencing and actively involve themselves in the community. This approach is unique and novel. Existing published literature has illustrated that conventional and adopted norm in using quantitative or mixed-methods approaches, such as questionnaires and interviews, are favoured by relevant engineering, business and economic development researchers. The research approach is further discussed in Chapter 3.

### **1.5 Ethical Clearance Approval**

The research has obtained ethical clearance approval **HO9REA036** as detailed in Appendix 4. Under the conditions of the consent for participants, there is a non-disclosure condition for



any traceable identification; including names, locations, photos, videos, and discussion notes. These are withheld and to be destroyed at the end of the research.

## **1.6 Significant Contribution and Publications**

This dissertation explores and reports on a number of contributions to field of research in innovation and SME:

- a comprehensive literature review covering macro-forces that drives innovation and SME;
- exploration of qualitative research methods in the research on innovation and SME;
- exploration of a unique and novel research journey via a university-industry collaboration context;
- identification of barriers to innovations in a regional micro-manufacturer;
- recommendations to address the barriers to innovation in a regional micro-manufacturer; and
- publication (during candidature) of a refereed international conference paper (Appendix 1), a refereed journal paper (Appendix 2), and a refereed book chapter (appendix 3);
  - **Goh, S. & Thorpe, D. (2008) *A Reflection in the Innovation and Technology Transfer Experience in a Regional Micro-Manufacturer: A Case Study*, 9th Global Congress on Manufacturing & Management, 12-14 Nov 2008, Gold Coast.**
  - **Goh, S. & Thorpe, D. (2008) *An Investigation into the Innovation and Technology Transfer Process in SME Sector within a University-Industry Collaboration Context*, Asian International Journal of Science and Technology, Vol. 1, No. 2, pp1-10, ISSN # 1906-151X.**
  - **Thorpe, D. & Goh, S. (2010) *Study of SME innovation in two Queensland industries*, in Al-hakim, L. & Jin, C. (eds) *Innovation in Business and Enterprise: Technologies and Frameworks*, Business Science Reference: IGI Global, Hershey PA, pp240-259. ISBN 1615206434; 9781615206438.**

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 Introduction to Innovation**

Innovation involves the commercial application of old or new knowledge to create additional value and wealth. Innovation involves using knowledge to find new ways to create and bring about change for the better (Business Council of Australia 2006b).

Firstly, innovation does not necessarily involve technology and technological knowledge. Successful innovation can involve the use of any type of knowledge, provided its application results in additional value and wealth. Secondly, innovation is not invention. Innovation may not even require the creation of new knowledge, be it to the world or to the firm. What it does require is the inspired application of knowledge, whether old or new, to create additional value (Business Council of Australia 2006b).

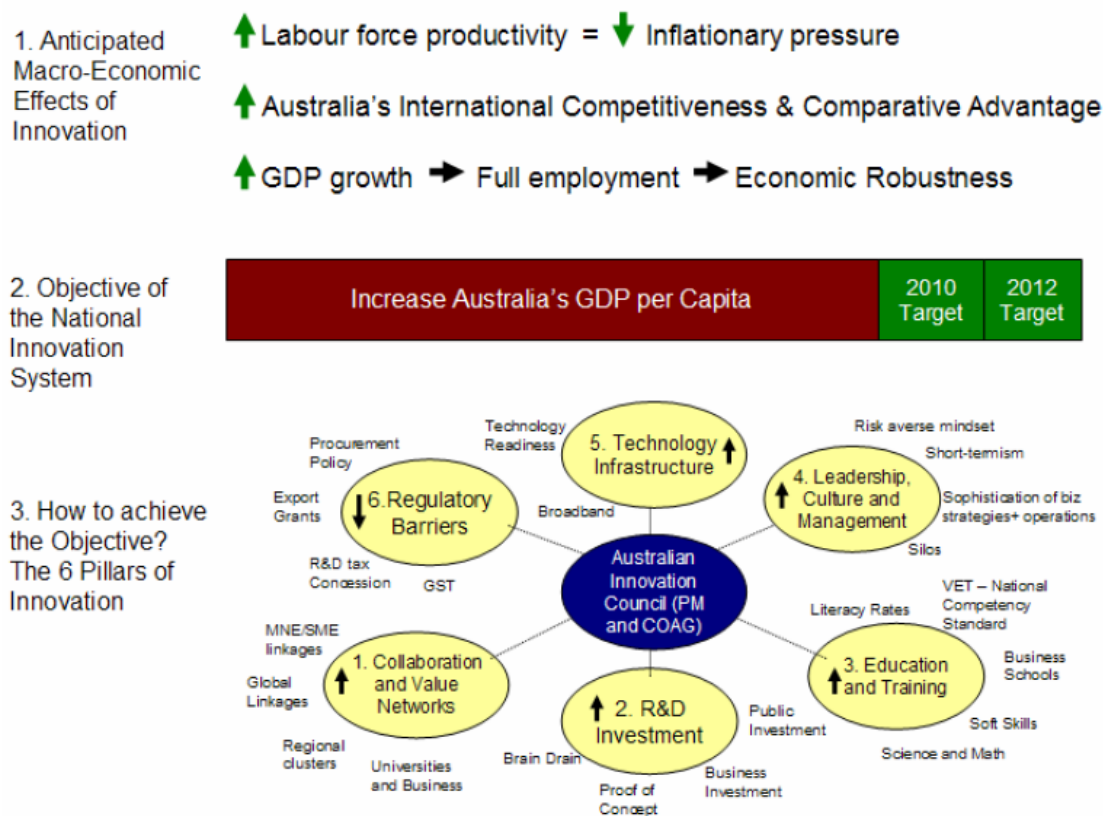
Innovation should be seen as a tool to increase productivity not simply by cost reduction, but raising the top line, customers' willingness to pay. By coming up with new answers to customers' needs, innovators attract customers who are happy to pay a premium. Ideally, the firm gains a position as the only supplier of a certain product type. That said, innovation certainly could threaten efficiency. Innovation cannot be an efficient process because it inherently involves experiments, many of which are necessarily unsuccessful. In a narrow sense of efficiency, that's wasteful! In a broader sense, it is part of learning and exploration; knowing that something won't work can be as valuable as knowing that something else will.

It would seem that what actually excites innovators is the intrinsic challenge of solving a problem, satisfaction from customers' satisfaction, and seeing their ideas become reality and appreciated by many. Very often, the elements that management theorists describe such as profit, competition, customer feedback, are merely little more than justification for an internal urge to innovate for its own sake.

#### **2.1.1 Australia's National Innovation System**

The recent Australian government's review of Australia's national innovation system signifies the importance of innovation in Australia (Cutler 2009). Certainly, Australia's national innovation system has pockets of excellence, such as the CSIRO and its National Flagships programs, the various Cooperative Research Centres (CRC), and sector-specific R&D institutions. However, one should note that there are significant gaps in the national innovation system and areas where Australia as a nation can do better to compete in the

global economy. Australian Bureau of Statistics (2005) reports that only 34% of Australian businesses are active in innovation. Internationally, Dodgson & Innes (2006) finds that Australian companies lag behind their international counterparts in terms of pursuing innovation as a business strategy. The study concludes that while there is evidence of manufacturers engaging in some innovative business practices, especially towards achieving production efficiencies and lowering cost bases, they generally fail to appreciate and employ innovation as a decisive competitive strategy. This indicates that more needs to be done to increase innovation activity in business and across government organisations, including universities as educational and research entities.



**Figure 1: The Australian National Innovation System (Cutler 2009)**

Figure 1 provides a graphic illustration of Australia's national innovation system towards 2012. It shows that innovation offers macro-economic benefits, such as increased labour force productivity, reduced inflationary pressure, improved competitiveness and a more robust and sustainable economy. It also illustrates importantly the economic prosperity are linked to and influenced by six operational pillars of innovation, each of which can act to enable and/or impede innovation activity. These six pillars are:

- 1) enabling collaboration and strengthening linkages between all sectors of the economy and with international markets;

- 2) building world class research capabilities and institutions;
- 3) developing leading education and training systems that build the innovation capabilities and skills of people;
- 4) creating the workplace environments and cultures where innovation is enabled, allowed and encouraged to flourish, supported by the right leadership skills and management tools;
- 5) developing the nation's technology infrastructure, recognising that ICT is a key enabling source of innovation for all industry sectors; and
- 6) fostering a regulatory environment, which incentivises and rewards innovative activity.

### **2.1.2 The Case of Australian SME Business Innovation**

Australian businesses have increasingly investing in innovation in the last few years. According to the Australian Bureau of Statistics (2006), just over a third (34%) of Australian businesses undertook some type of innovation during the two years to December 2005. This was up four percentage points from the two years ended December 2003. By type of innovation, 'implementing new or significantly improved organizational/managerial processes' (25%) had the highest result. Approximately 22% of businesses reported 'implementing new or significantly improved operational processes' and 19% of businesses reported 'introducing new or significantly improved goods or services'. Over 7% of innovating business reported introducing new-to-the-world goods or services. From the 2005 figures, the proportion of innovating businesses increased with business size. This is most noticeable in the difference between innovating businesses that employ 5-19 persons (28.4%) and the results for businesses that employ 20-99 persons and 100 or more persons (46.6% and 51.5% respectively). This pattern is followed for each type of innovation with the exception of businesses that employ 20-99 persons which recorded the highest proportion of businesses that introduced new goods or services. More than 58% of innovating businesses reported cost as a barrier to innovation. Lack of skilled staff was reported as a barrier to undertaking innovation by 27% of innovating businesses. Profit-related drivers were reported as a key reason for all types of innovation by 94% of innovating businesses.

During 2006/07, over one-third (37%) of Australian businesses reported undertaking some form of innovation. Across the three statuses of innovation, larger businesses were more likely to have undertaken innovative activity than smaller businesses. This scenario is consistent with that observed in the 2005 survey. The proportion of businesses that were innovation-active was greater for each successive employment size range, from 31% for

businesses with 0-4 persons employed to more than double this proportion for businesses with 200 or more persons employed (66%). (In considering these results, populations for each of the employment size groups should be taken into account. For example, for businesses with 200 or more persons employed, an innovation-active rate of 66% represents approximately 2,000 businesses, whereas an innovation-active rate of 31% for businesses with 0-4 employees represents approximately 136,000 businesses.) Over 25% of businesses claimed that a lack of skilled staff significantly hampered their ability to innovate. More than three-quarters (76%) of innovative-active businesses claimed that the most common driver of innovation was profit-related (Australian Bureau of Statistics, 2008).

Much of the academic research undertaken on innovation is based on large organizations (Cutler 2009; Zhu 2004; Porter 1990; Carnegie et al. 1993; Pappas et al. 1993; McKinsey & Australian Manufacturing Council 1993; Peters & Waterman 1982). Some of the factors that influence the performance of this process include organizational culture, government policies and support mechanism, structural framework, investment communities, intellectual property protection, financial stability, research-industry relationships, the organization's financial profile and stability, economic and corporate environment. However, there is increasing evidence to show that the most innovative and fast growth enterprises are from the Small-to-Medium Enterprise (SME) sector, such as small manufacturers who are operating with flexibility and innovation in niche markets within a very competitive global market place. It is noted that business failure in SMEs is a comparatively rare phenomenon. Only around 2 per cent of SME businesses cease operations each year because the owners, while solvent, are unable to secure a sufficient return. And less than 0.5 per cent of businesses cease operations each year due to insolvency - down significantly from the rate applying in the early 1990s. Unfortunately, common misperceptions about the level of business failure and the chances of survival may lead some entrepreneurs to overestimate the risk of failure, thus reducing their willingness to innovate (Commonwealth of Australia, 2000).

There is also increasingly improved structural support for these small enterprises from governments at all levels. However, such programs are often unable to flow down to the micro-manufacturers (less than yearly AUD 2 Million turnover per year), and access to relevant field officers for assistance are often very difficult especially within regional areas. This poses an interesting scenario where it is often very difficult for these SMEs to access the available financial and non-financial assistance for their innovation activities. Because they are dependent on cash flow from existing operations as their innovation funding source (Featherstone, 2008), the incentives for SMEs to invest in innovation are diminished. In Australia, the Australian Bureau of Statistics (ABS) has found that over the period 2001-2003

the construction industry, at 30.7 per cent, had one of the lowest proportions of innovating businesses (Australian Bureau of Statistics, 2005). This result was comparable to the mining industry, yet well behind many other industries such as manufacturing, electricity, gas and water supply, and communications (45 per cent or more of firms innovating). The 2006-7 survey by the ABS found that the proportion of innovative-active construction firms had subsequently decreased to 27 per cent (Australian Bureau of Statistics, 2008)

It has been reported that many of the small businesses (almost half) in Australia today started in the past six years and in the past decade they have provided four out of five of all the new jobs created. Small businesses employ around 40% of the workforce, and are responsible for generating around a quarter of our gross domestic product (GDP) (ABC Radio, 2008). It may be argued that good ideas that have been generated by SMEs have a low probability of developing into commercial successes although there may be more opportunities for innovation. Given the propensity of SMEs to create jobs, this is an important challenge for Australia if it was to be successful in developing a comparative advantage globally as the “clever country”. Thus, it has been noted that even a small increase in innovation intensity in SMEs would have significant flow-on effect given the sector provides a significant employment and economic activity (Featherstone, 2008). This conclusion applies to both the manufacturing and construction sectors, which is noted as contributing, across the various OECD countries, 6.0 per cent to gross value added (a measure of the contribution made to GDP) in 1995, and 5.4 per cent to gross value added in 1999 (OECD, 2004)

Innovation in SMEs is often poorly understood, in that it is often a disordered, unpredictable process that is hard for SMEs to manage effectively. Innovation effort can also see attention diverted from the core business and operations. Relative risks are higher because there are fewer margins for errors in SME. The ability to experiment with different options has great merit in larger companies with surplus cash flow, stronger balance sheets and excess staff, but it is not suited for SMEs. A further reported issue in innovation in the SME sector is that there is too much discussion about innovation and not enough action (Featherstone, 2008). SMEs want more practical, cost effective ways to maintain or increase their innovation intensity. There is evidence to date that governments are acting to enhance the innovation intensity in SMEs. For example, government agencies in Australia at the state and federal levels have always been trying to improve the innovation outcomes from industry, and in recent cases, in the SME sector. The establishment of the “Enterprise Connect” federal program in Australia, for example, is designed to provide small and medium enterprises with access to practical advice and mentoring. It has been reported that, according to Senator Kim Carr (Douglas, 2008), 10 Enterprise Connect centers to be opened around Australia will

provide businesses with confidential mentoring and support, to gain access to a range of government and non-government services including business planning, prototype development, grant applications and advice regarding human resources. This program is based on similar programs which have proved successful in Ireland and the United Kingdom.

## **2.2 Overview of the Innovation Process**

### **2.2.1 Innovation Adoption and Development**

An innovation may be described as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). Rogers (2003) outlines the innovation development process as consisting of the steps of recognition of a problem or need, research, development, commercialization, diffusion and adoption, and consequences, i.e., changes that occur in an individual or social system as a result of adoption or rejection of an innovation. He also divides adopters of innovations into five ideal types, each of which is defined by specific characteristics such as the subject’s ability to take risks, the subject’s resources, and the subject’s position within the overarching social system. The five types are innovators, early adopters, the early majority, the late majority, and laggards.

Knowledge and its organization and dissemination within the firm are significant factors with regard to innovation (Egbu, 2004). Such knowledge may be created within the firm rather than externally to it. Thus, the knowledge creation process can be considered as a continuous process through which one overcomes the individual boundaries and constraints imposed by information and past learning by acquiring a new context, a new view of the world, and new knowledge (Nonaka et al., 2006). Firms need to continuously innovate, adapt and improve on existing technologies, in order to exist, compete and grow. The better organizations are leveraged to the evolutionary nature of technology, the better their performance will be. This is supported by Moncrief & Cravens (1999) where technology is changing markets and buyer’s preference, and organizations that are market driven and leverage technologies, can provide better market growth and performance. There is also a need to develop a systematic approach to review an organization’s ability not just to innovate but to create value through innovation. It is important not to view innovation in isolation but as an integral part of any business strategy. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and its structure. In addition, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and are often underestimated, and therefore create a disincentive to invest in innovation.

Technological change is one of the significant influences on business enterprises, which companies both dying and emerging from every evolutionary technological innovation. Hill and Rothaermel (2003) provide a theoretical platform in that technology discontinuity does affect the performance of the incumbent firm, but that some firms some adapt and improve their performance, and some get ahead of the change and exploit the new technology and experience sustained performance. Macher & Richman (2004) have complemented this theory that firms tend to restructure and develop new strategies in pursuing a new technology in response to “discontinued” technologies. They have also found that certain organizational strategies are more appropriate for particular stages of the innovation life cycle. There is a common theme emerging that firms need to continuously innovate, adapt and improve on existing technologies, in order for it to exist, compete and grow. Dillon, Lee & Matheson (2005) propose that technology and research and development (R&D) are insufficient to create value and wealth when used in isolation, and that current business practices fail to support the activities crucial to value innovation. There is a need to develop a systematic approach to review an organization’s ability not just to innovate but to create value through innovation. Orr & Sohal (1999) have complemented this theory by using a German example of innovation by successfully managed technology transfer from home country to overseas productions, which delivered superior quality and competitive advantage, and indirectly provided an entry and presence in the respective market. They also demonstrated that managing the innovation process is not only about creating new ideas and gadgets, but also that it forms part of a holistic business strategy to enable the firm to ensure its sustainability as a business enterprise. Finally, it is important not to view innovation in isolation but as an integral part of any business strategy, which may take into account other factors proposed in Zhuang (1995); where the composition of an organization in terms of gender, age, industry type, and management level can influence its ability to devise and implement business strategies that focus on innovation. This theme is further supported by Roberts & Amit (2003) in proposing the view that innovative activity that is differentiated from industry norms tends to deliver superior performance, in which the successful firm has focused on a point of differentiation as its competitive advantage.

### **2.2.2 Barriers and Enablers of Innovation**

While organizational knowledge and its use are important in the innovation process, and factors like those related to profit can be important drivers for firms to innovate, there are also a number of barriers and enablers, both within and external to the firm, that has the potential to impede or aid the innovation process in SME firms. There a reinherited discourse and myths surrounds barriers to innovation in SME (Curran 1996; Adams 1982; Barber et al.



1989). A number of these barriers and enablers are discussed below. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and firm structure (Zhuang, 1995). Gyampoh-Vidogah & Moreton (2002) noted that the construction industry has always been a collaborative business environment. However, the corporate or collaborative information technology framework is lacking as the result of the culture that dictates each individual function maintains total independence in all respects including information. In addition, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and often underestimated, and therefore create a disincentive to invest in innovation. This view is supported for that particular industry through the identification by Hampson & Brandon (2004) of a number of barriers preventing the Australian SMEs from taking more responsibility for leading and investing in research and innovation. Such barriers include the cyclical nature of the industry, a lack of client and industry leadership, a limited history of business deliverables from researchers, the self-interest of many participants, an inability of the industry to foresee the tide of competition, insufficient trust between industry and researchers with respect to sharing vital information, and lack of a long-term funding basis for a national R&D centre. Similar barriers were observed by Koivu & Mantalya (2000) in the European construction sector, which they stated had not been very successful in adopting new technology and processes. Some of the issues in that sector included fragmentation, low potential for added value because of a price and project-based focus, fluctuation of demand with time, slow process or project improvement cycles, a relative inability to manage the innovation process, lack of educated personnel, limitations to risk taking, a conservative culture, and a relatively significant level of government oversight and control.

The culture of the firms themselves can be the source of additional barriers to innovation. Acar et al. (2005) found, for example, that organizational culture was a factor in implementing information and communications technology (ICT) in SME firms. The importance of these barriers to innovation is also noted by Egbu (2004), who observed that, if the construction industry is to benefit from innovation, it should change from an adversarial and blame culture to a sharing one. Further, a study by Manley et al. (2005) of 383 Australian construction firms found that key obstacles to innovation included high costs of developing innovations and insufficient time. Finally, Zhu (2004) has demonstrated that where the impact of ICT as a tool for e-commerce, profit performance and its value is underestimated,, there may not be enough financial justification to invest in ICT, which in turn may not reap the full benefit of e-commerce. Manley et al. (2005) found that the determinants of innovation outcomes in that particular industry included business strategies, innovation

drivers and obstacles, and the number of sources of ideas. In addition, the same researchers found that key drivers of innovation were efficiency, productivity improvements and customer needs, and that stand-out innovators a) developed innovations with higher degrees of novelty, b) adopted a higher number of advanced practices, and c) invested in research and development. Approximately one-third of the respondents maintained a culture that supported innovation. Dulaimi et al. (2003) found that an innovative proposal can be successfully implemented if effort is put into carrying the innovation through, if favorable results can be expected and there is high managerial commitment. Ling (2003) similarly concluded that the extent to which an innovation would prove beneficial is closely correlated to the level of interest of project team members, the working environment, the formation of task groups, and the capabilities of the people involved. Moreover, Egbu (2004) found that any meaningful innovation strategy must have unequivocal support from the senior managers, be communicated to and accepted by the organization's rank and file, and sit naturally within the organization's overall strategy. Similarly, Sexton & Barrett (2003) found that owners of small firms have the power to ensure rapid decision-making while the type of innovation and the different organizational factors brought into play largely depend on the firm's operating environment.

### **2.2.3 University and Industry Collaboration in Innovation**

University-industry collaboration has always been a mechanism for innovation. MacPherson (1998) examined the academic-industry linkages and small firm innovation in the scientific instruments sector, and found data from a sample of 204 SMEs in the New York State region that suggest that the university can play a helpful role in SME innovation. Knowledge spillovers from the academic sector were shown to be geographically localized. A key finding is that the intensity of academic-SME interaction varies inversely with the time-distance that separates firms from major campuses; and innovation rates are higher among SMEs that enjoy close proximity to academic resources. Freel (2000) expanded linkage collaboration further by examining external linkages and product innovation in small manufacturing firms. Based on a sample of 228 small West Midlands manufacturers in the UK, this study found that innovators are making greater use of external linkages, of a certain type and in a particular direction (predominately in vertical value chain linkages). It is observed that the data suggested the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration. In the construction industry, Hampson & Brandon (2004) have noted that commitment to collaborative research and innovation is required, with genuine mutual consultation with industry being essential for research and development to make a difference. They have also commented that it is important for researchers to engage

with SMEs (94 per cent of firms in the Australian construction industry employ fewer than five people). These studies indicate that, on the whole, successful innovation can be considerably aided by the involvement of universities, other research institutions, and business coaching approaches.

## **2.3 SME and Innovation Literature Review**

### **2.3.1 The Innovation Experience**

What do great innovators such as Henry Ford, Miles Davis, Thomas Edison, Confucius, Robert Louis Stevenson, Robert Kennedy, Sir Laurence Olivier, Thomas Watson, Douglas McArthur, Winston Churchill, Malcolm Forbes, Paramahansa Yogananda, and Charles Kettering have in common (Ditkoff 2010) with Homer Simpson? It would seem that if you want to innovate, you will first need to let go of your notion of what failure is all about. The following are quotes from prominent innovators of our times to illustrate this point.

- *"An inventor fails 999 times, and if he succeeds once, he's in. He treats his failures simply as practice shots."* **Charles Kettering**
- *"99 percent of success is built on failure."* **Charles Kettering**
- *"Do not fear mistakes. There are none."* **Miles Davis**
- *"The way to succeed is to double your failure rate."* **Thomas Watson, Founder of IBM**
- *"Failure is only the opportunity to begin again more intelligently."* **Henry Ford**
- *"Give me the young man who has brains enough to make a fool of himself."* **Robert Louis Stevenson**
- *"Only those who dare to fail greatly can ever achieve greatly."* **Robert F. Kennedy**
- *"No matter how well you perform, there's always somebody of intelligent opinion who thinks it's lousy."* **Sir Laurence Olivier**
- *"Failure is success if we learn from it."* **Malcolm Forbes**
- *"The season of failure is the best time for sowing the seeds of success."* **Paramahansa Yogananda**
- *"You may have a fresh start any moment you choose, for this thing that we call 'failure' is not the falling down, but the staying down."* **Mary Pickford**
- *"Never give in, never give in, never, never, never never... in nothing, great or small, large or petty -- never give in except to convictions of honor and good sense."* **Winston Churchill**

- *"I have not failed once. I've just found 10,000 ways that didn't work."* **Thomas Edison**
- *"I failed my way to success."* **Thomas Edison**
- *"I am not discouraged, because every wrong attempt discarded is another step forward."* **Thomas Edison**



**Figure 2: A quote from Homer Simpson**

(Extracted from “The Heart of Innovation” 21/6/2010

[http://www.ideachampions.com/weblogs/archives/2010/04/post\\_17.shtml](http://www.ideachampions.com/weblogs/archives/2010/04/post_17.shtml); Copyright Matt Groening)

At first thought, one may suggest that the infamous quote of “Homer” from the cartoon “The Simpsons” (illustrated in Figure 2) as sarcastic and somewhat funny. In the world of innovation however, it is no laughing matter. The quotes from great innovators such as Edison and Ford form the view that failures and innovation goes hand in hand. It seems that the first step towards innovating is “trying” to do new things and to do things better, and often than not, it leads to failures.

By definition, all innovation must contain a degree of novelty. Innovation means ‘creating or doing new things or doing things in new or better ways’, drawing on knowledge, relationships, value networks and other knowledge-based assets to add value to products and processes (Business Council of Australia 2006a; Green 2008; Cutler 2009; Commonwealth of Australia 2009). While research & development (R&D) activities are important and form part of an integral and systematic approach to innovation, we need to recognize, define innovation across a much broader range of activities other than R&D.

R&D activities form a significant part in defining innovation (Business Council of Australia 2006a; Green 2008; Cutler 2009; Commonwealth of Australia 2009). Legge & Hindle (1997) provides a definition of innovation from an entrepreneurship perspective, and focused somewhat in product-driven innovation or R&D. Several topics including life cycles, planning, screening, intellectual property, organization behaviour, marketing, and financial models as part of its definition of innovation. Similarly, Kuczmarski (1992), Trott (2005) and Bolwell (1991) provide a product-driven definition and guide to managing innovation. Within these literature, there are often mention of key success factors, diagnostic audits, new product strategies, product development processes, rewarding and motivating innovators. So, based on these literatures, one would argue that there is a formula to successful innovation.

Successful innovation is almost invariably associated with the exploitation of opportunity. In another word, successful innovation exploits the unfair advantage within a recognized opportunity presented by change in circumstances (Samson 1995). Drucker (1986) defined management of change as systematic innovation:

*‘systematic innovation is therefore in the purposeful and organized search for changes, and in the systematic analysis of the opportunities such changes might offer for economic and social innovation’*

The Oslo Manual (OECD 2005) defines “innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, work-place organization or external relations”. The Oslo Manual (OECD 2005) distinguishes three types of novelty: an innovation can be new to the firm, new to the market or new to the world. Rogers (1998) define innovation at the firm level as the process of introducing new ideas to the firm which result in increased firm performance.

Innovation as defined by OECD (2005) and Rogers (1998) are supporting Culter’s view that it is clearly a much broader notion than R&D and is therefore influenced by a wide range of factors, some of which can be influenced by policy.

**Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy (ie. systematically grasping opportunities in the midst of change while minimising failures)?**

So, one question is that “why is innovation so important” for governments to take it so seriously, and develop coherent strategies and approaches to nurture novelty and value

creation. The following section examines the innovation imperative from a global level to the firm level in remaining competitive as a nation.

### **2.3.2 The Innovation Imperatives**

Innovation is recognized around the world as a key driver of the competitiveness of firms and organizations in the global economy (Porter 1990). The emerging economies such as China which represents a third of global increase in R&D between 2001-2006 (OECD 2010) have grasped the opportunities and challenges of innovation, made it their own vision of the future. There is a clear correlation between countries that lead in the development of technology and those that lead in its application (Noal 1980). Australia must ensure that it is one of these societies.

Even before the emergence of China in the global economy, innovation in Australia was viewed as an important contributor to national GDP and the nation's standard of living. Carnegie et al. (1993) draws on a two year study by the Business Council's Innovation Study Commission on 120 leading edge Australian innovators across a range of manufacturing and service industries using a case study approach for both 'inspiration' and 'instructional' purposes. The evidence provided from the 120 leading innovators surveyed, Carnegie et al. (1993) concluded that the innovating enterprises could be big or small, across a wide range of industries, be local or foreign owned, and private or public; that the range of industries that are competitive in Australia is significantly wider than is popularly thought. It has the view that there are sustainable ways to side step significant disadvantages in competing with international peers across a wide range of industries, and in some cases, making a virtue out of experience in small remote markets. This followed similar work at the firm level by Australian Manufacturing Council (Pappas et al. 1990; McKinsey & Australian Manufacturing Council 1993). A similar American-equivalent study is Peters & Waterman (1982). Carnegie et al. (1993) points to the need for innovation frameworks (systems) to be established, and calls for public policy to remove regulatory impediments, and consolidation of 'innovation' related programs to better serve their enterprise clients. Much has been achieved since that time.

Australian businesses have increasingly invested in innovation in the last few years (ABS 2005; 2006; 2008; ABS & DITR 2006). According to the Australian Bureau of Statistics (2006), just over a third (34%) of Australian businesses undertook some type of innovation during the two years to December 2005. This was up four percentage points from the two years ended December 2003 (Australian Bureau of Statistics 2005). By type of innovation, 'implementing new or significantly improved organizational/managerial processes' (25%) had

the highest result. Approximately 22% of businesses reported 'implementing new or significantly improved operational processes' and 19% of businesses reported 'introducing new or significantly improved goods or services'. Over 7% of innovating business reported introducing new-to-the-world goods or services.

As mentioned in the 2005 figures, the proportion of innovating businesses increased with business size. This is most noticeable in the difference between innovating businesses that employ 5-19 persons (28.4%) and the results for businesses that employ 20-99 persons and 100 or more persons (46.6% and 51.5% respectively). This pattern is followed for each type of innovation with the exception of businesses that employ 20-99 persons which recorded the highest proportion of businesses that introduced new goods or services. More than 58% of innovating businesses reported '**cost**' as a barrier to innovation. Lack of skilled staff was reported as a barrier to undertaking innovation by 27% of innovating businesses. Profit-related drivers were reported as a key reason for all types of innovation by 94% of innovating businesses. As mentioned, during 2006/07, over one-third (37%) of Australian businesses reported undertaking some form of innovation. Across the three statuses of innovation, larger businesses were more likely to have undertaken innovative activity than smaller businesses. This scenario is consistent with that observed in the 2005 survey. The proportion of businesses that were innovation-active was greater for each successive employment size range, from 31% for businesses with 0-4 persons employed to more than double this proportion for businesses with 200 or more persons employed (66%). Over 25% of businesses claimed that a lack of '**skilled staff**' significantly hampered their ability to innovate. More than three-quarters (76%) of innovative-active businesses claimed that the most common driver of innovation was profit-related (Australian Bureau of Statistics 2008).

The Australian government has conveyed the importance of innovation to lifting Australia's productivity and to supporting future growth and opportunities for the nation (Carr 2007). It is reflected in the commissioning of the national review of the National Innovation System under the stewardship of Terry Cutler. Senator Kim Carr states on behalf of the Labor Party during the 2007 election campaign:

*'Innovation is a key driver of productivity and economic growth, particularly for advanced economies such as Australia. Innovation drives the creation of new businesses and sectors and revitalises existing industries ... Federal Labor will put the right policy framework in place, implementing a range of initiatives to: bridge the divide between industry and research; ensure that business has better access to new ideas and new technology; and increase innovation incentives across the economy.'* (Carr 2007)

In the past century, national wealth was thought to have its source in land, labour and capital as factors of production, but with the coming of the digital age where information, communication and technology (ICT) have changed the innovation paradigm. This new digital revolution has replaced the industrial revolution. It has resulted in a greater understanding and appreciation of knowledge-based assets in creating value for organisations and, in doing so, has transformed the productive profile of the Australian economy. In the 21<sup>st</sup> Century, many economies are increasingly competing on the basis of unique value delivered through the development and application of knowledge and knowledge-based assets in the production of goods and services (Business Council Australia 2006a). For example, Australia's services sector now accounts for close to four-fifths of Australia's economic activity, employs 85% of the workforce, and accounts for 23% of exports. Economic production in such sectors relies increasingly on the conciliation of knowledge-intensive services and human capital (Business Council Australia 2006a).

The Australian economy is currently experiencing an unprecedented boom in its primary commodity exports. This has seen a reversal in the decades-long deterioration of its terms of trade, as markets are adjusting from China's re-entry into the world economy (Business Council Australia 2006a). Unfortunately, in saying this, Australia still lags behind many of its international competitors in terms of Gross Domestic Product (GDP) per capita. The International Monetary Fund, for example, ranks Australia number 15 in GDP per capital, at \$43,312, behind countries such as the USA, the Scandinavian countries, Germany, Ireland, The Netherlands and Switzerland (Business Council Australia 2006a).

The significance of innovation to GDP performance has been shown by a number of leading innovative nations. Examples include Ireland, whose success is based on integrating global investors with local supply chains to build a presence in software, pharmaceuticals and medical devices; and the 'Asian Tigers' such as Taiwan, with its already formidable and continuously improving manufacturing capability in electronics and semiconductors; and Singapore is currently reinventing itself as a tourist destination in addition to its already well established trade, investment and financial services hub for the Asia-Pacific region; and Finland, via Nokia in mobile telephony and related technologies (Business Council Australia 2006a).

Though several Australian governments lead by Hawke, Keating, Howard, Rudd and now Gillard have been tackling the systemic deficiency in innovation and its contribution to GDP, it has not been apparent that innovation policies have any traction in the SME space. However, in saying that, Carr's approach to innovation of bridging divide between industry



and research, and investing in infrastructures (research, education, business support) should be embedded into the national culture, in governments, economic policy, business strategy, workplaces and the community to bring direct benefits for the nation's economic potential (Cutler 2009; Commonwealth of Australia 2009). This grand vision is to be applauded but questions need to be asked on the effectiveness at the coal face in terms of impact of policies flowing to the businesses, and in particular for Small-Medium Enterprises (SME) and micro-manufacturers in regional location (often isolated from major population bases). Another important question can be asked of the role that regional universities play as a government and research entity in the innovation of SMEs.

### **2.3.3 SMEs and Innovation**

Throughout history, technological changes have significant influence on business enterprises and their survival. In addition, there is increasing evidence to show that the most innovative and fast growth enterprises are from the Small-to-Medium Enterprise (SME) sector, which typically has the flexibility to be innovative in niche markets (Thorpe & Ryan 2006a;2006b; 2007; Thorpe et al. 2009; Thorpe & Goh 2010). There are two million SMEs in Australia, accounting for 96 per cent of all businesses. Also, given that such SME firms in Australia provide the bulk of new jobs created, employ around 40% of the workforce, and are responsible for generating around a quarter of our GDP (Carleton 2007), it is important that such firms are innovators. Improvement of the innovation process in such firms would therefore be expected to result in significant improvements in the Australian economy as a whole. Understanding SMEs better through research is therefore vital to the nation's economic health.

The cost of innovation, and the risks in taking up innovations too early in their life cycle, may limit the ability of SME firms to adopt innovations until fairly late in their life cycle, when their benefits are quite limited compared with earlier in the life cycle. Quite often it is also difficult for the SME sector to access financial and non-financial assistance for their innovation and technology transfer activities that are necessary for their continued growth and development.

Research into the process of innovation in the SME sector is therefore clearly important. Battisti of Massey University has been researching in SME sector, mostly in New Zealand (Battisti 2008, 2009; Battisti et al. 2009a, 2009b, 2009c, 2009d, 2009e). Walker of Edith Cowan University (Small Medium Enterprise Research Centre) has also been active in the Australian SME space, particularly in women entrepreneurship (Walker et al. 2007, 2008a,

2008b; Wang et al. 2007, 2008; Charters et al. 2008; Redmond et al. 2008a, 2008b). However, there is limited research into SME relevant to innovation policy and practices.

In saying that, Rogers (2004) initiated a study using survey data on Australian firms to investigate the determinants of innovation. Various possible determinants are investigated, including market structure, export status, the use of networks, and training. Regression analysis is conducted separately for manufacturing and non-manufacturing firms and, within each sector, by firm size categories. The results include evidence of persistence in innovative activities and that the use of networks is associated with innovation in some sector-firm size categories. Specifically, small manufacturing firms exhibit a positive association between networking and innovation. In contrast, for non-manufacturing firms this association is present for medium and large sized firms.

Huang et al. (2004) also provided some insights into the product innovation in Australian SMEs through his study to examine several conceptual issues underlining the measurement of new product success and the measurement practice adopted in Australian SMEs. The sample included 276 SMEs from two most innovative industries: chemical and machinery industries. Results have indicated that four factors underline the commonly used success measurement: financial performance, objective market acceptance, subjective market acceptance, and product-level measures. These four factors are related to each other and can be used to well predict the overall measurement. His result showed that the most frequently used specific measures in Australian SMEs are customer acceptance, customer satisfaction, product performance, and quality.

Such research by Rogers (2004) and Huang et al. (2004) has been limited in comparison with the research into innovation in larger firms, and there is therefore a need to undertake more research into the innovation development and adoption process in SME firms. This is especially so for regional SMEs. There is also the potential for the barriers to innovation to be addressed through the development of improved knowledge transfer approaches such as knowledge diffusion through organisations trusted by the SME sector, educational programs, business coaching and improved access to innovation development funds. For the purpose of this study into a regional micro-manufacturer, it is termed as the “innovation and technology transfer (I&TT) experience”. This terminology includes technology and educational diffusion.

The study undertaken by Thorpe & Ryan (2006a; 2006b; 2007) and Thorpe et al. (2009) into innovation in 20 smaller residential building construction firms in South-East Queensland,

through face-to-face semi-structured interviews, with the objectives of gaining information about the interviewees' use and adoption of innovative materials and practices. All participating firms undertook private sector residential work, with smaller projects (such as private dwellings) predominating. The results of this study showed that while the construction industry is often perceived as not highly innovative with respect to other industries, there was a high degree of innovation in the firms surveyed. Drivers towards innovation in the firms tended to be profit and legislative driven. Sustainability was a factor in some firms. It was noted that the firms rarely directly used the results of formal research, preferring to obtain information through their industry association or suppliers. This study was well supported by Ofori (2002) study into issues in small construction contractor development with emphasis on developing countries.

Research has indicated that the SME sector tends not to perform well in adopting and implementing innovations (Koivu & Mantyla 2000; Acar et al. 2005). This is not always the case (Winch 1998; Harty 2005), the issue is with its efficiency and effectiveness of adopting and implementing innovation (Hampson & Brandon 2004).

**Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs (such as research, education and business support)?**

These observations suggest that though SME firms are generally somewhat entrepreneurial and innovative, they are unable to capitalize on the benefits of national and state innovation policies. This includes universities as instigators and diffusers of research and education. Literature has suggested that businesses in regional areas that have a university located within its vicinity perform better in innovation than those that are without one (MacPherson 1998).

### **2.3.4 Types of Innovation**

There are various and multitudes of literature on models and types of innovation. Much has been rewritten on different frameworks, models, help-guides, and systems that pledge themselves as the way to innovate successfully (Freeman 1987; Lundvall 1992; Nelson 1993). There are sectoral and regional variants that have been developed. Edquist (1997; 2001) provides an excellent summary in the systems of innovation approach and innovation policy.

The category of innovation is extremely complex and heterogeneous. Innovation can only be understood in its totality. It is a combination of different but interrelated elements that contributes to the development of new, commercially relevant products and processes, or the

delivery of better, more cost effective services. But for the purpose of this study, innovation is categorized as Technological, Organisational, and Network-based innovations whether there are product-based (eg. goods and services) or process-based (eg. productivity) innovations. This conceptual framework is aligned with the views of the Business Council of Australia (2006a; 2006b).

While the innovation framework are structured around the concept that innovation may proceed along a conventional ‘linear’ route from scientific discovery to exploitable invention, and then to market, this tends to be the exception rather than the rule. As mentioned, innovation is complex and much broader phenomenon than traditional views such as those that focused on R&D and paradigm-changing technologies. The ‘linear’ model of innovation are not able to function well especially when innovation transcends traditional functional boundaries both nationally and within organizations. This ‘dispersion’ and somewhat ‘disruptive’ modes of innovation may transcend boundaries and resides in many different places. This poses new challenges to policy makers and managers alike in formulating innovation policies, in the sense that they will have to deal with more ambiguity and complexity. However, from literature it is observed that innovation has at least three main categories; technological, organisational and network-based.

### **Technological Innovation**

Technological innovation is often aligned with the ‘linear’ or R&D model of innovation. It is identified with the formal and well established body of knowledge arising from basic research in science and technology and its application to product and process development. Technological innovation is well defined and easily measured. It can be measured by the output of scientific papers and patents, and a strong correlation with public investment in research and education. However, continuous improvement in technology may also be reflected. This type of innovation activities (such as internal focus on quality and externally from a broader process of networking and collaboration with customers and suppliers) are much more difficult to quantify.

### **Organisational Innovation**

As with most technological innovation, not all knowledge is codified and measurable, and nor does innovation always embody R&D in new products and processes (Australian Business Council 2006a; 2006b). One element of innovation that should not be ignored is “organisational innovation”. This is where knowledge and learning may be tacit as well as codified, and has the capacity to transform organisations through adaptation and absorption

of new technologies, introduction of new operational processes and implementation of new workplace structures and practices. One may argue that some of the best example of organisational innovation include companies such as Google and Apple.

Significantly, ABS-DITR (2006) found that non-R&D spending accounted for over two-thirds of total business expenditure on innovation. While most innovating firms reported changes which were ‘new to the business’ rather than ‘new to the world’, the research suggests that organisational innovation can result in substantially improved performance through structural flexibility and agility, high performance workplaces and good practices associated with new product and service development, quality and supply chain management. It is noted that within the research that the organisational challenge is how to be ‘ambidextrous’; ie. to explore and exploit, to be fluid and organic, and structured and systematic. There is support for this approach found in IBM (2006)’s global CEO survey as CEOs continue to place more emphasis on technological innovation. The survey indicates that CEOs focus 30% of their efforts on organisational innovation, particularly changes in their business models. Further more, companies that have grown their operating margins faster than their competitors were putting two-fold more emphasis on business model innovation compared to underperformers. In this context, business leaders identified organisation structural innovation as one of the key features of business model innovation.

### **Network-based Innovation**

Firms and organisations that engaged in innovation clearly do not operate in isolation from the external business and broader economic and policy environments. This is why the external environment of innovating firms is, and must be, shaped by network innovation, the third element of innovation. Section 2.3 reviews literature that encompasses the macro environmental influences and business forces that drive enterprises and managers.

Network-based innovation is a key part of the theoretical framework of this study. According to research, innovating firms benefit from structured collaboration, technology spillovers, networking and knowledge diffusion, where the boundaries of the extended enterprise become less easy to draw (MacPherson 1998; Freel 2000; Australian Business Council 2006a; 2006b; Thorpe & Ryan 2006a; 2006b; 2007). In Australia, DITR (2006) found that firms which collaborated for innovation had a much greater chance of achieving a ‘new to the world’ or ‘new to sector’ degree of innovation, especially in technology-intensive sectors. Internationally, Frost & Sullivan (2006) found that ‘collaboration works in conjunction with strategic orientation and opportunities inherent in the market environment ... to improve

business performance’, and that collaboration was more than twice as significant for performance than these other factors. PricewaterhouseCoopers (2007) conducted with 1150 CEOs across 50 nations, found that 73% of CEOs agreed businesses need to collaborate more effectively to mitigate climate change. 57% of CEOs believe that collaborative networks will play a key part in future business models, with CEOs in Asia Pacific particularly convinced about the value of collaborative networks. However, many would argue that managing collaborative networks requires new skills and new business practices, and the survey also found that most companies are still opportunistic in their approach to capitalising and maximising the value of collaborative networks and how these are managed.

Successful and emerging knowledge-based economies are typified by sets of institutions and intermediaries, which support not only the internal capabilities of firms and organisations but also the interrelationships which allow them to realise their full productive potential. International comparative studies such as Porter (n/a) have demonstrated that national innovation capacity, including research, education and networking infrastructure, is as important as internal technological capabilities in driving competitiveness.

## ***2.4 Influencing factors that drive enterprises and managers***

This section reviews the literature that encompasses the macro environmental influences and business forces that drive enterprises and managers. For the purpose of this review, the “enterprises” is viewed as for-profit organisations, and the macro environmental influences and business forces are categorised into:

1. Technological factors
2. Economical factors
3. Corporate social responsibility (CSR) factors
4. Political factors
5. Legal factors
6. Globalisation & cultural factors.

For the purpose of this review, the CSR factor covers environmental factors and ethical factors as well. These factors influence and impact on the strategies, decisions, competitiveness and performance of businesses. The theories behind these factors are researched to seek a better understanding of the impact and implications it may have for businesses. This review exhibits a limited amount of researched literature and is not meant to be exhaustive.

The theoretical framework for the effects of macro environmental influences and business forces that drive enterprises are categorised into technological, economical, corporate social responsibility, political, legal and globalisation factors.

The literature review highlighted several theories proposed in the technological factors, that firms need to continuously innovate, adapt and improve on existing technologies, in order for it to exist, compete and grow. And organisations that are best leveraged to evolutionary nature of technology, the better its performance will be. There is also a need to develop a systematic approach to review an organisation's ability not just to innovate but create value through innovation. It is important not to view innovation in isolation but as an integral part of any business strategy. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organisational composition, and its structure. Also, the effective benefits, market and profit performance that technology innovation delivers tends to be hard to measure and often underestimated, and therefore creating a disincentive to invest in innovation.

The theories in the economical factors that emerged is that the economy should be “guided”, there is no right or wrong way to manage the economy but to manage the economy for “sustainability” and “sustainable growth”. It is observed that the underlying theme on the enterprise level with regards to economical factors is that the incumbent firms tends to restructure and evolve itself to survive, compete, and grow, again repeating previously subscribed theory of sustainability and sustainable growth.

With regards to the CSR factors, theories were proposed and discussed in that organisation must take a proactive and holistic approach, not just in documentations, in addressing their social and environmental obligation to the community, consumers, and investors (as well as other stakeholders), and that CSR performance should be a reflection of the overall's organisation behaviour. As a result of having good CSR status or corporate reputation, maximising monopolistic profits will not be seem as a negative attribute but something that is acceptable in order for the organisation to exist to benefit the community and consumers.

With reference to the political factors, a common conclusion can be derived that it is not necessarily essential to have a state-direct economic strategy to ensure economic growth, however, the government does play very important role in encouraging it. There is also evidenced that government will push the cost burden of their “popular” policies to businesses, if it knows that business will be able to cope with the consequences and ramifications.

With regards to the legal factors, the conclusion is that an effective patent system is needed to encourage and protect the financial investment put into the innovation process. It is evidenced that the patent system is not effective in protecting funds invested in innovation, especially so for those who are least able to enforce it (where the foreseeable retrieval of profit loss is financially unjustified), hence, contributing to the disincentives to invest in innovation.

Globalisation factor is a recent and contentious issue where some parties will inherently benefit and others will need to reposition and restructure themselves to counteract the negative impacts, not all citizen of this earth are unambiguous beneficiaries of globalisation. The perceived competitive advantage of “Multiculturalism” may not be as significant on the managerial level, but may be useful at the sales level where there is more personal interaction between buyers and suppliers. It is also concluded that economic ideology is the driving force for how managers behave, though cultural inclination would still exist to have some effect, but as economies developed and mature, the managers tends to change and evolve along with it as well.

This section of the literature review has concluded that macro-environmental influence will affect business strategy, performance and competitiveness one way or another, at different level of impact, of which managers must consider and address in their management of business enterprises. In some cases, managers can only absorb the impact by repositioning or restructuring their businesses, however, in other areas, managers can be active in affecting the way macro-environmental factors affect their businesses.

<p style="text-align: center;"><b>Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm’s manager to innovate?</b></p>
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The following sections are a segmented review of the literature in the macro-environmental factors that influence firms and their managers.

### **2.4.1 Technological Factors**

Technological change is one of the significant influences on business enterprises, where companies dies and emerge from every evolutionary technological innovation. Hill & Rothaermel (2003) provided a theoretical platform in that technology discontinuity does affect the performance of the incumbent firm, but some adapt and improve their performance, some get ahead of the change and exploit the new technology and experience sustained performance. Macher & Richman (2004) complimented the above theory that firms tend to restructure and develop new strategies in pursuing a new technology in response to



“discontinued” technologies. It also finds that certain organisational strategies are more appropriate for particular stages of the innovation life cycle. There is a common theme that emerged that firms need to continuously innovate, adapt and improve on existing technologies, in order to it to exist, compete and grow. And organisations that are best leveraged to evolutionary nature of technology, the better its performance will be. This is supported by Moncrief & Cravens (1999) where technology is changing markets and buyer’s preference, and organisations that are market driven and leverage technologies can provide for better market growth and performance. Agnihothri, Sivasubramaniam & Simmons (2002) further supported this theory in that organisation can achieve superior customer service by focusing on creating new service strategies that leverage the value of information technology.

Dillon, Lee & Matheson (2005) proposed that technology and R&D are insufficient to create value and wealth when used in isolation, and that current business practices fail to support the activities crucial to value innovation. There is a need to develop a systematic approach to review an organisation’s ability not just to innovate but create value through innovation. Orr & Sohal (1999) complimented this key theory by using a German example of successfully managed technology transfer from home country to overseas productions, which delivered superior quality and competitive advantage, and indirectly provided an entry and presence in the respective market. Orr & Sohal (1999) demonstrated that managing innovation process is not only about creating new ideas and gadgets, but form part of a holistic business strategy to enable it to ensure its sustainability as a business enterprise. It is important not to view innovation in isolation but as an integral part of any business strategy, which may take into account other factors proposed in Zhuang (1995) where the composition of an organisation in terms of gender, age, industry type, and management level can influence its ability to devise and implement business strategies that focus on innovation. This theme is further supported by Roberts & Amit (2003) in proposing the view that innovative activity that are differentiated from industry norms tends to deliver superior performance, where the successful firm has focused on a point of differentiation as their competitive advantage.

There are inherent hindrances to the adoption of technological innovation such as corporate culture, organisational composition, and its structure. This theory is highlighted by previously Zhuang (1995), and also Gyampoh-Vidogah & Moreton (2002) where the construction industry has always been a collaborative business environment, however, the corporate or collaborative information technology framework is lacking as the result of the culture that dictate each individual functions maintains total independence in all respect including information. Also, the effective benefits, market and profit performance that technology innovation delivers tends to be hard to measure and often underestimated, and therefore

creating a disincentive to invest in innovation, as demonstrated by Zhu (2004) where impact of IT as a tool for e-commerce, profit performance and its value is underestimated, and in terms, there may not be enough financial justification to invest in IT, which in terms may not reap the full benefit of e-commerce.

### **2.4.2 Economical Factors**

Economical factors are inherently connected to how enterprise operate and perform. Stonecash, Gans, King & Mankiw (1999) outlined five general macro economical policies in an Australian context on its contributions and also the cons. The theme that emerged is that the economy should be “guided”, there is no right or wrong way to manage the economy but to manage the economy for “sustainability” and “sustainable growth” (to enable a continuity of the present living standard). Zimmermann (2003) supported this theory in that the Austrian central bank interfered and raised interest rate to control asset inflation in Austria. Anwar, Catley, Zheng (2004) proposed a similar line of thinking in that it does not matter whether it is state-driven or “free-market” economic policies as long as the end goals are reached. This further supported by Parayll (2005) with the Singapore’s shift in national competitive strategy from manufacturing to biotech in the pursuit of “sustainability” of its industries in contributing to the growth of the economy.

A slightly different theme was proposed by both Harper (2000) and Keneley (2004) in that through economic rationalisation and change of economic environment in the banking and life insurance industries, the organisations are forced to restructure for marginal and capital efficiencies, enabling it to continue to exist, compete and grow as an enterprise. Again, this reinforced the theory of “sustainability” and “sustainable growth”. Pollin, Brenner & Luce (2002) and Arrowsmith, Gilman, Edwards & Ram (2003) provided some theoretical framework in suggesting that business tends to absorb the cost increase by combination of improved productivity, increased pricing and “best practice” adoption. It is observed that the underlying theme on the enterprise level with regards to economical factors is that the incumbent firms tends to restructure and evolve itself to survive, compete, and grow, again repeating previously subscribed theory of sustainability and sustainable growth.

### **2.4.3 Corporate Social Responsibility Factors**

There is growing community, consumer and investor’s pressure on business to address their performance on corporate social responsibility, not just product and profit performance. Carbone (2003) and Kermani & Bonacossa (2003) provided a negative impact in that the perceived monopolistic profits is viewed as pure greed, and an impression that the exclusivity

of patent rights simply allows companies to dictate prices and maximise profits without actually benefiting patients in their development of drug. This negativity will ultimately flow on to affect profit performance. However, Dowling (2004) provided a solution to this patent dilemma by building a corporate brand or reputation (rather than through their product or services), in turn, allowing companies such as Johnson & Johnson to create a competitive advantage in the healthcare market. Dowling (2004) proposed that the key to building successful brands and corporate reputation is in the reflection of the overall organisation's behaviour. This is supported by Waddock, Boldwell & Graves (2002) suggesting organisation should adopt Total Responsibility Management (TRM) where it is the systematic approach of addressing and providing a basis for meeting corporate responsibility such as social and environmental concerns. Young (2005) proposed a similar line of thinking in the global mining industry in that it tries to meet the needs of the present without compromising the ability of future generation to meet the needs of others.

Even in the global market where different local and cultural settings, Arthaud-Day (2005) proposed that there is a direct link between business strategy and socially responsible behaviours. Cooper et al. (2003) also support this view that international accounting needs to examine the broader social and environmental consequences at a global level. Norman & McDonald (2004) suggested that by just having CSR documentation such as "triple-bottom-line" reporting is not enough, and is previously supported by Waddock, Boldwell & Graves (2002), and that companies must have a holistic approach such as TRM. Else, companies are just using CSR reporting to avoid effective social and environmental performance by providing "smoke-screen" to what actually happens. Manfield, Allen, Doherty & Weigelt (2002) supported this theory in that pollution control is managed to not only optimise profits but its social obligations.

The observation from the research performed on CSR is that organisation must take a proactive and holistic approach, not just in documentations, in addressing their social and environmental obligation to the community, consumers, and investors (as well as other stakeholders), and CSR performance should be a reflection of the overall's organisation behaviour. By having a good CSR or corporate reputation, maximising monopolistic profits will not be seem as a negative attribute but something that is acceptable in order for the organisation to exist to benefit the community and consumers.

#### **2.4.4 Political Factors**

Government economic policy and interference is an integral part of business factors to consider. Anwar, Catley & Zheng (2004) proposed that there are contradictory policy style

but yet achieve the same goal of economic growth. Singapore has a state-directed policy where as Hong Kong has a minimum intervention or “free-market” policy, but both were successful in creating an environment for economic growth. Parayll (2005) viewed that paternal development of industry was a critical factor in ensuring the creation of Singapore’s manufacturing industry was successful. The shift in national competitive advantage from manufacturing to biotechnology in Singapore provided some autonomy in policy development, but the state still exert enormous control over Singapore Biotech innovation policy. This autonomy derived from the fact that in developing this policy, a flat or horizontal structure across state, academia, and enterprises were adopted (as compared with the “top-down” structure for manufacturing).

Ring, Bigley, Diaunno & Khanna (2005) proposed that governments are the underpinning central basis for all businesses in its influence and direction, even if it does not directly involve in the development of these industry. Its findings are that governments can also foster industry creation and economic development by ways of deregulation and legal certainty. Perren & Jennings (2005) further supported this theory in that the paternal behaviour of government is highly visible in its development of entrepreneurship and its economic contribution, even though its ideology and belief system may be itself an obstacle to the effective support of entrepreneurial activities. Therefore, the four research papers above can be derived that it is not necessarily essential to have a state-direct economic strategy to ensure economic growth, however, the government does play very important role in encouraging it.

Governments can take a view that they should be the champion of consumer protection (as they lose more direct control from deregulation) by adopting “vote winning” position on certain economic rationalisation. Manfield, Allen, Doherty & Weigelt (2002) outlined the view that it is the role of governments to interfere when anti-competitive practices arise, irrespective of whether the enterprise was only fiercely protecting their market position and being competitive. Harper (2000) supported this view in that the government refuses to remove the 4 pillar policy to enable the big Australian banks to be acquired or merged to improve both marginal and capital efficiencies to position them to compete on a global scale. This government position is caused by consumer’s fear of lessened competition.

This is further supported by Gilbert & Katz (2001) in the American context where Microsoft is charged for breaking antitrust laws in that it uses its monopolistic power to practise in anti-competitive conducts to maintain its monopoly to the detriment of consumers. This type of position taken by governments contradict intended role of legislative forces in a free market and competitive environment. This is also very much a legal issue, but more so, a political

issue as the driving force for governments to adopt a certain position, is the underlying view that it win votes.

Government interference with the minimum wage structure is only a major concern for business as it increases the cost of operations, especially in labour intensive industry. Government's incentive in taking such position is the same scenario as protecting consumers, it win votes. Some would argue that it delivers better labour efficiency (similar to how the reserve bank control interest rates), but the driving force of governments is the views of the voters. Pollin, Brenner & Luce (2002) supported this theory and further finding in that most firms simply absorb the increase in wage cost through a combination of price and increased productivity. The reaction from firms is that it is something that it is to be accepted as it is derived from the majority (the voters which may include their employees and consumers). Griffin (1992) further highlighted this theory in the form of affirmative action, and is further supported by Arrowsmith, Gilman, Edwards & Ram (2003) where business tends to absorb the increase in wage cost, and adopt "best practice" to counter this cost increase.

However, Zimmermann (2003) demonstrated an opposite view taken by governments, even though the economic policy taken by government is unpopular; it does what is good for the economy in terms of sustainability. This illustrate that government will take popular positions that significantly increases business costs but knows that businesses can cope, however, it will take "tough" or unpopular position if necessary to ensure sustainability.

Political pressure such as that highlighted in Carbone (2003) from countries wanting AIDS drug treatment but are the least able to afford it provide a difficult competitive environment. Not only businesses are competing against their competitors, but also other governments. This is supported by Kermani & Bonacossa (2003) in that protected industries will be affected by free trade agreements. This is further complimented by Kim & Prescott (2005) in that when regulation relaxes, an increase burden of agency costs flows to the firm. These observations support the principal theory that government will push the cost burden of their "popular" policies to businesses, if it knows that business will be able to cope with the consequences and ramifications.

#### **2.4.5 Legal Factors**

Patent is one way for businesses to protect their intellectual property, and enable it to exploit it to maximise profits. Carbone (2003) proposed that patents provide biotech companies a source of monopolistic profits that fuel high risk investment. Kermani & Bonacossa (2003) also proposed that effective intellectual protection is needed to ensure funds are directed into

drug development as it is still very risky and expensive. Profits need to meet the cost of developing drugs that work but also drugs that do not work. Manfield, Allen, Doherty & Weigelt (2002) backed this up in that patent is a way to manage the economic viability of the innovation process. The observation is that an effective patent system is needed to encourage and protect the financial investment put into the innovation process.

Patent is in effect a big announcement of your invention, and is subject to cloning and replication, and thus patent infringement. Werden, Froeb & Langenfeld (2000) proposed that the damages in enforcing the infringement may be less than the effective profits if the patent was not infringed upon. Feinberg & Rousslang (1990) complimented this finding in that the profit loss by the patent holder is significant compared to their total profit, and that there are larger than the profits gained from the infringer. Feinberg & Rousslang (1990) also proposed that the cost of enforcement is too significant as compared to the profit loss that might be retrieved. This may result in a disincentive to contribute funds and investment to innovation. From the research above it is evidenced that the patent system is not effective in protecting funds invested in innovation, especially so for those who are least able to enforce it (where the foreseeable retrieval of profit loss is financially unjustified), hence, contributing to the disincentives to invest in innovation.

However, it is evidenced that high risk big returns type innovation like drug development are well supported by investments as the result of the fact that it is financially justifiable and are willing to defend and enforce its patent rights. However, this provides a scenario that could hurt its corporate reputation in that it is undertaking the innovation with the principal aim of maximising monopolistic profits. Gallaway & Kinnear (2004) provided some argument to the view that the patent system or copyright must change with the changing paradigm and belief system. Corporate reputation is examined in detailed in “corporate social responsibility factors” section.

#### **2.4.6 Globalisation & Cultural Factors**

Globalisation is a recent and contentious issue where some parties will inherently benefit and others will need to reposition and restructure themselves to counteract the negative impacts. This is evidenced in Blyton, Lucio, McGurk & Turnbull (2001) in the case of the global airline industry, where the trade union has been losing its monopolistic position, and hence, strategises to counteract the effects of globalization of capital and labour. This is further supported by Whiting (2002) where enterprises seek competitive advantage outside their national boundaries, such as cheaper labour and less regulatory restriction to maximize profit. Whiting (2002) not only examine the impact on the firm’s level but also the national level. It

is observed that there are job losses at the low-skilled labour sector in developed countries while new jobs are created and increased standard of living for developing countries as the result of globalisation. However, there are critics that view globalisation more towards the exploitation of poorer countries by trans-nationals than, for its original purpose, to share and distribute the wealth of this world by helping developing countries access to the global market and to build their economies. That is in summary, the rich gets richer, but the poor remains poor and in cases sicker (through poor environmental and pollution management). This is supported by Cooper, Neu & Lehman (2003) where market efficiency may not be the only driving concerns for internationalism of accounting process as not all citizen of this earth are unambiguous beneficiaries of globalisation.

The cultural difference in the global market in which enterprises often have to deal with have a significant impact on the firm's strategies, decision making and performance. Whiting (2002) provided us with a key to competitive advantage on a national level where Queensland, and Australia is a multicultural country with many different cultures. By having this background, it is viewed as an advantage providing easier access to global market without cultural barrier based on this cultural diversity. In saying that, Sharfman & Dean (1997) contributed another key point for firms to succeed in globalisation. This is the ability of managers to overcome their informational and ideological barriers, and to be flexible in their strategic choices. Given that managers (especially for trans-nationals) need to manage across national borders, high level of uncertainty and high competitive threats, not just cultural barriers. Therefore, the perceived competitive advantage of "Multiculturalism" as proposed by Whiting (2002) may not be as significant on the managerial level, but may be useful at the sales level where there is more personal interaction between buyers and suppliers.

In recent publication, there has been diverse interest in doing business in China (may developed into the largest economy in the world). Therefore, it is important to understand the dynamics of doing business in China. Fan & Zigang (2002) examined the impact of cultural difference between Chinese and American managers. Its findings were that Chinese managers are more relational, less emphasis on contractual agreements, indirect and less confrontational, and take fewer risks than their American counterpart. However, Lee, Qian, Yu & Ho (2005) only agreed in part with this observation in that it found that Chinese marketing executive are more likely to succumb to unethical business practices (trading favours for marketing advantages) than their American counterpart. Yes, Chinese managers are more relational but because of the inadequate enforcement of unethical behaviours, Chinese managers seem to have no hesitation to take more risks in capturing markets by

sceptical and questionable means. It is also observed that in Hong Kong which has a better enforcement regime, managers tends to take fewer risk but yet is still “relational” in their business practices. The “relational” observation is also supported by Sin, Tse, Yau, Chow & Lee (2005) where the internationalisation of business has led to inefficient and ineffective use of standardised marketing practices.

Sin, Tse, Yau, Chow & Lee (2005) proposed that in regulated and transitional economies such as China, relationship marketing orientation is more effective. However, it contradict the theory that marketing strategies should be formed on a cultural basis, in that its finding shows that in a service or developed economy such as Hong Kong, as compared to China, market orientation is more effective even though they are both culturally identical. This finding differs from Lee, Qian, Yu & Ho (2005) with respect to the Hong Kong scenario. It would seem economic ideology is the driving force for how managers behave, though cultural inclination would still exist to have some effect, but as economies developed and mature, the managers tends to change and evolve along with it as well.

## ***2.5 University-Industry Linkages and Small Firms Innovation***

Following the previous discussion at the macro-level, the question arises on the mechanics and operationalization of this need to collaborate across industry, entities and networks. Technology advances or new innovation seldom travels alone. Instead, it takes on ‘form’ and gains strength as it travels through networks. The value of an innovation is created by the network that a technology or innovation travels through. Allee & Schwabe (2011) and Allee (2003) define value networks as any web of relationships that generates both tangible and intangible value through complex dynamic exchanges between two or more individuals, groups or organisations. Similarly, Stabell & Fjeldstad (1998) point out that value networks is a configuration which emphasises that the value being created is between customers when they interact facilitated by the value networks. Christensen (1997)’s definition is slightly different. He defines value network as: ‘the collection of upstream suppliers, downstream channels to market, and ancillary providers that support a common business model within an industry’. The main point here is that value assigned to an innovation or technology is a network effect.

Other successful knowledge-based economies as compared to Australia may be larger, but one of their key strategic advantages lies in geographically concentrated clusters of skills and technologies, which drive an increasing share of growth (Porter 1998). Examples from the US have included Silicon Valley, the Carolinas ‘Research Triangle’, Minnesota’s ‘Twin Cities’, Austin, Texas, and the emergence of a Massachusetts biotech region following the



exit of computer hardware. From Europe, examples include biosciences clusters in Cambridge and Munich, digital media in South-east England and Flanders, and French ‘competitiveness poles’ such as Grenoble and Sophia Antipolis. While these economies are large, diverse and complex, with distinctive systems of governance and public policy, there is arguably a common thread in their success – *investment in human capital and collaborative networks, besides R&D and technology infrastructure, as part of a broader innovation framework that provides a favourable business environment for innovation and enables knowledge diffusion*. It is this strategic policy focus, through a mix of government, business and education institutions, which creates innovation capacity at national and regional levels. This capacity in turn underpins the development of more specific innovation capabilities at the organisational level, where it counts for growth, employment and competitiveness. Investment in human capital and value networks, besides R&D and technology infrastructure, as part of a broader innovation framework that provides a favourable business environment is essential to innovation success. This leads to the next proposition below.

There are a number of significant contributions to the body of knowledge relevant to this research. One significant literature discussed is by MacPherson (1998)’s study of the academic and industry linkages and how it affects small manufacturing firm innovation within the scientific instrument industry. MacPherson (1998) explores the role of academic linkages in the product development effort of small and medium-sized manufacturing firms in the New York State, USA. Another significant literature of note is Freel (2000) who studied the external linkages and product innovation in small manufacturing firms in the West Midland region of the United Kingdom. The research asserts that the requirement for small firms to collaborate, as a means to supplementing and complementing limited internal resources, has dominated much of the academic and policy debate on regional development and small firm innovation. These two major works will be referred to extensively in this study.

<p><b>Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?</b></p>
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### **2.5.1 MacPherson (1998)**

This quantitative study explores the role of academic linkages in the product development effort of SMEs within the scientific instruments sector. Data from 204 firms suggests that university research units can play a helpful role in small firm innovation. Knowledge spillovers from the academic sector are shown to be geographically localized. A key finding

is that the intensity of academic SME interaction varies inversely with the time-distance that separates firms from major campuses. A related finding is that innovation rates are higher among SMEs that enjoy close proximity to academic resources within the context of micro-geographical factors in regional knowledge diffusion. MacPherson (1998) addressed the role of time-distance in the propensity of firms to interact with the academic sector. Three main questions are addressed in their empirical analysis:

- Do academic linkages play a significant role in the product development initiatives of SMEs?
- Is knowledge spillovers geographically localized?
- How are academic linkages initiated, organized, and sustained?

But probably more relevant to this study, MacPherson (1998) suggested that ‘**why** might geographical factors play a role in the academic-industry relationship and why is a focus upon SMEs justified?’ is left to be answered in further research opportunities.

MacPherson (1998) suggests policy implications that may be of interest to economic development agencies in the USA and elsewhere. For example, the results suggest that small firms in R&D oriented sectors perform better when they are located close to universities. If this finding turns out to be true for R&D-oriented or manufacturing industries in general, then it might make sense to maintain moderate amounts of industrially-zoned land within easy reach of major campuses. There is, however, a noticeable shortage of consensus regarding where these locations should be. MacPherson (1998) suggests that prime locations reside within 2hr driving time from major campuses. This would imply a need for industrial zoning policies that reflect the location of a region's main transportation hubs and highways.

MacPherson (1998) proposes a second policy issue which concerns the fate of 'peripheral' firms that find themselves 'out of the loop'. Across the three proximity bands examined in his study, there were no significant differences were found in terms of R&D intensity, and the same held true for external spending on non-university technical support. Firms located close to major campuses enjoy an innovation advantage. In policy terms, MacPherson (1998) suggests that it might make sense for universities to keep private firms informed regarding the types of outreach initiatives and/or research activities that are currently underway. He suggests that the starting point for any of this initiatives would appear to be information dissemination; a function that universities ought to endorse as a matter of policy. MacPherson (1998) noted with caution that with any initiative to increase academic--industry interaction would surely run into difficulty if academics and technical support staff were to suddenly

experience a demand surge from non-university sources. As noted earlier, part of the academic--industry interaction problem described by Quintas et al. (1992) reflects a mismatch between the needs of firms and the needs of academics. MacPherson (1998) put bluntly, how would university staff be paid, promoted, and be recognized for their contribution to the local economy? These are difficult policy issues.

His evidence reveals that the incidence of university linkages varies inversely with the time-distance that separates academics from firms. The evidence also suggests a relationship between SME innovation and the presence of university linkages. Taken together, these findings aligns to the technological spillover ideas tested by Acs et al. (1994), Anselin et al. (1996), Eicher (1996), Feldman and Florida (1994), and Jaffe (1989). Academics and SME interaction is sensitive to time-distance, in that useful interactions typically require face-to-face meetings at or near the relevant academic department. Interestingly despite all the advances in communication technologies, it would appear that electronic modes of communication cannot act as substitutes for these meetings in MacPherson's study.

Nevertheless, a variety of important questions remain unresolved in MacPherson's study. He suggested that in order for the role of geographic proximity can be fully understood; at least three relatively straightforward extensions to the present enquiry might be worth considering. Firstly, a multi-sectoral and multi-state survey would be helpful. **Secondly, it might be useful to conduct case studies of successful versus less successful academic-industry interactions across regions of different types.** Thirdly, it would be interesting to probe for international variations in the academic-industry relationship, perhaps with a view towards **finding optimal combinations of 'positive factors' that could be either replicated or adapted for different places.** It is with this rationale that the author of this dissertation suggests it is worth contemplating establishing a case study on academic-industry interaction of SMEs in regional zoning (outside major and capital cities) on drivers or barriers of innovation.

### **2.5.2 Freel (2000)**

This quantitative study looks at relationships and interaction required for small firms to collaborate, as a means to supplementing and complementing limited internal resources. The study noted that the issues in the UK have dominated much of the academic and policy debate on regional development and small firm innovation. However, it asserts that there is relatively little empirical work that has sought to look further than simple frequency enumeration; noting that the most innovative and better performing firms are generally more likely to have links with external organizations. Based upon a sample of 228 small West

Midlands' manufacturers, this study considers the source, function, geography and strength of innovation-related co-operation. While the Freel (2000)'s findings point to innovators making greater use of external linkages, of certain types and in particular directions (notably, vertical value chain linkages), the results are less emphatic than might have been anticipated. His study leads to consideration of the factors contributing to and impeding joint innovation and the firms' perceptions of the impact of innovation. Freel (2000) points out that much of the observed difference between innovators and non-innovators lies in less objective measures. His findings suggest the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration. This is one of the key elements of the theoretical framework that the author aims to investigate in one's study.

Freel (2000) raises the following questions in their research:

- To what extent is product innovation driven by suppliers/customers/competitors?
- Does the degree of supplier/customer/competitor influence differ between innovative and non-innovative firms?
- Does the geography of supplier/ customer/competitor links vary by innovative classification?
- Where an innovation-related co-operative venture was undertaken with a supplier/ customer/competitor, what was the focus of the relationship (e.g. R&D, marketing, training, etc.)?
- Did the venture involve a joint commitment of resources?
- To what extent is product innovation encouraged by contact with universities or colleges of further education?
- Does the frequency and geography of interaction vary between innovators and non-innovators?
- To what extent is product innovation encouraged by contact with support services, trade bodies or government departments?
- Does the frequency and geography of interaction vary between innovators and non-innovators?

Freel (2000) questioned the extent to which product innovation was driven by suppliers or subcontractors. He aims to establish the existence, or absence, of relationships between SME's innovative performance and a number of factors relating to the existence and nature of supplier links over the same time period. In light of the relatively low levels of firm-to-firm and firm-to-institution linkages in his study (particularly those outside the vertical value

chain), Freel (2000) investigated the factors contributing to, or hindering, successful collaboration.

Freel (2000) suggests that operating within the same industry is ranked relatively highly by the sample firms, operating within the same supply chain is considered to be somewhat less important. In some ways this latter finding stands in contrast to their earlier findings, which suggested a preponderance of vertical value chain linkages and comparatively few horizontal linkages. Highlighting the importance of established relationships and recurring contact, Freel (2000)'s findings serves to underline the role of **interpersonal dynamics and trust** in the SME's articulation with other participants within their relevant industry and the wider local economy.

Freel (2000) indicated that “difficulties identifying suitable partners” and “lack of trust” as the primary barriers to collaboration, regardless of innovative classification (62% and 58.8% of all firms studied). That is, the “real” barriers to partnership, as perceived by the firms themselves, are almost certainly associated with lack of trust and an inability to find suitable collaborators. This finding, in itself, is perhaps not surprising and serves to emphasize the importance of **established relationships and frequency of contact**. However, Freel (2000) suggests that reducing such intangible (and conceivably embedded) barriers may be a more difficult task for public policy than if the constraints were associated with the more material barriers such as taxation, contracts, finance, management, communications or location. If the policy development can focus on promoting intervention in “frequency of contact” and “relationship building”, the author of this dissertation suggests it may be a panacea to this barrier.

Freel (2000) noted that innovators were significantly less likely to consider the impact on **rate of new product innovation** as 'not applicable', and significantly more likely to view it as having a 'high impact' or 'very high impact'. Similar results are noted for the perceived impact of **collaboration on design, technology transfer and management culture**. Additionally, he noted that innovative firms were significantly less likely to view the potential impact of **partnership on training, process improvement and firm organization** as 'not applicable'. Freel (2000) suggests that the general impression given is that the most innovative firms appear to have either appreciated greater gains through co-operative ventures or are more able to determine the incidental advantages that may be gained, irrespective of the global project aims and outcomes. Moreover, it might be anticipated that SMEs that had an experience of egregious collaboration, for whatever reason, this would discourage their view of the positive impact and value proposition. That is to say, Freel

(2000) data may just simply reflect a greater number of unsuccessful joint ventures or collaboration involving the less innovative firms. Regardless, the weight of evidence in Freel (2000)'s study points to innovators achieving greater value added through innovation-related joint activities.

### **2.5.3 Other Literatures**

There is now a large body of quantitative evidence that connects industrial innovation with knowledge spillovers from academic research (Acs et al. 1990; 1992; Andersson et al. 1990; Jaffe 1989; Jaffe et al. 1994; Mansfield 1991; Nelson 1993; ACOST 1990). These spillovers can be defined as formal or informal movements of new science-based concepts, ideas, technical procedures or information from the academic sector to private industry. A recurring theme in the literature is that firms located close to major universities exhibit higher innovation rates than their counterparts that reside elsewhere (Acs et al. 1994). Part of the logic behind this pattern is that new technical knowledge from the university sector can be more readily accessed by firms that forge face-to-face linkages with academics (Florax 1992). Despite the advances in modern telecommunications and improved transportation systems, the empirical evidence suggests that the intensity of university-industry interaction varies inversely with the distance that separates academics from firms (Anselin et al. 1996). Significantly, evidence is growing to suggest that SMEs are becoming more adept at tapping knowledge spillovers than larger companies (Feldman 1994; Link & Rees 1990; MacPherson 1992; 1997a). This may explain somewhat why literature have identified a growing innovative role for SMEs (Malecki 1994), notably within industries that exhibit low levels of market concentration (Acs & Audretsch 1990). From other perspectives, evidence from Ceh (1996), Feldman & Florida (1994) and Rothwell (1992) reveals a rising innovation share for SMEs across a variety of industries. Freeman (1991) suggests that part of this trend can be traced to the growing ability of SMEs to exploit external resources, including universities.

Several studies have shown that academic inputs can support the innovation goals of manufacturing firms, especially SMEs (Mansfield 1991). Some of the more notable studies include regional or company-specific case examples (Klofsten & Jones-Evans 1996; Lawton-Smith 1993; 1997; McConnell 1997). A number of important but largely non-geographical studies include useful contributions by Bonaccorsi & Piccaluga (1949), Bullock (1983), Nelson (1986), and Pavitt (1984). A common element across many of these studies is that innovation responds positively to knowledge spillovers from the academic sector (Eicher 1996; Mansfield 1991; Zucker et al. 1994; Zucker & Darby 1996). Significantly, there is evidence that SMEs have become more efficient at exploiting these types of spillovers than

their larger counterparts (Link & Rees 1990). Relative to big companies, in fact, it would appear that SMEs often exhibit faster innovation rates (Rothwell 1992; Feldman 1994), as well as superior R&D productivity (Audretsch & Feldman 1996; Koeller 1995), even on an adhoc basis. Several other attempts to model these relationships have cropped up in the recent literature (Anselin et al. 1996; Feldman 1994; Feldman & Florida 1994), most of which have confirmed Jaffe's (1989) original questions. However, in many of these cases, best-practice econometric approaches have **failed to identify the mechanisms and drivers whereby innovation spillovers are actually transmitted**. At the same time, such approaches have not revealed whether innovative activity at the firm level involves a direct or significant academic linkage or not (Audretsch & Stephan 1996). Some of the significant survey-based research has resolved some of these problems by exploring the nature of academic-industry relations at the firm level. For example, Link & Rees (1990) found that SMEs tend to exhibit stronger university connections than larger firms (which respond more directly to corporate R&D). These findings aligns well with the conclusions drawn by Acs et al. (1994), supporting the proposition that SMEs react more positively to academic research than larger firms. This is supported further by Berman (1995), Chandra (1992), Mansfield (1991), and MacPherson (1997b), suggesting a degree of consistency among the different methodological approaches to the academic-industry question.

It is suggested that although SMEs are generally more dependent on local customers and suppliers, this is less characteristic of innovative firms (Karlsson & Olsson 1998). Moreover, Keeble et al. (1998), based on a sample of 100 technology-intensive SMEs, suggest that internationalisation, innovation and growth are strongly correlated. Wynarczyk & Thwaites (1997) suggest that there is evidence of high involvement with and growth of exports in the innovative small firm sector. Innovative firms turn to export markets as a means of survival and, through this, gain a competitive edge over their domestically oriented rivals. Such findings serve to further underline the notion that innovative firms are marked not only by the number and duration of external linkages but also by the external reaches of these links; it can be drawn that universities are a significant candidate for these linkages. The literature is far from consistent. Evidence from a survey of innovative SMEs in two similar UK regions (Wilkinson et al. 1996) found that a higher proportion of the more innovative firms have significantly more important links with local suppliers and subcontractors than do the less innovative and that no important differences exist between more and less innovative firms as regards the type of linkage they have with other firms outside the local area. Lefebvre et al. (1998) was unable to establish any relationship between R&D and export performance.

Evidence of local bias may suggest the existence of substantial spatial interaction and transport costs which, at least for some products, serve to hinder inter-regional interaction.

Alternatively, literature on the importance of proximity and on inter-firm collaboration such as Becattini (1978; 1990), Brusco (1982) and Bianchi (1990), defines such regions as a territorial agglomeration of small firms, normally specialised by product type, product components or process phases, held together by inter-personal links, by common "social culture" amongst the workers, entrepreneurs and politicians and enveloped by an "industrial atmosphere" (Bianchi 1998). Staber (1997) noted that geographic proximity is important to the extent that it facilitates information exchange and mutual adjustment, but cautions that information is not the only commodity and that proximity may also be defined socially. Thus, the relevant organizational population is not defined spatially. Innovators were significantly more likely to have had extra-regional, rather than intra-regional, collaborative arrangements with suppliers and were significantly more likely than non-innovators to have collaborated with an overseas customers. This suggests that innovators are marked not only by the frequency but also by the geographic reach of external linkages. Nooteboom (1994) suggests that, when internal knowledge, competence or resource limitations are appreciated, the rational entrepreneur will conclude that there is a need to delegate or share responsibility for those decisions, or processes, upon which the limitations impact. Successful delegation or in some cases, co-operation requires trust in a dual relational sense; the other party to whom judgement is delegated has no interest in giving wrong advice (disinterestedness), and is capable of giving good advice (competence) (Nooteboom 1994). All things considering, academics could be such candidates. The requirement for both disinterestedness and competence is likely to lead SMEs to interact at first with those agencies with whom they have daily contact, such as customers and suppliers. **Interaction with public bodies, universities or competitors is likely to be less frequent.** While government and universities are likely to be disinterested, question marks exist over their **competence to judge applicability and priority**. As Hoffman et al. (1998) suggest, it may be that there is an inherent, intractable mismatch between the essentially long-term research interests and focus of most university research entities and the short-term, near-to-market needs of most SMEs.

It is also interesting to note that most literature indicates that the most innovative firms appear to have appreciated greatest benefit from innovation-related collaboration. This may be due in part to rewarding and more successful experiences of joint collaborative partnerships. Equally it may reflect a greater ability on the part of the most innovative SMEs to identify and capture the incidental gains that may arise through firm-to-institution co-



operation. However, the danger here is in advising and promoting to SMEs that all such links are inherently good (Hoffman et al. 1998).

## **2.6 Literature Review Summary**

This chapter discussed and explored the literature around the definition, imperative, types of innovation and how it relates to SMEs. It also discussed the local macro-economic context within Australia and the comparative positioning around the world, and the influencing factors that drives innovation. The chapter also covered the prior research associated with industry-university related SME innovation; specifically, MacPherson (1998) and Freel (2000). The research questions were developed and these are presented in the form of propositions:

- **Proposition 1:** Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy (ie. systematically grasping opportunities in the midst of change while minimising failures)?
- **Proposition 2:** SMEs are not effective and efficient beneficiaries of innovation policies and their outputs (such as research, education and business support)?
- **Proposition 3:** To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?
- **Proposition 4:** Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?

## **CHAPTER 3    METHODOLOGY AND METHODS**

### ***3.1    Introduction to Methodology and Methods***

This chapter describes the methodology and methods upon which the research is conducted. There are different research approaches that are commonly used by for research in policy development for SME purposes, and most of these are quantitative approaches as evidenced from prior literature. In this study, the researcher has approached the research from a qualitative dimension, and the journey in deciding how to undertake the research is explained in this chapter. Thus in this chapter, the different research purposes and approaches and types of outcomes are discussed, including prior work based on quantitative approaches. Then, this research methodology is evaluated on the basis of its focus and objectives based on the research question developed from the literature review. Moreover, the chapter explicitly explains the methods through which the research is to be conducted. This includes the process of establishing data collection techniques and analysis techniques.

#### **3.1.1    Prior Studies based on Quantitative Approaches**

There are a number of significant contributions to the body of knowledge relevant to this research. One significant literature discussed is by MacPherson (1998)'s study of the academic and industry linkages and how it affects small manufacturing firm innovation within the scientific instrument industry. MacPherson (1998) explores the role of academic linkages in the product development effort of small and medium-sized manufacturing firms in the New York State, USA. Data from a sample of 204 SMEs in New York State's scientific instruments sector suggest that university research units can play a helpful role in small firm innovation. Knowledge spillovers from the academic sector are shown to be geographically localized. A key finding is that the intensity of academic SME interaction varies inversely with the time-distance that separates firms from major campuses. A related finding is that innovation rates are higher among SMEs that enjoy close proximity to academic resources. The paper concludes with a brief discussion of the role of micro-geographical factors in regional knowledge diffusion.

Keeping this context in mind, self-administered questionnaires were mailed to the known population of New York State scientific instruments companies of 437 that qualified for SME-status under the US Small Business Administration's current planning criteria. A total of 204 firms supplied valid returns after two rounds of follow-up, giving a response rate of 46%. A total of 40% (n = 83) of the survey firms were found to operate with commercially

significant academic linkages. Respondents were asked to rank the importance of these linkages along a 5-point scale, ranging from 1 (no importance to the innovation process) to 5 (critically important). Respondents were also asked to estimate the frequency and duration of their university contacts. The common denominator among the 83 university-linked firms was that they all used the academic sector for commercial purposes on at least four occasions over the last 5 years. Firms with lower contact frequencies were allocated to a non-linked category because of their self-reported lack of interest in developing commercially-oriented relationships with academics. Respondents were also asked a number of basic questions regarding their recent product development efforts (innovation), R&D expenditures, sources of technical knowledge (internal and external), occupational structure (proportion of scientific and technical workers), and product focus. With regard to external technical inputs, respondents were asked to specify the location of their main suppliers. While the survey instrument provided a range of categories for this question (e.g. customers, competitors, consultants, corporate R&D laboratories), the university category is all that will be discussed here. In most cases, the survey instrument was able to pinpoint the main sources of academic help (campus locations). For the sample as a whole, then, it was possible to estimate the time-distance separating university facilities from individual firms, giving a rough measure of geographic proximity.

Several assumptions were made in adopting this approach to the 'proximity' question. Firstly, it was assumed that useful academic-industry interaction would primarily entail face-to-face contacts rather than telephone calls or other forms of communication. Follow-up interviews with academically-linked firms confirmed that this was a reasonable assumption. Secondly, it was assumed that time-distance by car was the most suitable measure of proximity. Finally, it was assumed that intervening opportunities would play no role. Within the analysis framework, it is necessary to define three of the key variables in the research that are central to the empirical analysis. The term 'innovation' refers to the successful design, development and subsequent marketing of a new or substantially improved product over the 5-year study period (1989-1993). Aborted efforts were excluded from the analysis, as were experimental models (e.g. prototypes under review). On this basis, the survey describes only those innovations that actually moved from the R&D stages to the market-place itself. The term 'innovation performance' refers to the proportion of a firm's 1994 output (total sales) represented by products that had been introduced over the last 5 years (giving a crude measure of technological creativity). Finally, the term 'time-distance' refers to the estimated amount of driving time (one-way) that would be involved in establishing a face-to-face

meeting between any given company representative and his/her main university contact. Proximity scores were calculated for all 204 firms in the sample.

Another significant literature of note is Freel (2000) who studied the external linkages and product innovation in small manufacturing firms in the West Midland region of the United Kingdom. The research asserts that the requirement for small firms to collaborate, as a means to supplementing and complementing limited internal resources, has dominated much of the academic and policy debate on regional development and small firm innovation throughout the late 1980s and 1990s. However, relatively little empirical work has sought to look further than simple frequency enumeration; noting that the most innovative and better performing firms are generally more likely to have links with external organizations. Based upon a sample of 228 small West Midlands' manufacturers, this study considers the source, function, geography and strength of innovation-related co-operation. While the general findings point to innovators making greater use of external linkages, of certain types and in particular directions such as vertical value chain linkages, the results are less emphatic than might have been anticipated. This leads to consideration of the factors contributing to and impeding joint innovation and the firms' perceptions of the impact of innovation. From this research, it appears that much of the observed difference between innovators and non-innovators lies in less objective measures. The data suggest the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration.

The study is based in the West Midlands region of England, which possesses a relatively large but declining manufacturing base (manufacturing firms within the region contribute 30.06% of GDP compared to the UK average figure of 21.75%). In addition, manufacturing productivity levels in the West Midlands (measured as GDP per head) are 6.2% lower than the UK average. Moreover, the West Midlands has a larger 'tail' of under-performing firms, and a smaller proportion of firms with very high performance. This would seem to suggest that firms within the region are generally less innovative than their extra-regional peers. A caveat to this would be to note that the industrial distribution of manufacturing activity is skewed towards low productivity sectors and sectors with low R&D intensity. Accordingly, it might be anticipated that certain aspects of the region's innovative potential would be constrained. Freel (2000) suggests that there are some evidence of other regional innovation systems have prospered by introducing new technology and design expertise to traditionally low-technology industries. Specifically, the random, stratified sample consisted of 228 manufacturing SMEs (<250 full-time employees) who provided usable responses to a comprehensive postal questionnaire addressing innovation and general organizational characteristics. The questionnaire asked relatively detailed questions relating to internal skills

and organization, sources of finance, sources of information and collaboration. The present paper is concerned primarily with the firms' responses to eight questions relating to external linkages. With regard to the characteristics of the sample: manufacturing is defined at the two-digit SIC (92) level. A large proportion of the sample firms are independent (80%) and have fewer than 21 full-time employees (52.2%). Of those responding, 72.2% reported introducing a new product in the financial period 1994-1996, and 70.2% of firms recorded an intention to innovate within the next 12 months. Freel (2000) noted that the most obvious difference between the current sample and its notional parent population relates to the number of firms in "Fabricated Metal Products". The West Midlands has a disproportionate number of 'metal bashing' firms compared both to the UK as a whole and to the targeted sample. The opportunities for significant product innovation within such a relatively low technology sector are inevitably fewer and the decision to stratify the sample, reducing their influence, was made accordingly. This sacrifice was made in favour of sectors in which it might intuitively be believed that there would be greater scope for product innovation, namely: Electrical Machinery; Radio, TV and Communications Equipment; Chemicals; Rubber and Plastics; Motor Vehicles and Trailers; Medical and Precision Instruments; and Other Transport Equipment. In light of this, the current sample can hardly be viewed as truly representative and is likely to overstate the level of innovation within the region and, if aggregated up, within the economy. None the less, Freel (2000) suggests the deliberate stratification strategy should allow us to concentrate, more fully, on those firms in which the issues under consideration are of greatest relevance.

These two significant works suggest that there are limitations, though not significant, that needs to be addressed; and that their hypothesis leads to the dilemma that perhaps pure quantitative approaches to the undertaking research in this field are somewhat limited in investigating, postulating, and developing useful and effective policies; ie. finding and explaining "why" certain perceptions, values, and behaviours are observed and quantified. Hence, one of the main reasons for justifying the qualitative approaches taken for ones' own study in answering the research questions developed in the literature review.

### **3.1.2 Justification of the Research Methodology**

Qualitative research methodology was a steep learning exercise for the researcher, an engineer by training and this was evidenced in the work by Borrego (2007). It involved relearning new terminologies, new languages, new paradigms, new methods, and new thinking to address validity and reliability of the research outcomes. Qualitative research is heavily embedded within the educational research, social and behavioural sciences, cognitive

sciences, and anthropology, but is considered foreign to engineering or scientific (physical) research normally associated with quantitative methodologies. The researcher considered employing mixed-methods, however, after much deliberation and feedback, decided that it would be brave but foolish to undertake the research trying to integrated mixed methodologies and multiple methods, increasing the risk of research failure.

Hence, the author decided this study should be a **description case study within an action-based participatory research framework grounded in explanative principle** after experimenting with a number of qualitative methodologies starting in 2003 to 2006 with a pilot ethnographic study into the hospitality industry. The case study approach is not a data-gathering technique per say. Rather, it is a methodological approach that incorporates a number of data-gathering measures (Berg 2001, p225). Here, the descriptions of change in values and behaviours at one small and regional manufacturer are based on observations and interviews applied to the participants. The case study method is useful in describing change processes because it provides for investigation of value and behavioural change within its real-life context (Yin 1984, p23). This diverges from modernist reductionism (deductive) and represents a shift from objectivism towards critical subjectivity, and from relativism to relationalism (Sterling 2004, p51). Its purpose is pragmatic because it shares practice: Case studies may provide ideas, suggestions, or imagery that might sensitise outsiders to issues they may have not considered, particularly with regards to the process of behavioural change (Wals, Walker & Blaze Corcoran 2004, p347). The conceptual framework for this research is based on relational (MacNeill & Silcox, 2006) and constructivist (Collins & O'Brien, 2003) pedagogy in that if participants are immersed in a rich and authentic professional environment with real-time input from industry practitioners, they are more engaged with the experience as designed. Further to this, a number of literatures were referred to during the course of developing the methodology and methods for this research. Two significant literatures were Yin (1984) and Bernard (2002), but others include Stake (1995), Atkinson (2001), Atkinson & Hammersley (2007), Stringer (2007), Stewart (2007), Leydens et al. (2004), Strauss & Corbin (1997), Corbin & Strauss (2008), Best & Kahn (2003), Bogdan & Biklen (2007), Bernard (2000), Bernard & Ryan (2009), and Commonwealth of Learning (2004). The following section describes the approach taken in this research.

### **3.2 Case Studies Approach**

Case studies lie at the heart of qualitative methods in much the same way as samples lie at the heart of statistical methods. 'Cases' can be people, organisations, villages, families, networks, courses, students, events or locations. Each case is distinctive: a school is in some ways

similar to other schools, yet in other ways different from them. Part of what ‘makes the case’ is documenting the balance of these similarities and differences, so that the reader can recognise what is familiar and what is novel. Cases are ‘bounded’ instances because each case is to some degree defined by a sense of boundary between what lies within the case and what lies outside. In some sense this boundary is ‘natural’, though often less clearly defined than we might assume. For example, a family may be defined in terms of the people who live together, though there are many instances where parents and children might be separated. In some cultures a family might be thought of as the ‘nuclear’ family of parents and children, in others it might include other generations and other relations.

### **3.2.1 Case study research in various disciplines**

Case study methodologies are better established and accepted in some disciplines than in others, though it is well established in history. Historical events only happen once and historians are mostly content to account for the particular instances of history and reluctant to generalise from them, in terms of theorising the causes of war (for instance). Anthropologists are often drawn into debates about the origins and evolution of cultures, but most anthropological research is case-based, as is much archaeology and not a little astronomy. Across the social sciences there are areas where the study of cases is the norm, in community studies, in clinical studies, in several areas of criminology and in education. In all these fields there is of degree of debate between methodologies and in the relative merits of each.

### **3.2.2 Action Research Theoretical Framework**

For many people who approach qualitative research critically, this is one of the first questions one ask, “How can one generalise from single cases and on the basis of qualitative data?” It is a question that starts from within the assumptions of another paradigm and so is in itself biased. Generalisation has a very specific meaning in the context of sampling theory. It concerns knowing the limits and the extent to which it is legitimate to apply the findings derived from the study of a sample to a wider population. But in case studies one cannot make claims of this kind with any degree of precision. All one can do is give readers access to our findings and ask that they test these findings against their own experience, and against other information they might have, some of which might be statistical. The research task is a different task and aimed at different kinds of findings. And of course, different forms of theory.

Qualitative research is sometimes described as if it were merely a technical option, as though it could be substituted for measurement methods without changing the nature and character of the study. The author for one is starting to question this assumption. To do qualitative research is, in fact, to see the world differently. Despite the tag ‘hard data’, most quantitative research is located in a realm of probabilities and conjectures. Statistical analysis is essentially concerned with estimating the gaps that exist between what has been measured and what can be assumed to be true. The question at the back of every quantitative researcher’s mind is ‘but what if we are wrong?’ **And the answer is usually in the form of the probability that they might be.** It follows that the kinds of theory that are most relevant to statistical studies is theory that looks for causal relations between social structures and suggests correlations between variables. Qualitative researchers tend to be surer of their data. One knows what one has seen and what one have been told. Their concern is to find the best way of getting the record straight and they tend to dismiss questions about the generalisability of their claims or the bias that stems from limited, and usually opportunistic, samples. Qualitative researchers will also study social groups but will do so with greater awareness of the variability within categories. Furthermore, their interests in theory will often form around questions about the nature of these categories themselves.

Often, beginning researchers are tempted to suggest research designs that mix quantitative and qualitative methods, in an attempt to get the best of both approaches, noting that the author was one of them. One has to be wary of this approach. It might make sense to think of making a survey and following this with some detailed case studies, but each approach leads in a different theoretical direction and unless ones’ study is very localised and specific one will be pulled in two quite different theoretical directions. Hence, the author’s avoidance of mixed methods in this research.

### **3.2.3 Applied and Action Research**

One may encounter discussion in this field of research of the differences between different methodological approaches. Some literature reject the idea of ‘applied research’, claiming that all research in engineering is by its nature ‘applied’, even if it might not be immediately obvious how and why this is so. Others dislike the label because it suggests another kind of engineering research that is purely ‘theoretical’. Researchers sometimes claim that the service role that they accept implies that they can claim that their studies are inherently ‘useful’. Others see this as necessarily implying a loss of critical independence. Neither claim appears to hold in practice but this is, nevertheless, an area of discussion and debate which still goes on today. A key tenet of action research is that one can only engage in action research on



one's own practice, not on someone else's. Thus you cannot go into a village, a school or an organisation and 'do' action research as an outsider, only those within can make this claim. This provides a point of distinction between evaluation and action research, though again, once engaged in a project the distinction is less clear than you might expect. More often than not, who is a 'member' of what may be contentious, and often an outsider is needed to initiate the study or to act as 'critical friend'. Hence, that poses questions on the 'rigour' aspects of the research and how one should address it.

### **3.2.4 Generalising in Qualitative Studies**

A number of literature sources mentioned claims that the kind of generalisation you can make from a case study is of a different kind. This can be seen as similar to the kind of generalisation we might make from reading a novel or watching a documentary film. There are some aspects of the account we recognise, and others we don't and we are able to treat these differently in our thinking about the case, even if removed from our experience. A close descriptive study of a participant in an industry will be both familiar and strange to readers who do not know the relevant industry. There will be some aspects of the account that they will recognise as familiar, and some that remains opaque and somewhat bizarre.

### **3.2.5 Sampling in Qualitative Studies**

'Sampling' is an interesting topic to discuss. Ideas about 'sampling' that have been developed in statistical research, educational testing and in experimental methods are deeply ingrained in the research tradition, sometimes so deeply engrained that it is difficult to see that there may be other ways of thinking about research. To some eyes 'case studies' is not research, particularly from the quantitative research fraternity. One cannot deny that the use of random sampling and the other assumptions of evidence-based practice are not important considerations in research design.

One has to point out that sometimes they cannot be applied without distorting reality, perhaps for ethical reasons, or because the subjects under study do not lend themselves to this kind of research design as discussed by MacPherson (1998) and Freel (2000) within their research limitations. In practice we often deal with single cases such as this study. Often, what we want to know about the participant's work is specific to their context (small manufacturer in regional location), and importantly, any generalisations that might be available in the literature that do not take adequate account of this context. It is rarely possible to be able to claim, on the basis of research alone, that it is 'true' that university locality can enhance small

business success as per MacPherson (1998), the literature might provide some examples, but in the end, the judgements that we have to make need to take account of context and circumstances.

Hence, this study is singular and very specific to micro-manufacturing within a regional location (a product manufacturer that has less than 10 employees located outside major capital cities and township but within 1 hour driving distance to an university campus and a state or federal based regional business support center; ie. QLD Department of Employment, Economic Development and Innovation, or Enterprise Connect respectively).

### 3.2.6 Reliability in Qualitative Studies

One of the many criticisms made of case studies is that they lack ‘reliability’. ‘Reliability’ is a technical term which refers to the degree of confidence you can have that the study would provide the same results if it were to be repeated. The author had difficulties digesting this part of the methodology. However, based on the mentioned literature, there are different kinds of ‘reliability’, one being about the extent to which the study would be the same if it were replicated on another occasion by the same observers and another, if it were to be repeated by different observers. In making the criticism in relation to case study, people usually mean what researchers term ‘inter-observer reliability’, the extent to which the results depend on the observer and the degree to which using different observers would yield different results. It is almost always the case that different observers see different things, though it is not uncommon to see **synergy** and **data-triangulation** with different observers.

Case study is essentially ‘high inference’, which is to say that the process of observation involves **extensive** and **iterative interpretation**, and interpretations will almost always be distinctive. Indeed, this is one of the things that make case studies interesting and difficult and some would agree, time consuming. The interpretation that the observer brings to the study often uncovers a perspective that we may have overlooked or neglected. In this respect, author aims to do exactly that. This leads to the idea that the best way to respond to the issue of reliability is to try and build in to the study an element of ‘**triangulation**’, whether it is in the data or analysis. Where possible, one should not rely on a single source or format of data, but attempt to draw on several. In this study, observations are supplemented by informal interviews (which are not recorded), and further tri-angulated by relevant sources of documentary evidence or artifacts, such as photographs and videos which are confidential and not for publication.

### **3.2.7 Validity in Qualitative Studies**

‘Validity’ refers to the degree to which the evidence you have measures what it is you are seeking to investigate. Again, the author struggled with this criterion, and many research articles still question the validity of qualitative studies, though one would argue the validity aspects would be strong if qualitative methods were conducted well. In explaining, some studies it is possible to collect findings that are derived from good samples, appear free from bias and suggest identifiable trends, but do not actually relate to the issues under investigation. This is more of a problem in measurement studies because there is a strong tendency to measure what is most easily or cleanly measured and to worry less about the validity of the measures.

From the relevant literature mentioned, measurement specialists tend to be sceptical about what many refers to as ‘face validity’, by which they mean the degree to which a measure ‘seems’ to be a valid indicator of the phenomenon being measured. But in qualitative research, ‘face validity’ is taken more seriously and a large part of the investigation is usually taken up with probing and testing the extent to which the data collected provide the basis for valid interpretation. If one person tells you something, one’s impulse is to seek to verify this independently from other sources of data. The wealth of evidence needs to be substantial to makes it difficult to deny that it is true. In this sense, the pursuit of valid evidence in qualitative research is a little like being inside a court of law providing a strong and defensible argument. And it is through multiple sources of data that this research has built its evidence.

### **3.2.8 Authenticity in Qualitative Studies**

In this study where the researcher is the instrument, sources of data are subject to reactivity and circumstances change over time, the security of an interpretation needs to be enhanced through triangulation or member-checking. This may be in the form of methodological triangulation, combining dissimilar methods such as interviews, observations, and physical evidence to study the same ‘family’. Some quantitative data are also appropriate within the same study particularly in support of a generalization made from a single or limited observation. Data triangulation can be used. It uses purposive sampling within one method, such as interviews, to ensure different perspectives by choosing different gender, status, ethnicity, and participants known to hold alternate viewpoints. Some researchers use longitudinal studies as a type of time triangulation. Other ways of enhancing authenticity is

via grounded theory reiterations and making one's stated theoretical and methodological assumptions and perspectives very clear, particularly in ethnography.

The difficulties here lie in the ill-defined nature of the construct, and the fact that the researcher is also the research instrument. There are many definitions that exist in social science research, hence each researcher needs to explain and justify which position they are adopting. Frameworks, assumptions, perspectives and paradigms must be stated and their relevance for the study discussed. In addition, because it is the researcher's experience and interpretation of data that forms the basis of the data collection and analysis, transparency requires that the researcher consider possible biases in their own position and make these clear to the reader. This requires a sophisticated degree of **reflexivity** and **reiteration**, not only about one's practice but with the construction of knowledge in research. Hence, one of the reasons why this research has taken so long to be written up.

As an inherited outcome of this extended period of reflection and reiteration, the artefacts collected, studied and analysed also covered a period of several years over which time macro-environmental influences may have changed and continue to change. Hence, there is a degree of assumed relevance placed on the macro-environmental influences and artefacts applied to the interview and observation data of the firm being studied.

### **3.3 Research Methods**

#### **3.3.1 Data Collection**

This section provides a brief background to data collection methods in qualitative research methods employed in the study; ie. data collection and analysis methods. In addition to the literature on qualitative research methodology mentioned previously, Banks (2001), Chaplin (1994), and Kvale (1996) were referred to in this section. Qualitative methods are considered here in terms of four broad categories, and are briefly explored:

- Interviews
- Observation
- Images and Videos
- Artifactual analysis

This study uses a modified Bernard (2002)'s model in matching artifacts and observation collected to the research variables and questions as part of the data collection process, and it involves:

- **Internal states** (direct questioning or indirect inference) – survey, interview, phenomenography, diary studies, observed behaviours in controlled circumstances, psychological testing, narrative analysis.
- **External states** (direct or indirect) – financial statements, tax returns, clinical records, journaling.
- **Behaviour** (reported or observed) – survey, interview, diary studies, social network analysis, scenario-based interviews, verbal protocol, focal and selective observation, objective tests, behavioural traces and mapping.
- **Artifacts** (direct or indirect) – counting, describing, photography, transect walk, journaling, documentary.
- **Environment** (direct or indirect) – observation such as photography, mapping, documentary, participant observation, and journaling.

These elements are grouped into:

- **Artifacts** (case studies, photos, videos, interviews, descriptors, policies & programs, literature)
- **Observations** (activities, behaviours, environment, data triangulation)
- **Reflections** (author's notes and journals, generalization, analysis triangulation)

### 3.3.2 Interviews

There are a number of interview methods, some informal and some formal, some structured or unstructured, however, interview methods are based on asking questions and collecting answers. But this simple formulation allows for a wide range of methodological possibilities. Interviews can be more or less pre-planned and structured, can be by telephone or face-to-face and can be with individuals or with groups. In qualitative research, one usually concerned with a particular form of interview. This study uses '**impromptu**' **interview methods; open, unstructured and informal**. This is sometimes termed the open or unstructured interview, though these names are somewhat misleading since some interviewees might find the open interview highly coercive and anything but open, and no interview is ever really 'un'-structured in the same sense that spoken language is rarely unstructured, and often referred to as semi-structured interviews. This structure simply exists at another level; that the interview that may have some pre-set questions but is to a large degree free-flowing and the interviewer follows the lead of the interviewee(s). Such interviews are usually more conversational in form, rather than made up of standardised questions and answers, or set sequences. Such interviews are normally recorded though some

prefer to take extensive notes especially when interviewees feel uncomfortable with being recorded. This is the case for this study, at the request of the participants; no recordings were made of the interviews or discussions. Documentation is in the form of a journal entry based on notes taken during the interviews, and observation noted.

To any outside uninformed observer, a research interview of this kind might be perceived as deceptively conversational. The interviewer will usually guide the interviewee(s) through a range of topics, ask questions to clarify or extend what the interviewee says, in particular by asking for instances or examples of claims that they make, or sometimes confronting them with information that appears to contradict claims that they might have made earlier. Instead of reading the questions, the interviewer will normally place the questions in the conversational flow, perhaps linking them to something previously said by the interviewee. A predominant concern that quantitative or survey researchers have is that the question is presented as a consistent stimulus and asked in the same way to everyone, is not usually a concern in qualitative research. Usually, in qualitative studies, we are not looking to make generalisable statements such as “60% of those interviewed expressed a preference for coffee over tea”. In other words we are looking for the range of **meanings** and **associations**, and in trying to identify points where these different meanings meet, intersect or perhaps collide, rather than in trying to identify their frequency of occurrence and distribution across categories.

The dialogue of conversation rarely consists of clearly identifiable questions and answers and is in fact more subtle and complex than it seems. In normal social conversation questions may be asked obliquely rather than directly, people may answer a different question from the one being asked. All these signs and strategies are culturally specific. Some researchers are better tuned to them than others, but most enact them without thinking about them, or even with great awareness of what we are doing. They are not unambiguous and may or may not be clearly indicated by body language or tone. They can only be read in context, and if you guess the meaning, you may guess wrongly. In normal daily life, one takes the transparency of meaning in conversation for granted when in fact much of what is said, and what is heard, is embedded in coded statements or communicated indirectly. Hence, the author believes that it was the steepest learning to be skilled in these interview methods in undertaking this study, and what makes qualitative research so difficult.

However, the important thing to remember about the research interview is that the researcher's main concern is with **meaning** rather than with verbal evidence, and thus the saving grace for this study. One listens for what people **think and believe** and with trying to

understand how they see the 'world' and their situation and environment, rather than with attending literally to only what they say. Being a competent research interviewer in qualitative research is difficult, and requires a set of skills that one should practice extensively. Kvale (1996) identifies these key skills as:

- Knowledgeable - the interviewer is thoroughly familiar with the focus of the interview.
- Structuring - gives the purpose for the interview, draws it to a conclusion, and asks if the interviewee has any questions.
- Clear - asks simple, easy, short questions, jargon-free.
- Gentle - let interviewee finish, gives them time to think, allow pauses.
- Sensitive - listens attentively to what is said and how it is said; is empathetic to interviewee.
- Open - responds to what is important to interviewee and is flexible.
- Steering - knows what he or she wants to find out and gets there.
- Critical - is prepared to challenge what is said, picking up inconsistencies.
- Remembering - relates what is said to previous statements.
- Interpreting - clarifies and extends meanings of interviewee's statements, but without imposing or distorting meaning.

The author felt during the course of undertaking the study, probably not the first to do so, that the most difficult aspect of interviewing is **listening**. The research interview often takes an apparently conversational form. Conversation is two-sided or multi-sided in the way that the interview is not. In conversation, everyone involved has an equal right to initiate a topic, ask a question, summarise or make a judgement. In the research interview, however, the roles are asymmetrical, the interviewer is mostly in the role of listener and questioner, and the interviewee is mostly the speaker and respondent. This specification of roles can be demanding of the interviewer as it requires considerable concentration. It also requires strategy; the interviewer has the responsibility to structure the interview, intervening at critical points to move to new topics, to seek clarification, perhaps to challenge, sometimes to summarise. As the listener, you need not only to be attentive to what the interviewee is saying at any moment, but also thinking about the conversation as a whole, with what topics have been covered, what questions have been asked and answered, with what remains to be asked and said, and with how to end the interview. One would suggest that it is 'multi-tasking' at its worse, easier said than practiced well! However, this asymmetrical arrangement has a significant psychological affect. It frees the interviewee from the responsibility to manage the

topics and the structure of the talk, which is why people may say things that they do not usually say in ‘normal’ conversation.

### 3.3.3 Active observational methods

There are number of ways to use observation as part of research, including the use of photographs, videos and artifacts. Observation is not just about seeing but perceiving things. Observation is central to qualitative research methods. This might sound too subtle a distinction but observation is not simply about the visual but involves researchers consciously using themselves as a research instrument as discussed previously. Again, this difficult but key task is that of identifying the different meanings that people might have in understanding social actions, projects, places, occasions, events or phenomena. Essentially, qualitative research is about ‘meanings’ rather than things, and this apply as much to feelings as it does to ideas or plans. The research task is not about accumulating information, but to be selective in the information that is collected by relating it directly to the pursuit of ‘**meaning-making**’.

One needs to be a participant observer as discussed previously in the methodology section. Observation is not just a research method, it is a role. Finding an appropriate role from which to observe social situations and social behaviour is critical to data collection and the process of research. Furthermore, as observation are made, the researcher is not just ‘outside’ the observation looking ‘in’ or ‘at’ a set of events, places or occasions, but that in observing, one of the things one is observing is yourself as the instrument. This may sound paradoxical. A key issue in observation is how you establish a role for yourself in the places where you are observing, and how the perceptions that people have of this role might influence the way they behave and what they might say. In this study, the author is involved as an **active observer and participant, namely, a technology and business advisor from the local university visiting on site about two days a week during a 12 month period from 2006 to 2007 in supporting and enhancing the innovation process with the participants and their manufacturing business.**

### 3.3.4 Visual research methods

Observation up until now is an entirely human skill, visual research methods such as images, photographs and videos play an important role in qualitative research today. Banks (2001) is a useful reference to this type of research. Even though this aspect of observation predominates in social science history, they are often neglected in the standard qualitative research texts. There are many uses for cameras and other recording devices in qualitative



research, especially with the advent of digital technologies that are easy to use. There is now an extensive technology for recording events and occasions that are not intrusive, in that they do not require extra lighting, or cumbersome or noisy equipment. Photographers and film directors have documented life in particular social circumstances. Despite the problems of handling visual evidence in relation to situations and events that are highly politicized or sensitive, there remains a tradition of social documentary photography, film-making and video that runs parallel to social science research.

### **3.3.5 Analysis in extracting meaning from data**

One of the most difficult part of undertaking this research using qualitative methodology is realising that one has far more information than one can manage and not knowing quite what to do with it. The inexperience was evidenced at the start when the author spends a disproportionate amount of time collecting data in comparison to analysing it and presenting it. The temptation is always to think one does not have enough evidence and that one must make a stronger case if one have a lot of data, but data and evidence are not quite the same. Sometimes one can establish a point with a few examples but how do you reach a degree of condensation is often a challenge. In measurement studies, a lot of the empirical detail can be condensed as frequencies and variations, but in qualitative studies, more often than not, you are left with boxes of discs and tapes and pages and pages of transcripts and notes. There are software programs available such as NVivo which can help to conceptualise qualitative material, but they are usually not well adapted for use in small, short, one-person applied projects. They generally require extensive coding and quite lengthy periods of analysis so they don't really save any time. Hence, analysis software was not used in this study.

Noting the basic tool of analysis in qualitative research is the human brain (as well as being the instrument). One needs to keep reading the material that have been collected, going back to ask the same questions in different ways, thinking about what people say and trying to form some kind of pattern. The pattern appeared when one least expects it. For the author, it is often when one stops thinking about the material that one starts to see the patterns in it. But this of course took time, and the reiteration process provided many insights to this research.

There was no audio recording of the conversations and interviews; however, it is worth noting some of the issues associated with transcribing and listening to recording. Transcribing recording is a good way to proceed but time-consuming. Getting someone else to do the transcribing does not always help because it is in the process of transcribing that one learns most, since one have to listen to what was said word by word and write it down.

Listening to the recording and writing down what was said makes you pay close attention to detail. The very process of transcription imposes a rhythm and a discipline that observing the live event doesn't. Then one may need to code the data in some way according to certain themes that may emerge. There is a need to build some categorisation into the data collection and this is more evidenced in the result and analysis section.

### **3.3.6 Documentation and Journaling**

It is worth noting that a journal is not the same as a diary and not quite the same as a log book, though it has many aspects in common with both. Here, a journal is a book in which one writes regularly not just of the observations but also in order to keep track of one's ideas and to create a reflective record that one can go back and re-read as ideas take off in new directions providing deeper insights. Journal writing is a vital habit to cultivate and one that the author lacking in patience found difficult but rewarding. The author found that keeping a project journal is invaluable in managing any research because it helped one to remember what happens and what is important. Also, as the research develops, ideas will change and often one will not realise how one has made critical decisions or judgements on data until much later. A good journal should have a record of what one was thinking at the time, with what seemed most important, and with the way decisions appeared as one became aware of the need to make them.

### **3.3.7 Ethical Issues: managing fieldwork relationships**

There were ethical issues in this research that were addressed. This is covered in the ethical clearance application as documented in the Appendix. It is difficult to do qualitative research from one's office without direct and perhaps continuing contact with the participants in one's study. Many researchers would argue that the main feature of qualitative research is that it involves a direct relationship with those who are the subjects of, or participants in, the research. This is generally seen as both a major problem, and as a significant advantage. It is a problem because, in developing relationships with the participants, one inevitably becomes part of the research, and this can easily compromise your objectivity and even become a source of bias. It is an advantage because, without some level of contact with the participants, it is very easy to misrepresent them, to misjudge their motivations and misread their perceptions.

It is worth noting that a central problem for qualitative research is that of establishing and maintaining objectivity. It also follows that objectivity cannot be entirely secured through

procedures or protocols, since it has to be managed in relatively close interaction with people, and the closer the interaction, the more subtle and difficult this becomes. One would suggest that this is true of all qualitative research, but becomes a particular issue in applied studies such as this study, because in most applied studies the focus of the research is generally on activities, ideas and beliefs that are immediately important to participants. In this applied study, the researcher and participants generally have a strong interest and perhaps a lot at stake and any evidence that may undermine credibility or performance will be perceived by most people as a threat. Although guidelines or principles of conduct are never fully adequate, boundaries have to be established and procedures to deal with problems before they arise. These concerns were addressed within the ethical clearance document.

### **3.4 Methodology and Methods Summary**

This chapter discussed the methodology and methods used in this research. The key ideas that were introduced are that qualitative methods:

- are concerned how one perceives the world as others know, see and understand it;
- involves finding ‘meaning’ to questions or phenomenon.
- involve taking on a particular research role and as an instrument, and managing these roles alongside other roles you might have to play in the study;
- are not simply recipes for doing research but involve a distinctive research recipe that may change from one study to another;
- involve data and analytical triangulation, and building evidence as a reiterative and reflective process;
- involve judgement, especially in regard to relationships with others;
- require you to have a degree of self-awareness in terms of the key qualities as a researcher;

This research was based on a description case study within an action-based participatory research framework grounded in explanatory principle. In this study, the author is involved as an active observer and participant, namely, a technology and business advisor from the local university visiting on site about two days a week during a 12 month period from 2006 to 2007 in supporting and enhancing the innovation process with the participants and their manufacturing business. This study uses ‘impromptu’ interview methods; open, unstructured and informal. This study uses modified Bernard (2002)’s model to match the collected data (observation, interviews, photographs and videos) to variables (Internal states, External

states, Behaviour, Artifacts, Environment) in answering the research questions stated in the previous chapter:

- Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy?
- Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs?
- Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?
- Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?

## CHAPTER 4 RESEARCH DATA AND FINDINGS

### 4.1 Introduction

This chapter contains the detailed description of the research findings. There are three main types of data that was collected. These are:

- Reflections (generalization, author's notes and journals, analysis triangulation) - *Section 4.2.*
- Observations (activities, behaviours, environment, data triangulation) – *Section 4.3.*
- Artifacts (case studies, pilot studies, photos & videos, interviews, policies & programs, literature) – *Section 4.3.*

Firstly, the reflections section (with the research findings) will be discussed, followed by the observations, and then the artifacts will be outlined. These data approaches are aimed at exploring and explaining different issues associated with the research questions:

- Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy?
- Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs?
- Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?
- Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?

### 4.2 Reflections

#### 4.2.1 Summary of Findings - Reflections

*Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy?*

This proposition is found to be partly true but with some qualifications with regards to policy development, in that it to a certain degree SME have a higher risk-tolerance for failure against the innovation undertaken. Though many policies attempt to cater for SME, there are often than not very process driven, given that the most important driver for SME is the

owners themselves. Hence, policies need to be more people-centric and have a higher tolerance for risk and failures.

***Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs?***

This proposition was found to be quite true in that the owners are often so preoccupied by the running of their businesses to be actively involved in searching and applying for grant and government assistance opportunities, and new technologies and advancements that may have derived from local research (from universities). There is also a quite interesting point that there could be a self-reliant attitude unique to regional entrepreneurs and business owners, that Frank Sinatra's motto of "I did it my way and on my own" type of values can be observed quite visibly. This is perhaps caused by a number of reasons but one of note is the perceived isolation experienced by most regional SMEs.

***Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?***

The macro-environmental factors identified were affecting the business owner on a daily basis. This is somewhat a catch 22 in that the owner knows that she needed to work on the business but not in the business, but it drives against her reasons for starting her business in the first place (it is her passion). Unless, an external influence such as a business advisor is there to encourage and reinforce positive business behaviours and practice, it is too easy to fall back in 'operational' mode.

***Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?***

Regional universities could play a significant role in facilitating the support, education, innovation and technology transfer of regional SMEs. However, this suggestion is made with qualifications. Traditional values and culture of academia does not correlate well with that of innovative SMEs in that the speed at which innovations and failures happens are worlds apart. Hence, an intermediary is required to facilitate clusters which may involve other competitors, larger firms, and universities. This may be the role that government agencies such as the Enterprise Connect should play more extensively.

## 4.2.2 Generalization and Overall Findings

It is important to note that the generalization of the findings in this research is confined within one case and with one observer over a significant space of time. Hence, there will be validity and reliability issues with the assertions made (as below). However, as explained previously in the methodological approach taken in this study is not about to proving anything, but to gain a deeper understanding of the innovation dynamics of SMEs using an action-based intervention within the conceptual framework modeling. The findings are presented below:

**Proposition 1 findings:** This research in examining the artifacts of the available innovation related programs has indicated a growing weight of evidence to suggest that failure and novelty is mutually inclusive and is the governing principle behind innovation policy, in that it presumed by the policy makers that it is a process that systematically grasps opportunities in the midst of change while minimizing failures. The research observed that SMEs have the natural tendency to innovate, and a willingness to approach innovation in a “trial-and-error” in comparison to large businesses where significant large R&D budgets are involved (and reduced risks of failure). The notion of failure is fundamentally embedded within the culture of SMEs in a positive sense that you have to “give-it-a-go” to innovate, however often than not, failure could mean the end of the business venture. Some would suggest that the SME’s owners wear these “failures” as a “badge of honour”. Though the principles behind the policies are aligned with visible SME requirements, there is a fundamental difference in the approach taken; ie. process vs people centrality. Many of the programs and literature resources (engineering and business) that were developed to cater for SMEs have this belief that SMEs do have core fundamental expertise and resources, strategic and operational systems, and in general, good business principles and application. However, this research suggests that many SMEs and specifically in our case study, micro-manufacturers in regional settings do lack many of the standardized and theoretical models of a SME, in that the business is the owner, and that every owner is different in their profile, traits, personality, and skill sets. That is, the business can only grow and prosper with the owner in isolation of the policy-based support that are seemingly accessible at face value but often rendered useless. Process-centric policies will not suit people-centric needs. Process-centric policies would not have much traction dealing with essentially people-oriented problems and issues.

**Proposition 2 findings:** Our study has shown that SMEs especially micro-manufacturing in regional setting are not effective and efficient beneficiaries of innovation policies and their outputs, such as research, education and business support. In addition to the process-centric

programs that are not conducive to business owners as day-to-day decision makers, there is a limitation of the availability of time and money to gain support and then innovate accordingly in a planned and systematic fashion. Often than not, innovation came through as an adhoc and experimental approach lacking in assurance of success but lacerated with zeal and passion for the new products and improved processes one envisioned in one's sleep. Often than not, the source of finance for the experimentation and innovation is the "credit card", in the hope that the new product line will sell. Time constraint is a significant barrier to SMEs innovating. Literature suggests that the most innovative firms do not rely on just the owners to innovate but one that creates a culture of innovation across the organization. Very difficult to achieve when the organization is only three people as in our study, and the ownership of innovation derived from the owner. Time to do research and consult on the potential grants and innovation programs that are available were not prioritized. This is perhaps not just a time or prioritization issue, but one that is buried within the entrepreneurial spirit "I-did-it-my-way" and "See, I-made-it-worked". The self-reliant belief is very visible especially in our regional setting, where isolation has been part and parcel of the Australia outback way of life. Investing in support for SMEs mean investing in the owners. This could be in the form of business coaching, educational support and skill development.

**Proposition 3 findings:** The study examines the question on what extent do macro-environmental factors influence the decisions of business owners to innovate. It has concluded that macro-environmental influence will affect business strategy, performance and competitiveness one way or another, at different level of impact, of which owners must consider and address in their management of SMEs. In many cases, managers can only absorb the impact by repositioning or restructuring their businesses. This variable is very much a determinant of how well business owners deal with time constraints. Often than not, owners are approaching multiple fronts; strategic, operational, and frontline activities. You have the customers, the banks, the taxman, the suppliers, the forwarding services, even a simple utility bill can cause "hernias" in any given day. The old saying in SMEs, "work on the business not in the business" still hold true, but the difficulty still reside on values and behavioural barriers to remove oneself from the frontline. Monitoring the operational progress and "working on the business" defeats the purpose of why owners started the business in the first instances. The core value of a "need" or "passion" in SMEs is in itself providing the basis for starting the venture but holding back the owners in the toil of day-to-day activities. However, in saying this, the most successful SMEs are the ones that are able to change this paradigm in their thinking, and invest in themselves and allow others to "work in



the business”. The proliferation of business coaching for SMEs is an exemplary illustration of such a change in discourse.

**Proposition 4 findings:** From the basis of this participatory study, one could suggest that regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster. Though the active participatory researcher (and author) made preparations and skilling in the engineering, business, and management expertise, it was unprepared for the interpersonal and counseling nature of the interactions. One would spend an afternoon listening to the owner sharing the “struggles” and “battles” of the week, and this is somewhat missing in all innovation program and policies; the psychological difficulties and barriers associated with regional SMEs who generally operate in isolation and remoteness. Though enriching an experience, it was difficult to apply the technical expertise into business and technological solutions without dealing with the psychological barriers to innovation. As a result, many of the envisaged solutions were not tested or implemented. However, the impact of the “first-priority” innovation implemented saw immediate increase in production efficiencies, and hence, a reinforcement for the owner of the need to change the SME discourse into “working on the business”. Even that the location was still within a 2hr driving distance, it was still evidenced that the lack of focal point, in terms of a networked “cluster”, diffuses any incentive to engage or interact with the university in its region. It is also quite evidenced that there is a lack of understanding by the SME community of the role of tertiary institutions in their research and teaching for economic and community development. Governments in this instant have an important role to play as the creator and facilitator of collaborative environments. Universities cannot do it alone nor will it as the incentives are not compelling in relation to the third prong of its existence: “Service”. Australian universities in recent times have the tendency to focus in only teaching and research but in a mutually exclusive way. Perhaps, one can suggest that all three prongs should be in harmony, teaching, research, and service, and be funded appropriately to do so. This study suggests a model where a team of case managers would facilitate collaborative research between networked clusters consisting of manufacturers in the region, teaching of entrepreneurial skills and educational development for the managers and owners, and providing a service to the community in a coordinated effort between industry and institution to encourage innovation and economic prosperity in the region.

### **4.2.3 Author’s notes and journals**

As part of the author’s research journey, personal notes and journals were recorded as part of the reflective exercise to strengthen the research in terms of validity and reliability. The

journey is somewhat perplexed in that one assertion made early on the research path and quite comfortable with will be later challenged and rethought. In some way, this is the iterate process of analysis that is often a struggle and a delight at the same time in coming up new findings or refining old ones. Table 1 outlined the reflection of these notes and journal entries, and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation.

**Table 1: Reflections of Author’s notes and journals**

Engagement Phases	Reflections
Relationship Building	<p>This period was a “get-to-know-you” time where nothing much was achieved in terms of innovation improvement or knowledge transfer. The author had envisaged that he was able to go to the factory premise armed with innovation tools and available grant and assistance programs. However, this was not the case. The owner and the employees required some time to know and be comfortable with the extent of the assistance being offered and importantly, to place some trust in the external agent (from the university) to provide advice for changing some of the innovation practices and new product development process. This took considerable amount of time investment (listening and talking). It is also evidenced that the owner has invested heavily emotional investment into the business, and is very emotional attached to it. Hence, the difficulties in trusting and relying on external agents to influence how things operated in the business. The isolation of the factory’s regional setting may also have had some influence over the issue of trust and creditability.</p>
Consultation and Development	<p>The perceived barrier of trust and creditability gradually were broken down over a space of a few months of weekly visits (mostly listening to the difficulties of how business was and that there is always a lacking of money, and importantly, time to invest in innovation and technology). It quickly occurred to me that the biggest hurdle most of these micro-businesses are not necessarily the eligibility to access the grants and assistance packages under a number of innovation programs, but the time investments. Micro-business’s owners are often tied down to the day-to-day operations of the business, and that to “go into town” could literally mean lost revenue and ill-afforded profits. In addition, the macro-environment</p>

	<p>that micro-manufacturers operate in is an incredibly tough one. One would suggest that these businesses often operate because “you only do it for the love of it”. However, having the benefit of the external agent at their factory doors, as in our case study, will have had a significant contribution to activating the innovation triggers. The author also had to continuously aware of the emotional elements attached to the business, and every advice given needed to take into consideration the characteristics and belief system of the owner. In some ways, the business is the owner. The owner lives, breathes, and dreams for the business. Breaking through the self-reliant approach to managing their business is also a barrier faced by the author. The challenge here is to convey an innovation strategy to the owner, giving the impression that it was the owner’s ideas and inspiration that came up with it. This injunction with breaking down the distrust barrier took most of the consultation time. In essence, the development of the innovation strategies and the engineering that came with it was rather easy and simple (when compared to the human factors).</p>
Implementation	<p>This phase was quite rewarding in that months of listening, planning, and developing “low-cost” solutions were finally implemented to address the operational and strategic challenges faced by the micro-manufacturer. It was personally rewarding in seeing the ideas and engineering innovation being implemented and the rewards in the form of increased productivity and reduction in wastage were measured. This required to a large degree flexibility and agility in time from the author, to change the plan when required and to add in additional “enhancements” at short notice. It also required a hands-on approach to the implementation, which traditional university academics would loath at. However, in saying this, the relationship could still work, though an intermediary trained and experienced in connecting owners and managers of businesses (along the value chain) and university within the regional cluster setting will be required for any visible improvement in I&amp;TT to work effectively.</p>

#### **4.2.4 Analysis and Data triangulations**

Analysis triangulation is achieved via a reiterate process by reviewing over my personal reflective journals, the observations and artifacts over a period of approx 2 years. During this time, new insights were developed into how and why SMEs behave a certain way, deducing reasons for explaining the observations, in developing the findings for the research questions. Data triangulation is achieved via the array of data collected including photos, videos, activities, behaviours, and literature from a wide range of sources. The triangulation of data enables complimentary and perspective views of the I&TT process from different angles. The practice of triangulation both in analysis and data collection helps to enhance the validity and reliability of qualitative research methodologies as outlined in Chapter 3.

## **4.3 Observations**

### **4.3.1 Summary of Findings - Observations**

***Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy?***

Failure and Novelty is mutually inclusive as far as the findings in this research. However, it was noted that it is probably not the governing policy behind innovation policy development. There seems to be a lower tolerance to risks in Australia and less forgiving if failure occurs. It is observed that there were many times the micro-manufacturer would have a new batch of product literally thrown into the “bin”, because of the innovation did not result in the desired outcomes. “Oh well, let do that again and I think it just needed a little bit more of ...” is typical of the observed attitude and behaviours of the owner and surprisingly the employees. It is almost a badge of honour to the participating micro-manufacturer to fail in attempting innovation, which indicated a high tolerance to risks and failure. Perhaps this is born out of necessity rather than the norm, as the business gets started out of personal drivers such as interest, passion and love. There is a strong thematic linkage between failure and innovation in regards to small manufacturer, but much stronger in regional and isolated settings where there is much self-reliance and to “tough it out” and “make it work” mentality. However, this has been totally missed by policy developers, where there is much more emphasis in business systems and much lower tolerance to risks (especially financial risks). Hence, this may be the reason why most micro-businesses do not bother with seeking assistance and grants even though it may be primarily designed for SMEs. In some ways, it is a choice that some micro-businesses may decide that it does not desire to cross the divide between a “hobby” and “profit-maker” because of the inherited human factors which are not considered in any way or form in innovation policies (until recently with establishment of the Business Enterprise Centres). This somewhat explains the proliferation of business coaching targeting small firms.

***Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs?***

This proposition supports the findings in proposition 1. The findings do indicate that SMEs are not effective and efficient beneficiaries of innovation policies and their output. The observations indicate that the micro-manufacturer did not seek the many SME programs and grant opportunities that exist, because “I don’t have the bloody time to look at the paperwork and who is going to write up the proposal” and “business plan.... What business plan? I am

surviving one day at a time”. This is in some way the catch 22 mentioned previously that unless the owner starts to work “on” the business it will be difficult not to work “in” the business. The missing link is an advisory role or external agent that takes the onerous tasks of establishing the specific needs of the SME, then seeking the right programs and makes ready the paperwork required.

***Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm’s manager to innovate?***

It is observed that the influencing macro-environmental factors did affect the micro-manufacturer. Most of the factors outlined in the literature review did have an impact in some ways. However, the most significant ones are that of economic and market drivers as the micro-manufacturer’s product are mutually linked with the discretionary spending consumers. Hence, financial return and productions tends to be fluctuate from week to week and month to month, creating uncertainty that does not promote medium to long term planning that are key ingredients to successful planning and implementing innovation in the product development and manufacturing processes. In some ways, the macro-environmental factors reinforce the intrinsic need of the owner to be involved in the day-to-day operations of the manufacturing, as opposed to working on planning and strategizing.

***Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?***

It is observed that regional universities can play an instrumental part in delivering support for I&TT to occur in SMEs, in particular within a networked cluster. This must include small business advisory services preferably free or at a low cost. This advisory service should be a platform to connect the SME to other networks including the technical, business, and management capacity and capability of the regional university. However, it will be a challenge to implement. It is observed that the culture and expectations of SMEs and academia will clash. SMEs are generally quite reactive, agile and spontaneous when approaching innovation, where as academia tended to be more forward looking, pioneering in some ways, but tends to be long termed and investigative in nature of the innovation they aspire to. Hence, it may be a marriage too risky and fraud with danger, and that the proposition is ideally and structurally sensible, but culturally impractical. We are dealing with human being (the owners/managers and their businesses) after all.

### 4.3.2 Activities

Table 2 outlined the observation of the activities, and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation.

**Table 2: Observations of Activities**

Engagement Phases	Observations of Activities
Relationship Building	The manufacturing activities were quite erratic, with order priorities and its manufacturing being often decided on the morning before production. Decisions are literally made on the run basis, and sometime would change during the day because “did you do that batch the other day, what you mean no, we need to dispatch tomorrow!” There were orders flowing from phone calls, faxes, and emails (generated from online orders). There were products stored under crudely made bench-tops used for manufacturing work-stations, and other made products were on available floor spaces.
Consultation and Development	The manufacturing activity was surprisingly very efficient despite the lack of automation; eg. such as sticking labels by hand or cutting the product into its segments by hand. The main culprit in terms of productivity is the manual handling between work-stations. Hence, the strategy adopted for improving productivity and costs is to introduce cost-effective semi-automation solutions and relocating work-stations for activities that require high levels of manual handling or transfer between work-stations. It was noted that hindrance was also caused by the congested floor space, given that the staff had to “step-over” product that needed to be stored “somewhere”. Hence, another strategy adopted was to de-clutter and design in a easily accessible storage solution for both temporary storage (during manufacturing) and final storage for distribution.
Implementation	There were some disruptions to the manufacturing during the implementation stage, however this was minimal. The preparatory planning and consultation ensured that the stages of changes were implemented with minimal disruptions to effective product flow. There were also new learning curve for the manufacturing staff to operate in the new environment and work-stations. The learning curve was short, in that the extensive consultation with the owner

	and staff did provide opportunity for most of the preparatory learning. In fact most of the innovative ideas and concepts derived from the owner and staff. They were innovating and learning without even knowing they were!
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### 4.3.3 Behaviours

Table 3 outlined the observation of behaviours, and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation.

**Table 3: Observations of Behaviours**

Engagement Phases	Observations of Behaviours
Relationship Building	There is definitely a hint of suspicions from the owner among the friendliness that greeted the author when he first visited and explained what he was trying to research and how he can help the micro-manufacturer in terms of innovation, business and manufacturing improvement. This friendly, confident and somewhat proud facade continue for a number of weeks until the owner “opened up” and conveyed the difficulties and the isolation one experienced as a regionally based micro-manufacturer. It is apparent from the behaviours that the owners were often quite emotionally inconsistent with one week being happy and bright to doom and gloom the next. Perhaps it is the hardship and sense of inability to change or control their circumstances that one is in. It is also observed that there are sensitivity with receiving external advice, in that the owner are so engrossed in her area of expertise as a business owner and master-craftsman. It is evidenced that taking advice openly can be a perceived hurdle and resistance, and many hours were spent breaking down interpersonal and self-limiting barriers about change. The author also observed that even though the owner was very self-motivated and confident in her demeanour, it is evidenced that the financial hardship and long-working hours were taking a toll on her confidence for the business.
Consultation and	During the consultative and development stages, there is an



Development	<p>uplifting sense that circumstances are changing and change for the better. The intervention of having an external advisor visiting once per week is having a significant impact in improving confidence and emotional stability. This positive behaviour exhibited consistently throughout the visitations. The author believe the physical manifestation of a person visiting regularly to provide support and encouragement, and assistance with the innovation ideas and improvements, and as a conduit for evaluating new product ideas the owner came up with the week before, the impact to behaviour was significant. This does indicate a direct and close relationship between the business and the owner. In some ways, the business is the owner (a living and organic being).</p>
Implementation	<p>The implementation stage saw evidence of very positive behaviours in seeing productivity improvements, and a redesigned factory layout and new storage areas established. The author does have one question that would be difficult to answer in this study, in that “Is this positive behaviour continues without the visitations and interventions?” The need for continuity and sustainability in the desired outcomes is therefore one issue that may need to be addressed with any proposed support mechanisms. How do we continue this positive behaviour towards innovation and technology transfer? Perhaps a need for network clusters is desirable where there is peer-support in addition to the external advisor.</p>

#### 4.3.4 Environment

Table 4 outlined the observation of the environment, and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation.

**Table 4: Observations of Environment**

Engagement Phases	Observations of Environment
Relationship Building	<p>To say that “it was a mess” when I first saw the factory and manufacturing process is an understatement. However, in saying this, I am commenting on the basis of a professional engineer who</p>

	<p>had manage large manufacturing facilities where its systems and layouts are planned, executed, and importantly maintained to a measurable standard that equates to measurable outputs and outcomes. This observation of the operation in action was a unique experience in that it was “chaotic” but it works! Somehow in the midst of chaos, products were made and shipped out in boxes within reasonable timeframe. There were empty boxes in one corner, rejected product in another, unfinished products in unlabelled crates would be scattered through the floor space. There were drums holding up a broken door that was used as a workstation, and there were miscellaneous items cluttering the storage shelves. But, it still functioned and kept producing products of exceptional quality.</p>
<p>Consultation and Development</p>	<p>No significant changes to the environment took placed during the consultation and development stages. Though there were minor improvements through purchases of low-cost solution to improve the ease of manufacture (and hence the productivity), the big item solutions were not implemented until the owners had excess funds and were confident that the change will work.</p>
<p>Implementation</p>	<p>Major changes to the factory layout and manufacturing processes were implemented after months of planning and consultation. The changes were implemented within a few days, and immediate productivity improvement was evidenced. The factory layout was streamlined into an L-shaped manufacturing flow (as documented in Chapter 5), with a significant increase in temporary storage for unfinished and finished products, as well as for raw materials, and dedicated spots were created for equipment used in the manufacturing. The floor space was opened and cleared up, and workstations were position to minimise manual handling and movements of unfinished goods.</p>

## **4.4 Artifacts**

The artifacts collected are wide-ranging and numerous. These included local case studies into a small but very successful manufacturer looking to engage a regional university to undertake research and to encourage knowledge and technology transfer. The author also undertook a local pilot study in seeing how macro-environmental factors influence small businesses (within the hospitality industry but with manufacturing themes). These artifacts were collected to undertake the research with the regional micro-manufacturer in question. Other important artifacts relating to the micro-manufacturer being studied included photos and videos of the factory and operations, and both formal and informal interviews (these are withheld and to be destroyed at the request of the participating proprietor). Also included within the artifacts collected are the policies and programs to assist SME's innovation. Several state-based and national-based programs are outlined with brief descriptions provided. In addition, innovation policies from the Australian government dated from 2001 to 2008 are outlined with brief descriptions provided. Artifacts consisting of literature were also collected. These were from reports and submissions from lobby groups such as Business Council of Australia and Society for Knowledge Economics. Other literature includes articles from Business Review Weekly, SME-related business coaching tools, business-related books, and engineering management books, regional economic development reports, and academic research papers.

### **4.4.1 Summary of Findings – Artifacts**

***Proposition 1: Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy?***

The artifacts collected indicate there is a contradiction in the perception and views around failure and novelty. Perhaps it is the case where literature often dismiss failures and glorify success, and often than not, the relationship between failure and novelty is blurred. The author is somewhat perplexed by the eclectic range of external artifacts such as innovation programs and grant assistance right down to business and academic literature. This proposition is neither confirmed nor dismissed when the internal artifacts (from the participating micro-manufacturer) were collected. It may be argued that this is one of the reasons for the need for deep insightful research to be undertaken (even if it is a sample size of one). While some externally oriented literature does acknowledge the role of failure plays in the innovation process, others tend to avoid it, especially when it comes to policy development. This does indicate a risk aversive approach to policy development, even if it is

aimed at catering for SMEs (which have the tendency to have higher risk appetite and tolerance to failures).

***Proposition 2: SMEs are not effective and efficient beneficiaries of innovation policies and their outputs?***

There are some indications that SMEs are utilizing innovation programs and grant assistances. The question here is whether SMEs are effective and efficient as far as regional SMEs are concerned. The artifacts collected do indicate that SMEs are not utilizing the programs as much as they should as much as it was catered and planned for. The process for application and qualification for these innovation programs generally contradict the original intent to assist in area where most SMEs are at their weakest; ie. business and financial planning. It is a catch 22 scenario where the in order to qualify for assistance, SMEs have to overcome the barrier(s) of which they are seeking assistance for. This point to the fact that most innovation programs in the past has been designed based on a process-driven philosophy. Encouragingly, refinement in policy development in the last few years, innovation programs are becoming much more people-centric, but more specifically, owner/manager-centric. In some ways, the owner is the business.

***Proposition 3: To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?***

The artifacts collected do indicate that the macro-environmental factors do affect the SMEs significantly. It also reinforces the tendency for owners to continue to focus on operational issues (which often deals with trouble shooting either with the manufacturing process or customer services), rather than focusing on business and financial planning. Some literature did suggest strongly that the role of incubation and hosted clusters for SMEs will generate a sense of control and structured guidance and mentoring which otherwise would not exists in regional context.

***Proposition 4: Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?***

The artifacts collected do indicate that this proposition may be quite promising. All evidence collected including literature strongly suggest that regional universities can play not just an instrumental part but a significant part in supporting innovation of SMEs using networked clusters. Many examples of successful government intervention in the USA and UK were documented, and this is somewhat supported by the research study. It should be noted that

not all universities are alike and not all SMEs are alike in terms of interests, values, and practices. Hence, the success factor here must be driven strongly at the policy directive level, where “picking winners” will be part of the selection process for SME clusters and to a certain extent, directed funding (or termed “compacts”) for the regional university.

#### **4.4.2 Artifacts - Local Case Study**

##### **Russell Mineral Equipment – A Journey to Successfully Collaborate with the Research Sector (SME Case Study by Dr Rowan Gilmore)**

When Russell Mineral Equipment (RME), a specialist mining equipment technology company with its design and manufacturing facilities based in regional Queensland, donated \$200,000 in 2001 to a local university, they expected better collaboration with the university and ultimately commercial outcomes from the partnership. As a highly innovative and successful business committing 4% of their total income to R&D activity, RME thought it worthwhile to assist the university to retain one of their gifted academics through the donation, and to increase their access to the university’s advanced computer modeling capability (SKE 2008).

Unfortunately, their contribution did not achieve its objectives; RME saw no direct increase in collaboration between themselves, or any other business, and the university. At the same time, RME’s approach to collaborate with another national research organisation was declined. That research organisation stated that they feared losing annual funding from a foreign multinational who might see such collaboration as competitive (SKE 2008).

After these experiences, RME were introduced to TechFast, an intermediary service specialising in facilitating collaborations between SMEs and research organisations. The service assisted RME to explore various technology commercialisation and collaboration opportunities with multiple research organizations across Australia. RME Managing Director John Russell said TechFast was ‘the perfect adaptor plate between academia and industry that also showed RME what it should do to better engage’ (SKE 2008).

Subsequently, RME were able to leverage an unspent portion of their donation to win an ARC Linkage grant with the university, but needed additional expertise from the Julius Kruttschnitt Minerals Research Centre (JKMRC). Unfortunately, the ARC grant made reallocating existing project funding to bring in a third collaborator complex. Still determined, RME paid additional money to integrate JKMRC into the project. Because of this increased collaboration, JKMRC recognised RME’s extensive commercialisation

experience and capability and so approached RME to assist them to take a new JKMRC technology to the market. The first units of this technology will soon be delivered to customers, and sales of more than one million dollars have already been secured (SKE 2008).

‘...after two years the collaboration is yielding quite interesting results, although progress is geological... Australia must do better in creating the right environment and connecting mechanisms between SMEs and universities to meet our critical challenges,’ John Russell said (SKE 2008).

## **Conclusions**

The above case study shows that collaborative interaction between regional universities and local businesses in research projects can be quite difficult. Most firms would not persist with the collaboration effort, and will fund and expand their respective inhouse R&D. This is a good indication that the policy and program platform for research collaboration between the SME sector and universities in regional areas are not working.

### **4.4.3 Artifacts - Local Pilot Study**

#### **Kingfishers Café Restaurant – A Business Review and Pilot Study into SME Innovation (SME Pilot Study by Steven Goh – Poie Consulting)**

This pilot study aims to review and assess the macro environmental influences and business forces that affect Kingfishers Café Restaurant. After a comprehensive review of the business including a SWOT analysis, several of these external business forces were identified, and there are categorised into: Innovation, Economical, External Human Resource, Corporate social responsibility (CSR), Political factors, Legal, and Globalisation factors. These factors affected Kingfishers Café Restaurant in one way or another, and at different degrees of influence.

Cost of doing business and effective human resource management (HRM) is of major concerns, and were addressed. However, the business had a good management foundation and systems for continuous innovation and growth, where the main strategy is in the form of the 3-Fold Strategy. In analysing and addressing the external business forces, a number of strategies were proposed.

The Café needed to target the medium to high discretionary spenders by providing and innovating superior product and service delivery, as part of 3-Fold Strategy. It is also imperative to continuously monitor and improve operational costs. The Café needs to

implement a recruitment, retention, reward (RRR) strategy to be valued as an “Employer of Choice”.

The Café needed to incorporate CSR and “brand equity” value adding into the marketing strategy. The Café must somehow influence government policies through Industry Group. The Café needed to incorporate risk management process as part of the overall business strategy. The Café should continuously look for expansion opportunities to compliments existing operation and to lower management overheads.

In analysing and addressing the external business forces, a number of actions were proposed. Most of the actions are associated with effective HRM, and effective cost management.

The main findings are:

- 1) The strengths of the Café are in its strong business management system, its unique atmosphere, and its brand and reputation.
- 2) The weaknesses are its “off-street” location and visibility, increasing cost of operations, and fierce and congested competition.
- 3) The opportunities are to use its current management abilities to expand to other locations, and thus lowering the cost of management overheads, and have the ability to cross-sell and promote between the different locations.
- 4) The threats are in the form of unsustainable cost increases, further escalation of competition, and the inability to compete effectively with large businesses in the same sector.
- 5) The Café is under pressure from external forces that have impact on cost of doing business.
- 6) The Café has also been proactive in developing management systems and strategies to combat these external forces.
- 7) The innovation in the operations is continuous and forms part of the “3-Fold” Strategy; to strive for excellence in the product, the delivery of service, and the ambience and atmosphere.
- 8) The Café has targeted medium to high discretionary spenders to lower the effects of any economic downturn and to pay for increases in the cost of employment.
- 9) The main challenge for the Café now is to recruit and retain the best staff, as part of the successful delivery of the “3-Fold” Strategy. This can be achieved by becoming an “Employer of Choice”.
- 10) There is a need for the Café to continue the work started on risk management.

11) There is a need to implement the expansion strategy in the near future to lower the cost of management overheads.

12) It is noted that the Café has been adopting the principle of being a small business but think like a big business.

There are 9 recommendations for strategies as illustrated in Figure 4.1:

1) To target the medium to high discretionary spenders by providing superior product and service delivery.

2) 3-Fold Strategy: excellence in the product, its delivery, and dining ambience.

3) To continuously improve and innovate the operations as part of the 3-Fold Strategy.

4) To continuously monitor and improve operational costs.

5) To implement Recruitment, Retention, Reward (RRR) strategy to be valued as an “Employer of Choice”.

6) To incorporate CSR and “brand equity” value adding into the marketing strategy.

7) To influence government policies through Industry Group

8) Incorporate risk management process as part of the overall business strategy.

9) Expand to compliments existing operation and to lower management overheads.

There are 17 recommendations for actions:

1) Training (3-Fold strategy) to incorporate innovation elements.

2) Management support for innovation in the form of capital investments.

3) Recruit only the best candidate or the potential to be the best

4) Recruit with a view for long term gain for both parties

5) Develop comprehensive training program that incorporate innovation

6) Promote stability and flexibility in the working hours

7) Promote a pleasant, supportive but challenging workplace

8) Pay above award where possible

9) Provide performance-based incentive program

10) Continue to seek and support one charity of choice per year, and promote it to the customers.

11) Ensure public relation and brand equity is considered and involved in all actions.

12) Continue to support Restaurant & Catering Association.

13) To improve the “paperwork” & administration tasks to decrease costs.

14) To systematically review all risks associated with the operations to decrease compliance costs.



- 15) To review and form closer relationship with the suppliers to decrease costs of operations.
- 16) To review pricing regularly to ensure required profit margin is met.
- 17) Review current expansion plan with the aim of complimenting existing operations.

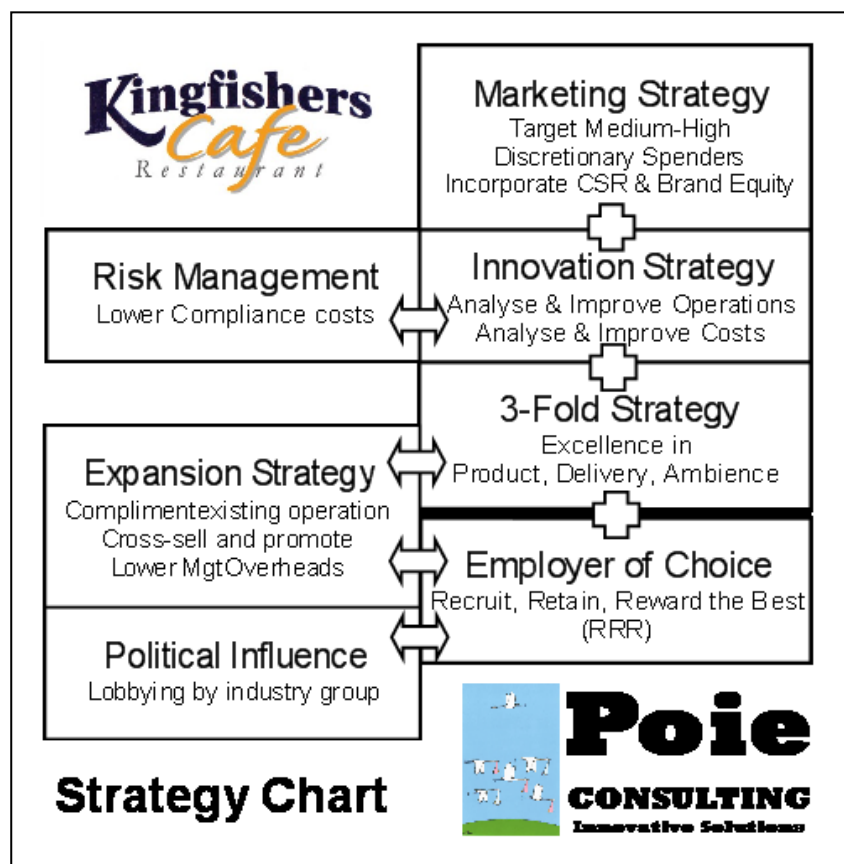


Figure 4.1 “Strategy Chart” of the strategies proposed for Kingfishers Café Restaurant

### Description of the Firm

Business History: Located in Springs Garden World, 333 Spring Street, Toowoomba, Kingfishers Café Restaurant started commencing business on the 1st August 2003, when Poimaco Pty Ltd took over the lease. Before this, the café had been operating 3 years from the official site launch as a management run inhouse operation of the current landlord and owner of the property and building. The café was then leased to AOP Catering, and for unknown reasons, breached the lease and left the premise after approx 17 months. According to the landlord, during this time, the reputation and the trading condition were damaged severely. During the 22 months of operations, reputation were rebuilt, sales improved (almost doubled), operational system designed and implemented, and service level improved dramatically. The business is currently fully management run.

Business Operations: The Café is opened for breakfast and lunch 7 days a week from 9am to 4:30pm, can fit up to 100 people indoor and another 30 outside on the patio. The café also have 2 prime lake-front sites for marquee set-up. The café is also marketing itself as a boutique function venue for garden weddings and receptions, of which the receptions are normally held during night times. The Café has been very successful in penetrating the wedding market, and have a strongly booked year ahead.

The menus are a broad line of flavours and food types that can cater for almost every taste bud. It varied from the typical café offering like toasted sandwiches to restaurant grade steaks and seafood pastas. It is positioned itself as a premium café offering restaurant style service and menus. It is fully licensed and provides full table service. The vision of the business is to be a group of growing and highly profitable boutique restaurants focusing on niche market of medium-high discretionary spenders. Its mission is to develop ownership and empowerment in the staff to sustain excellence in providing exceptional dining experience.

Marketing Strategy: The marketing strategy employed by the café emphasises the product it sells is a “dining experience” consisting of: 1) the product (ie. food & drinks), 2) the delivery of it, and 3) the ambience. This “3-Fold” strategy has helped to win prestige awards for excellence, and indirectly, self-market the café through “word-of mouth” advertising from customers. There has also been emphasis in building the Kingfishers’ branding. The cafe uses a number of methods to attract and retain customers, such as loyalty program, directory advertising, TV, newspaper, charity work, and public promotions. Statistics have shown that only 5% of Toowoomba’s population dines out regularly at restaurants, with majority of diners preferring fast or takeaway food. This confirms Toowoomba as a growing (as the result of population growth) but limited market. However, the competition is fierce with a large number of restaurant outlets competing for the same limited customer base. This has resulted in recent closure of Big Barra, Luminous, and Korean Village.

Human Resources: Currently, the café has about 12 employees in its books, which was recently scaled back from 15 as the result of a staff performance review. The employees consist of 1 manager, 1 function coordinator, 1 head chef, 2 apprentice chefs, 1 school-based trainee, and with rest employed on a casual basis. Historically, there has been a high turnover of managers and staff, which affected staff motivation and operational stability. This is the 4th manager and 4th head chef the café have employed. The casual turnover rate has been very high, with most staff staying no more than 6 months on average. The quality and the availability of staff that can be recruited are often extremely limited. This is of major concern, as it is estimated that for each new employee recruited, it cost approximately \$3000

in training, loss productivity, loss sales, higher food cost and human errors. A comprehensive “Employee Manual” has been drafted to help decrease the cost of employment by fast tracking the job familiarity. A “Competency Checklist” is currently being drafted to ensure every employee is trained to competent levels.

Innovation: The Café has a policy of systematically and continuously looking at its operations and attempt to improve it. The menus are reviewed every six months or less. The operations are improved either by changing the procedures or investing in equipment to lift productivity. The café ambience is also reviewed regularly to ensure that the place do not become “tired”, and face lifts such as changing the colour scheme were recently implemented.

Financials: The café is currently turning over slightly under \$500,000, with gross profit around 64% (70% industry standard), and a probably net margin of only 2% (5-10% industry standard). Excluding the manager wage, as if it was owner-operated, the net margin would be over 12%. The 3 areas of cost concern are cost-of-goods, wages, and leasing costs. The leasing cost to sales ratio is currently around 10% and tends to be fairly stable, with small rises yearly. The cost of goods has been rising dramatically over the last 18mths, some suppliers’ prices have risen more than 30%, but on average the increases has been around 15-18%. Most suppliers have cited increased labour and fuel costs as the reason for price rises. The wages has been rising with every Industrial Relation’s minimal wage rise (15% over 22 months). The café has some small borrowings funded out of cash flow to invest in new equipment.

The Future: Faced with rising costs in both labour and cost of goods, and a matured and very competitive market, a number of proposed strategies have been adopted by management. A review of cost and pricing has been underway for a few month, and is close to completion, and very small price rises are expected (it is small because of the price sensitivity and the competitiveness of the market). A review of the capital needs will be performed next. And an expansion plan has been drafted. The expansion plan looks at either acquiring or establishing niche hospitality opportunities. The reason for expansion is to share and flatten the cost of management, in terms of the Manager and the Head Chef (ie. to divide the management cost to 2 or 3 businesses instead of just one). The plan is to triple turnover in the next 4 years and increase net profit margin to at least 10%. Remuneration of management has been structured to include a performance bonus if these targets are met.

## SWOT Analysis

The SWOT analysis analysed the strength, weakness, opportunities, and threats facing Kingfishers Café Restaurant.

Strength: What has really helped Kingfishers Café Restaurant to survive and compete in a matured and highly competitive sector is the ability to applying “big business” principles and approaches to developing systems and management, in particular, highly focused market and financial reviews (Abernethy 2005). As the result of this focus, the right customers are targeted, and the right profit margins are maintained. It has also been a continuous effort to improve the operations, innovate the menus, and refresh the deco as part of the “3-Fold” strategy. It also has a benefit of being in a peaceful garden surrounding, combined with outdoor furniture, nursery and gift shop, with a hint of boutique nature. This combination tends to attract the medium-high discretionary spenders who have the spending capacity. It has developed a strong brand and reputation among return customers, who tends to recommend their friends and colleagues to come and try the Café.

Weakness: The pricing structure tends to be competitive with most cafes, but is less than most up-market cafes and restaurants. This is simply the case where the café is only open during day time. There is evidence showing that the target market in Toowoomba is willing to pay more for night dining but less during daytime dining. The decision not to open night time is simply because of its location. This is because there is firstly no frontage exposure, it is also in a side street location on the most southern end of town, and premise and car park lighting is poor. Though it is a scenic location, it may not be the best position for a business which needs constant public exposure. With full service oriented industries, there is a high leverage to labour cost. Wages are continuously rising along with material cost each year, which has put pressure on putting pricing up. However, the downward pressure on pricing from existing and particularly new competitors has forced only small increases, which do not cover the increase in cost of operations. This along with the lack of size and scale in turns of turnover, and the inability to open night time, has compounded the problem in sustaining regular profits.

Opportunity: There are opportunities to expand and increase the overall market share using the systems and management abilities of the current business model. To select strategic locations which can cater better for regular night time trading, will complement the existing business, and promote cross-selling between different locations. This will also lower the costs of management overheads. An important factor to consider with this expansion is ensuring

that in some way, the different locations have something uniquely different to offer when compared.

Threats: The threat of unsustainable increases in cost is realisable, which will ultimately affect all in the industry. However, new “rogue” operators can also do serious damage in an already congested market place, such as using discount pricing or exhibiting bad practices. The convenience and massive advertising of fast food operators is also a strong factor in preventing more people eating out in restaurants.

### **External Business Forces**

The analysis of the external business forces will examine the innovation, economical, external human resource, CSR, political, legal, globalisation factors. The examination will include 1) how the factors affect mission & vision of the firm, 2) the pressures and constraints faced by firm, 3) evaluate how the firm responds to these pressures, and 4) recommend strategy and actions to improve competitiveness and performance of the firm. The recommendations proposed will take into account the findings from the SWOT analysis.

### **Innovation Factors**

There is a continuous need to innovate and adapt to changing environment in order to exist, compete and grow (Hill & Rothaermel 2003; Macher & Richman 2004). In order for innovation to contribute to the sustainability of the business, there is a need to create value through innovation as an integral part of the overall business strategy (Dillon, Lee & Matheson 2005; Orr & Sohal 1999; Zhuang 1995), not just by individual actions of innovation. There is also a need to have a way of measuring the success of the innovation (Zhu 2004). There are natural hindrances to effective innovation in the form of human related issues (Zhuang 1995; Gyampoh-Vidogah & Moreton 2002). There is an opportunity to build very strong brand equity (Kim & Kim 2005).

Effects on Vision & Mission: Because of the high leverage to human factors in innovation in the service industry, there is a need to have involvement of staff, and to a large extent, ownership and empowerment of the innovation process. The current vision and mission statements reflect and support of this principle of continuous improvement.

Pressures & Constraints: The pressures are mostly derived from large restaurant chains like Hog’s Breath Café or Sizzler, as well as major fast-food giants like KFC and McDonalds. There are both innovative in their product design and service delivery, as well as their

marketing techniques. This is hard to compete with because of the typical constraint of a small scaled business, such as lack of highly skilled management expertise and monetary capital. However, in saying that, small business are more flexible and quickly to adapt to the changing environment.

Evaluation of Response: The management has responded to these pressures by systematically identify areas of improvement with regards to the “3-Fold” Strategy. This focus on innovation has helped to build its reputation and cemented some of the industry’s highest awards for excellence. The motivation and training of staff to cooperate with the implementation of management-driven changes, and improve on existing operations in the long term will be another challenge to address. This has to deal with the empowerment of the staff.

Recommendations: The recommendation on strategy is to continue to build on the ownership of innovation in the staff, especially in the empowerment part, where motivation and training will be needed to see operational improvements successfully implemented. Inherently, this will also build the brand equity. However, there needs to be a structured effort in creating value in the brand. The actions required may be in the form of better format and systematic training of staff to incorporate innovation, and management support for improvement ideas through appropriate funding. It may also require actions that reflects and portrays the Café as an “Employer of Choice”.

### **Economical Factors**

The economy is guided for sustainability (Stonecash, Gans, King & Mankiw 1999; Parayll 2005), however, on the firm level, need to restructure and evolve itself to survive, compete and grow (Harper 2000; Keneley 2004). The risks are in the likelihood of a dramatic slow-down in the economy, and firms should be prepared for such an event in the economy, even if signs are showing that it can be sustained. The uncertainty caused by a credit boom and current account deficient, with threats of further interest rises may extract from medium discretionary spenders from the target-market pool. However, in saying this, the population demographics are changing from majority low-income earners and retirees in Toowoomba, to one that includes an ever growing working professional population that have relatively high spending power. The high petrol prices and increasing wage cost to suppliers have resulted in dramatic increases in supplier’s prices. This price rises have been hard to absorb in the pricing structure. The rise in cost is hard to pass onto the customers as the result of high competition and also price sensitivity. The competitive environment is fierce and congested

in the food industry in Toowoomba, and with such a limited market, it is prudent to identify a segment of preference with little downside to any economic downturn.

Effects on Vision & Mission: The effect of economic factors on the vision is that the target market is focused on a niche market of medium to high discretionary spenders. To reflect the vision, this market expects a higher quality of product and service delivery, thus reflected in the mission statement.

Pressures & Constraints: The pressure faced by the Café is in the highly competitive nature of the local food industry, and a potential downturn in the economy. The constraint is the inability to influence the economic factors that affects it. Though the Restaurant & Catering Association does lobby the government in introducing food-industry friendly policies which will “soften the blow” if there is a downward shift in the economy. The higher quality of product and service delivery requires higher staff level and training, thus increasing the overall labour costs. This constraint is particularly concerning as the result of the high staff turnover.

Evaluation of Response: The response as far has been to target a market of medium to high discretionary spender through higher quality of product and service delivery. Regular price reviews and negotiation with suppliers ensures that any price increases are within the industry norm. These measures will ensure that the impact of any economic downturn will be lessened. A suitable staff retention strategy has been minimal, and thus needs further examination.

Recommendations: The recommendation on strategy is to continue to target the medium to high discretionary spenders by providing superior product and service delivery, and to continuously monitor operational costs. In order to train and retain highly skilled and trained staff, a suitable staff retention strategy is to be devised. The required actions to portray the Café as an “Employer of Choice” may be in the form of regular training sessions, above award pay, bonus for excellence, and more permanent and flexible workplace. Another action that is required is to continue systematically perform regular suppliers’ reviews, but also to work closely with the suppliers to decrease operational costs.

### **External Human Resource Factors**

The hospitality industry as a whole is dealing with under-employment (Johnson Mar-Apr 2004), and the increasing difficulty to recruit quality trained individuals that is willing to work at the award wage levels. This is not just confined to just the casual staff level but

especially so in the managerial levels (Burgin 2004; Abernethy 2005). There is evidence that there is only a small pool of available staff in the workplace market in Toowoomba. It is also an industry that has a long history of low wages, casual or short term conditions, and undesirable working hours (Mishra 2005; Lindsay 2005).

Effects on Vision & Mission:The effect of external human resource factors on the vision is that pricing have to reflect the full cost of employment, and a focus toward the market that can most afford to pay for it. The effect on the mission is that the recruitment and training of quality staff is critical to the success implementation of the “3-Fold” Strategy.

Pressures & Constraints: The main pressure is in the cost of recruitment and training, and seeking out the highest calibre employees. A squeezing between pricing and costs, combined with a small turnover and large management overheads, has resulted in an inability to pay significantly above award wages to attract the best candidate. The constraint is in the available pool of quality candidates in the surrounding region.

Evaluation of Response: The response as far has been a limited effort in trying to address this problem by systemising the operations to ensure a consistency of standards being produced. There is also an effort in standardising pay structure, and rewarding individual staff that performs. Another response to these pressures is the attempt to systematically train new staff by developing help tools such as a competency checklist.

Recommendations: The recommendation on strategy is to develop and promote the Café as an “Employer of Choice”. The actions that may be required to recruit, retain, and reward (RRR) the high quality staff (Feiniag 2005) are:

- Recruit only the best candidate or the potential to be the best
- Recruit with a view for long term gain for both parties
- Develop comprehensive training program that incorporate innovation
- Promote stability and flexibility in the working hours
- Promote a pleasant, supportive but challenging workplace
- Pay above award where possible
- Provide performance-based incentive program

### **Corporate Social Responsibility (CSR) Factors**

The Café has been heavily involved with fund raising efforts of charitable organisations. This is part of the marketing strategy to provide for an edge over new competitors (Norman &



McDonald 2004; Waddock, Boldwell & Graves 2002; Dowling 2004), in terms of willingness of customers to pay a higher price and in building brand capital. There is evidence that customers are willing to pay more in price to a business that assist the community than one that is not. Even with monopolistic profit, as long as the community can see the benefits the business is contributing (Dowling 2004); price sensitivity is less of a concern.

Effects on Vision & Mission: The effect of CSR factors on the vision and mission of the Café is less obvious than other factors. However, effective utilisation of CSR can ultimately contribute towards superior performance and deliver a competitive edge over competitors.

Pressures & Constraints: There is a continuous pressure from existing and new competitors in the market place. There is a need to distinguish the Café as a good corporate citizen, and use that as a differentiation from other competitors. However, as it is only a small business, the ability to support charity is constraint by the limited finances available from the marketing budget.

Evaluation of Response: The response to these pressures and constraints is to not only embrace charitable work, but to use unique and innovative methods help charity and self promote the Café without the financial burden.

Recommendations: The recommendation on the strategy is to systematically link the marketing function with charitable contribution. The actions required may be in the form of choosing a charity of choice for the calendar year, support its fund raising activities, promote this to the market, and finally also involve the customers.

### **Political Factors**

The governments and its entities play an important part in influencing the performance of businesses. Governments will push the cost burden of their “popular” policies to businesses (Kim & Prescott 2005; Arrowsmith, Gilman, Edwards & Ram 2003; Griffin 1992; Pollin, Brenner & Luce 2002), if it knows that business will be able to cope with the consequences and ramifications. The current work place industrial relation policies are often a burden to small businesses, through increase in wages lower productivity, and inflexible work conditions. However, in saying this, recent work place reforms such as the revision of the unfair dismissal laws, individual workplace contracts has assisted in helping small businesses to lower the cost of employment and increase in productivity. The introduction of GST is also

been a burden to small businesses particularly by introducing another layer of paperwork and compliance.

Effects on Vision & Mission: The effect of political factors on the vision is that the Café is now focused its attention on medium-high discretionary spenders who have higher expectations of quality of service. And the effect on the mission is that through well trained and quality staff, it can position itself accordingly to service this market.

Pressures & Constraints: The political pressures faced by the Café are predominantly cost driven. Constraint such as the inflexibility in modifying state awards to suit certain businesses, in particular small businesses, has been factor in large firms dominating certain sectors. Large firms tend to be able to cope with political factors better than small ones because of its financial strength, its standardisation, and large turnovers.

Evaluation of Response: The response to the political factors is to join and endorse the work of industry's political lobby groups to petition for better operating environment for small businesses, and thus lowering the cost burden of certain political driven policies.

Recommendations: The recommendation on the strategy is to continue to influence and innovate in all areas of government driven policies including workplace relation. Assistance from industrial advocate can be used to devise better arrangements in terms of lowering the cost burden of government policies. Other actions that may helped in lowering cost is innovating the administration processes including processing invoices and payroll.

## **Legal Factors**

The legal factors facing the hospitality industry is in the form of: workplace health & safety regulations, council health standards, liquor licensing, workplace harassment, unfair dismissal, and customer & public liability issues (Wojcik 2003; Skalpe 2003; Prewitt 2005; Morgan & Rao 2000; Borde 1998; Hertneky 1995). The café has systematically examined these so-called risk factors and address them appropriately in the operations.

Effects on Vision & Mission: The effect of legal factors on the vision and mission of the Café is less obvious than other factors. Effective compliance of legal factors can ultimately contribute towards superior performance; however, it will incur a compliance cost.

Pressures & Constraints: The pressures of legal factors derive from the compliance cost associated with the legal burden of operating a restaurant. This compliance cost must be considered with the risk profile to weight up the invested amount.

Evaluation of Response: The responses for risks such as public liabilities, theft and fire are to purchase insurance to cover such events. The Café has also implemented risk management strategies in the form of anti-harassment policy, workplace safety audits, regular hygiene audits, and a defined approach to employee dismissal.

Recommendations: The recommendation on the strategy is to devise and incorporate risk management process into the overall business strategy. Actions proposed may be in the form of systematically review all legal risks with regards to cost of doing business.

## **Globalisation Factors**

Globalisation is a major threat to small businesses with reference to its ability to compete effectively (Cooper, Neu & Lehman 2003, Whiting et al. 2002). Small businesses do not have the scale and monetary power to compete head-to-head with multinationals (Johnson Nov-Dec 2004). It also does not have the capacity to innovate and invest in the evolutionary improvements in both strategies and operations. However, small businesses tend to be more agile and flexible, and be able to adapt itself quickly to the changing environment, and cater for niche markets (Abernethy 2005; Garber 2005).

Effects on Vision & Mission: The effect of globalisation on the vision and mission is that the Café must continue to seek for growth opportunities and strive for excellence through better adaptation to the business environment, and is reflect in the statements.

Pressures & Constraints: In order to sustain the business in the long term, the Cafe needs to grow to provide the ability and resources to handle the external forces effectively. If this can be achieved while still maintaining the agility and the adaptation abilities, that would be even more beneficial. If the Café remain at its current form, it would not be able to sustain its operations in the long term as the result of these forces, whether directly or indirectly affected. Funding for growth is a major constraint as it can be quite limited to organic growth. Opportunities for external investor are available to be involved in future deals, however, that would cause other potential complications associated with partnerships and reporting to shareholders.

Evaluation of Response: The response so far has been review of business opportunities, including potential business acquisition or new leases, and invitation for investor's interest in future expansions.

Recommendations: The recommendation on the strategy is to have an expansion plan that compliments this current operation, and not compete with it. The actions required is to review the current plan to specify accurately the types of new businesses we need and want to operate.

## **Conclusions**

The external business forces that influence the performance and competitiveness of businesses are categorised into innovation, economical, external human resource, corporate social responsibility, political, legal and globalisation factors. These factors affect Kingfishers Café Restaurant in one way or another, and at different degrees of influence.

The strengths of the Café are in its strong business management system, its unique atmosphere, and its brand and reputation. The weaknesses are its “off-street” location and visibility, increasing cost of operations, and fierce and congested competition. The opportunities are to use its current management abilities to expand to other locations, and thus lowering the cost of management overheads, and have the ability to cross-sell and promote between the different locations. The threats are in the form of unsustainable cost increases, further escalation of competition, and the inability to compete effectively with large businesses in the same sector.

The Café is under pressure from external forces that have impact on cost of doing business. However, the Café has also been proactive in developing management systems and strategies to combat these external forces. The innovation in the operations is continuous and forms part of the “3-Fold” Strategy; to strive for excellence in the product, the delivery of service, and the ambience and atmosphere. The Café has targeted medium to high discretionary spenders to lower the effects of any economic downturn and to pay for increases in the cost of employment.

The main challenge for the Café is to recruit and retain the best staff, as part of the successful delivery of the “3-Fold” Strategy. This can be achieved by becoming an “Employer of Choice”. There is a need for the Café to continue the work started on risk management, and to implement the expansion strategy in the near future to lower the cost of management overheads. It is noted that the Café has been adopting the principle of being a small business but think like a big business.

In analysing and addressing the external business forces, a number of strategies were proposed. The Café needs to target the medium to high discretionary spenders by providing

and innovating superior product and service delivery, as part of 3-Fold Strategy. It is also imperative to continuously monitor and improve operational costs. The Café needs to implement a recruitment, retention, reward (RRR) strategy to be valued as an “Employer of Choice”. The Café needs to incorporate CSR and “brand equity” value adding into the marketing strategy. The Café must somehow influence government policies through Industry Group. The Café needs to Incorporate risk management process as part of the overall business strategy. The Café should continuously look for expansion opportunities to compliments existing operation and to lower management overheads.

#### 4.4.4 Artifacts - Photos and Videos

Table 5 outlined the reflection of the photos and videos, and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation. These photos and videos are to be destroyed after the research has been completed as part of the ethics clearance as per request from the owner of the participating micro-manufacturer.

**Table 5: Descriptions of Photos and Videos**

Engagement Phases	Descriptions of Photos and Videos
Relationship Building	The photos and video taken can be described as quite disturbing at first sight as a professional engineer who had almost 8 years of managing R&D and innovation processes. Photos of the factory “the shed” externally and internally were taken for analysis and reflection. It was messy to say the least. As mentioned previously, the chaotic scheme however did not significant interfered or restricted the successful manufacture of the products that were ordered by both retail and wholesale customers. Photos of the overall manufacturing flow for 2 main product lines, a miscellaneous product line, the factory floor, the retail floor, the storage spaces (or the lack of), and the administration office were taken and documented and then further analysed as part of the intervention to improve productivity and costs of production. These were also used as part of the triangulation process with other data in the iterative process in searching for the findings. It was observed that despite the chaos, the owner and staff went about their work quite happily and without much fuss (the occasional cursing when one tripped over a crate!). Though it would be desirable to just go straight in there and

	<p>“clean-up” the mess and start innovating, the author decided that the best course of action at that time is to just listen, observed and understands the context of the micro-manufacturer. This was however quite difficult as a professional engineer who strive on fixing challenges such as this, and had to be disciplined to hold to the research plan (to gain a deeper insights into the barriers of I&amp;TT process).</p>
<p>Consultation and Development</p>	<p>Further photos and videos were taken and collected during the consultation stages. Though it was still somewhat operations as usual, there seems to be some minor improvement in the organisation and planning of the manufacturing based on the artifacts collected during this time. The author believes this may be because of simply the presence of an external advisor and agent. This change in the performance of the owner and the staff may have been attributed to an increased sense of confidence and support, becoming more self-aware (because someone is watching them perform), but also of pride in their work (showing off how good they can be).</p>
<p>Implementation</p>	<p>Photos and videos were taken after the implementation of the planned improvements. It was clean, organised, and importantly functional. This resulted in an increased rate of output and a better workplace environment. New storage areas with new shelves were put in with the redesigned factory layout (this is described further in Chapter 5). The artifacts indicated that the turn-around of the manufacturing processes of the micro-manufacturer was successful given the extremely small investment (less than \$500) and the significant impact it had, however, the author on reflection did have some reservations of the sustainability of this without further intervention and visitations from an external advisor. Would the manufacturing turn back into a “messy and chaotic” operation without the regular visitations, advice, and importantly, words of encouragement? Can entrenched behaviours be reversed and stayed reversed? One would suggest that because of the dynamic nature of SMEs, especially regionally based, that the success will be short lived. And new scenarios, hurdles and barriers will be confronting the owners of SMEs (as the owner is the business), and will defeat</p>

	all the prior improvements in business planning and innovation practices. This is a concern for policy makers in that there needs to be consistencies and sustainability built into any policies being developed for SMEs. This may mean less government interventions in policy setting.
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#### 4.4.5 Artifacts - Interviews

Table 6 outlined the reflection of the interview artifacts (formal and informal), and these are categorised into 3 phases over a space of 12 months; relationship building, consultation and development, and implementation. No recordings were made at the request of the owner. These artifacts are derived from the author’s journal and interview notes. These artifacts will be destroyed after the completion of the research.

**Table 6: Descriptions of Interviews**

Engagement Phases	Descriptions of Interviews
Relationship Building	Every visitation by the author included some time to sit down with the owner to “chat” about her business and how everything is going. There were days when things are very positive and bright but there are days when things are not so. Often than not, conversations do take a turn into other matters such as family issues, health difficulties, marital and relationship issues, etc. This does indicate the need for a holistic approach to policy setting for innovation, or rather, owner centric rather than process-centric. It is becoming evidenced that the biggest barrier in I&TT is the owners themselves rather than the manufacturing processes, innovation practice, or the business management.
Consultation and Development	During this stage, it is apparent that the continuous weekly visitations, offer and acceptance of advices, and words of encouragement helped to reinforce a positive mindset, and somewhat a clarity of purpose that was not visible before. Perhaps this is the result of the self-awareness and reflection brought about by external agent asking the tough questions. Often it is quite obvious that during the conversations that “Oh, don’t ask me that... I have been avoiding doing that for years!!!” does prompt and motivate the owner to act and believe that it can be done. This type of reflection flowed onto I&TT activities and saw a renewed belief that her

	business can be improved. Importantly, the owner was going through an education and learning process from the advice and coaching provided.
Implementation	The conversations at implementation stage were filled with enthusiasm and optimism. There was a sense of purpose and focus “This is what we are going to do... let’s do it” and the previously “let’s hope it works” turn more so into “it will be absolutely fantastic when we get it right!” Even after the implementation, there was a sense of achievement and the language used was significantly positive (as compared to the earlier stages). The author believes that these SME owners thrive on innovation challenges and are not the least afraid of failure, but needed to be directed, supported, guided and importantly, maintained focus on what will deliver improved business outcomes. The role of business coaching and external advisory plays a significant part in intervening with the business but with what really matters, the owner. Innovation policies for SMEs need to take this part of the mechanics in encouraging and facilitating I&TT.

#### 4.4.6 Artifacts - SME Innovation Programs and Assistance

The artifacts collected in this segment are associated with the innovation related programs and grant assistance that are available at the state-level (outlined in Table 7) and the national-level (outlined in Table 8). State-based programs are mainly associated with government assistance with starting and growing a business but also selected grant programs that promote entrepreneurship, energy efficiency, utilization of information technology and systems, and business innovation. There are also state-based organisations such as Queensland Manufacturing Institute that specifically caters for supporting innovative manufacturers in Queensland. National-based programs or organisations are AusIndustry that administer the R&D tax concessions and other grant assistance, Enterprise Connect and Business Enterprise Centre(s) that provide advisory services and facilitates the connection of number of stakeholders to achieve improvement in I&TT process. To complement, other organisations such as Austrade that supports opening export related markets, and Commercialisation Australia (previously known as COMET) is there to connect financiers with incubated and supported businesses to commercialise relevant innovations.



**Table 7: Artifacts collected for SME Innovation Programs and Assistance (Qld State Based)**

<p><b>Department of State Development, Infrastructure and Planning</b></p> <p><b>Queensland Treasury and Trade</b></p> <p><b>Department of Education, Training and Employment</b></p> <p><b>Department of Science, Information Technology, Innovation and the Arts</b></p> <p>(Formerly the Queensland State Development or Department of Employment, Economic Development and Innovation) <a href="http://www.business.qld.gov.au">www.business.qld.gov.au</a></p>	
Smart Licence Online	<p>Smartlicence is a unique business licensing and information service that puts a stop to the red tape run-around and gives you the freedom to get on with business. SmartLicence will provide you with tailored business licensing information including:</p> <ul style="list-style-type: none"> <li>• Summary information on the State, Local and Commonwealth Government requirements for your particular business</li> <li>• The name, address and telephone number of the agency responsible for each listing</li> <li>• Licence application forms</li> <li>• Details of licence fees, periods of cover, and renewals</li> <li>• On-line lodgement and secure payment for some licences</li> </ul>
Business Resource Centre services and support	<p>The Business Resource Centre offers a range of products and services to guide you through the process of assessing your business idea and planning your business.</p>
<p><b>Innovation grants and support</b></p> <p>There are a variety of grants and resources available to help businesses innovate. Businesses need to innovate in order to grow, stay ahead of their competitors and reduce costs. Investing in innovation enables businesses to introduce new (or improved) products, services, processes or methods. Many businesses want to innovate but don't know how to go about it; they often see it as too hard, too expensive, or too time-consuming. Taking advantage of available funding and mentoring support could save your business valuable time and money, and streamline the innovation process.</p> <ul style="list-style-type: none"> <li>•Grants for innovation</li> <li>•Mentoring and coaching for business innovation</li> <li>•Innovation centres</li> <li>•Support services for business innovation</li> <li>•Innovation workshops and events</li> <li>•Innovation readiness tools</li> <li>•Innovation grants and support - case study video</li> </ul>	
GOBiS	<p>There are a range of government support services that can help you to plan, start and run your business in Queensland. For example, you may be eligible for grants and subsidies. Government Business Information Service (GOBiS) can provide you with a free pack of essential support information that is tailored to your business.</p>
SmartService Queensland grant wizard	<p>If you are a business, organisation, or an individual, you can find Queensland Government grants through the SmartService Queensland grant wizard. You can search grants by name or category, or by using the simple grant wizard questionnaire.</p>
GrantsLINK	<p>The GrantsLINK directory provides information on grant opportunities for businesses and industry. GrantsLINK can direct you to funding programs for new ideas and initiatives from all levels of government - Australian, Queensland, and local.</p>
Business and Industry Transformation Incentives	<p>If you are a progressive Queensland business with significant growth potential you can apply for BITI. The initiative is looking for bright</p>

(BITI)	business ideas that will support innovation and encourage job creation/retention in Queensland. Collaborative projects with other businesses are especially encouraged.
What's Your Big Idea Queensland?	If you are a small to medium sized business with an innovative idea, you can apply for up to \$50,000 from the What's Your Big Idea Queensland? grant program. The initiative is looking for ideas that could transform your business and industry, with funding designed to help make your big idea a reality.
Smart Futures Fund	The Smart Futures Fund offers an array of funding opportunities to businesses, research institutes and individuals for research projects looking at innovation and skills development. Grants and funding opportunities include: <ul style="list-style-type: none"> <li>•The Co-investment Fund</li> <li>•The Research Partnerships Program</li> <li>•Smart Futures Fellowships</li> <li>•Queensland International Fellowships</li> <li>•The Proof of Concept Fund</li> <li>•Commercialisation Champions.</li> </ul>
Food Innovation and Productivity Incentives (FIPI)	FIPI funds innovative projects from Queensland food businesses, organisations, cooperatives and associations.
Climate-friendly funding	If your business is looking to innovate to reduce costs and its affect on climate change, there are a number of funding opportunities to help you make the necessary changes.
<p><b>Queensland Manufacturing Institute (QMI Solutions)</b> is dedicated to improving the skills, performance, innovation and capability of the Queensland manufacturing industry. We achieve this through the provision of specialist knowledge and expertise to help manufacturers implement workforce development strategies, operational enhancements and innovations, and to link industry with major projects, researchers and technology solutions. QMI Solutions was established in 1993 as the Queensland Manufacturing Institute to be Australia's premier technology diffusion agency. Its founding members were the Queensland Government, CSIRO and the University of Queensland (UQ). In the late 1990s, CSIRO withdrew from the company and was replaced by the Queensland University of Technology (QUT). The company evolved through strong relationships with the Queensland Government especially the Department of Employment, Economic Development and Innovation (DEEDI) and the Department of Education and Training (DET). These relationships, together with the close links with the research sector through QUT and UQ, were, and continue to be, instrumental in the successful diffusion of a number of important technologies and practices to assist Queensland manufacturing become globally competitive including:</p> <ul style="list-style-type: none"> <li>• stereolithography</li> <li>• water-jet cutting</li> <li>• selective laser sintering</li> <li>• incremental sheet forming</li> <li>• Lean Manufacturing and Lean Product Development</li> <li>• supply chain management</li> <li>• service enhanced manufacturing</li> <li>• sustainable manufacturing.</li> </ul> <p>In recent years QMI Solutions has merged with two other key organisations to create a truly integrated centre of excellence for Queensland manufacturing. QMI Solutions' merger with Manufacturing Skills Queensland in 2007 enables the company to take a lead role in the development of workplace improvement strategies for the manufacturing sector, including advising on skills development and skills retention strategies. The company's second merger, with ICN Queensland in 2008, provided QMI Solutions with the capability to contribute to Queensland business and employment growth and to foster innovation by identifying procurement opportunities to increase local industry access to major</p>	

domestic and global projects. QMI Solutions is now able to offer a ‘one-stop-shop’ service, supported by government, for Queensland manufacturers to ensure the sector works towards achieving world’s best practice and remains globally competitive on the world stage.

Skills - MSQ	<p>It assists our customers improve organisational culture by implementing workforce development and skilling strategies.</p> <p>The Skills Division, known as Manufacturing Skills Queensland (MSQ), is an initiative of the Queensland Government’s Department of Education and Training (DET). As part of the Queensland Skills Plan, DET established a number of Centres of Excellence for Queensland industry. MSQ is the Centre of Excellence for skills development in the manufacturing and engineering industry. MSQ leads and influences the manufacturing and engineering industry in skill-related matters – from industry strategy and business process to smarter workforce management. MSQ ensures that skill needs are identified at local, regional and state levels while ascertaining training priorities, suitable training products and ideal training delivery methods.</p>
Performance & Innovation	<p>It helps implement best practice processes, innovative techniques and world-leading technologies to improve our customers’ performance. The Performance &amp; Innovation Division assists companies improve the uptake of proven practices and technologies specifically helping manufacturers, particularly SMEs, get started and continue on the journey to excellence. The first step on the journey to excellence is to heighten the awareness or benefits of a particular technology or practice. To continue the journey, a subsidised benchmark is available through P&amp;I and its partnership with DEEDI. P&amp;I partners with the Federal Government’s Enterprise Connect program, which offers business reviews and access to Federal Government subsidised programs.</p>
Capability - ICN	<p>It assists Queensland industry to win new opportunities and to build sustainable businesses. The Capability Division, known as Industry Capability Network (ICN), is part of a nationwide network that assist industry maximise access to government and private sector opportunities, particularly in major project infrastructure and industrial projects. ICN does this by:</p> <ul style="list-style-type: none"> <li>•maximising opportunities for local suppliers and enhancing visibility to major project procurement teams</li> <li>•identification and evaluation of Queensland and Australian industry capability and capacity for opportunity access, local sourcing and business matching for Australian and overseas purchasers</li> <li>•assisting Queensland and Australian businesses in accessing global supply chain and export opportunities</li> <li>•maintaining commercially confidential information while assisting suppliers to comply with quality and technical specifications</li> </ul>

**Table 8: Artifacts collected for SME Innovation Programs and Assistance (National Based)**

<p><b>AusIndustry</b> provides is an extensive list of business grants and incentives relating to innovation and research and development. If you need help to grow your business, or develop an innovative idea, see AusIndustry's program summary for a full list of their incentive programs.</p>	
<p>Research and development (R&amp;D) tax concessions and incentive</p>	<p>The R&amp;D tax incentive is a program administered by AusIndustry and the Australian Taxation Office (ATO) that encourages companies to invest in R&amp;D activity by providing a targeted tax offset. The R&amp;D tax incentive replaces the R&amp;D tax concession and applies to activities and expenditure for income years commencing on or after 1 July 2011. The R&amp;D tax incentive offers a 45% refundable tax offset to eligible businesses with a turnover of less than \$20 million per year and a non-refundable 40% tax offset to all other eligible businesses.</p>
<p>Commercialisation Australia</p>	<p>Commercialisation Australia is an initiative of the Australian Government. It is a competitive, merit-based assistance program offering funding and resources to accelerate the business building process for Australian companies, entrepreneurs, researchers and inventors.</p>
<p>Small Business</p>	<p><b>Small Business Advisory Services</b> is funded to provide high quality, low cost business advisory services that will be targeted toward improving the business and/or financial management skills of participating small businesses.</p> <p><b>Small Business Support Line (SBSL)</b> will be dedicated to assisting small businesses during the global recession.</p> <p><b>Textile, Clothing and Footwear (TCF) Small Business Program (SBP)</b> is a competitive, merit-based grants program. It provides program funding to textile, clothing and footwear small businesses to improve their business enterprise culture.</p>
<p>Regional Innovation Funds</p>	<p><b>Illawarra Region Innovation and Investment Fund (IRIIF)</b> supports the Illawarra region by stimulating investment and diversifying the economic and employment base.</p> <p><b>South East South Australia Innovation and Investment Fund (SESAIIF) Program</b> \$12 million available over the 2011/2012 and 2012/2013 financial years.</p> <p><b>Tasmanian Innovation and Investment Fund (TIIF)</b> is a competitive, merit-based program aimed at companies seeking \$50,000 or more in grant funds for investments in activities that provides sustainable employment and diversify Tasmania's economy.</p>
<p>Manufacturing Industry</p>	<p><b>Automotive Transformation Scheme (ATS)</b> encourages investment and innovation in the automotive industry.</p> <p><b>Certain Inputs to Manufacture (CIM) Program</b> provides import duty concessions on certain imported raw materials, intermediate goods as well as prescribed metal materials and goods.</p> <p><b>Clothing and Household Textile Building Innovative Capability scheme (BIC scheme)</b> is an entitlement program providing grants for innovation activities for registered Australian clothing and household textile firms carrying out eligible activities in Australia.</p> <p><b>Steel Transformation Plan (STP)</b> encourages investment, innovation and competitiveness in the Australian steel manufacturing industry.</p> <p><b>Textile, Clothing and Footwear (TCF) Corporatewear Register</b> allows employers to register non-compulsory occupational clothing, thereby avoiding liability for FBT and allowing employees to claim the cost of purchasing and maintaining such clothing as a tax deduction.</p> <p><b>Textile, Clothing and Footwear (TCF) Strategic Capability Program (SCP)</b> is 5-year, \$35 million, competitive grant program that will support large projects that will build innovative capability at the enterprise and workplace level.</p>

<p><b>The Australian Trade Commission or Austrade</b>, is the Australian government trade and investment development agency, a statutory authority administered by the Department of Foreign Affairs and Trade (DFAT), with offices in overseas embassies and consulates and representative arrangements in some other locations.</p>	
Export Market Development Grants (EMDG)	<p>The Export Market Development Grants (EMDG) scheme is a key Australian Government financial assistance program for aspiring and current exporters. Administered by Austrade, the scheme supports a wide range of industry sectors and products, including inbound tourism and the export of intellectual property and know-how outside Australia. The EMDG scheme:</p> <ul style="list-style-type: none"> <li>•encourages small and medium sized Australian businesses to develop export markets</li> <li>•reimburses up to 50% of eligible export promotion expenses above \$10,000 provided that the total expenses are at least \$20,000</li> <li>•provides up to seven grants to each eligible applicant.</li> </ul> <p>To access the scheme for the first time, businesses need to have spent \$20,000 over two years on eligible export marketing expenses.</p>
<p><b>Business Enterprise Centres (BECs)</b></p> <p>The Australian Government will provide \$42m over 4 years to fund the delivery of low cost small business advisory services through nominated Business Enterprise Centres (BECs) throughout Australia. Thirty six (36) BECs will be supported through this measure. The funding will enable BECs to expand and strengthen their capacity to provide low cost advisory services to small business; complementing the Government's overall objective to maximise the growth potential, prosperity and sustainability of small business. It aims to improve the business skills of small business operators, intending operators and independent contractors.</p>	
Business Information	Current literature and publications eg. Tax GST & PAYG, Yellow Pages, business registration, available training, bench marks.
Training Programs	Financial Management, record keeping, BAS, marketing, business planning, customer service and promotions. New Apprentices training. Certificate IV Small Business.
Business Referrals	Local accountants, solicitors, marketing consultants, insurers, ATO officers and financial planners.
Government Programs	Management of New Enterprise Incentive Scheme (NEIS) Small Business Improvement Program (SBIP) Smart Start, WIB.
Business Networks	Encouraging local businesses to meet each other and share experiences and network for more business, developing strategic alliances, establishing local community liaisons.
Workshop/ Seminars	Current issues eg. Taxation reform, e-commerce, Women in Business (WIB), Starting Your Own Business, The Internet, Home Based Business.
Mentoring Support	For start-up and established small and micro businesses.
Business Analysis	Research, quality management, purchasing a new business.
General Management	Business projects, Business Incubators, Work for the Dole, Internet Service Provider, Online Access Centre, Access to Finance, event planning & facilitation and office services.
<p><b>Enterprise Connect</b> (an Australian Government initiative in the Department of Industry, Innovation, Science, Research and Tertiary Education) is a \$50M per year Australian government initiative backed by industry that offers customized advice and support to eligible Australian businesses to help them reach their full potential. It has a network of 12 centres located across the country that work with small and medium businesses in industries as diverse as manufacturing, clean technology, resources, defence, tourism and the creative sector by providing business improvement services. All services are available to businesses whether they are located in metropolitan areas, country centres or remote Australia. The centres are staffed by highly skilled Business Advisers who provide access to specialist expertise and the best available technical and business resources to help you transform your business.</p>	

Researchers in Business	<p>EC supports the placement of researchers from universities or public research agencies into businesses, to help develop and implement a new idea with commercial potential. EC will provide funding for up to 50 per cent of salary costs, to a maximum of \$50,000, for each placement for between 2 and 12 months. Its aim is to:</p> <ul style="list-style-type: none"> <li>• help break down the cultural divide between business and the research sector</li> <li>• speed up the distribution of knowledge and expertise</li> <li>• accelerate the adoption of new ideas and technologies</li> </ul>
Tailored Advisory Service Grant	<p>Tailored Advisory Service funding can be used to engage a consultant/s to make improvements to your business that your Enterprise Connect Business Adviser recommended in your Business Review. Enterprise Connect will reimburse your business up to half the cost of engaging the consultant, up to a maximum of \$20,000 (excluding GST). Applications for Tailored Advisory Service are to be submitted within six months of completing your Business Review. In extenuating circumstances, this may be extended to 12 months if you can demonstrate you have commenced implementing the recommendations in the Business Review and the recommendations are still relevant to your business. Tailored Advisory Service funding can be accessed for a single project, or span several projects using different consultants. Businesses must seek proposals and quotes from at least two consultants prior to applying. Businesses have a maximum of 12 months to complete all projects.</p>
Technology and Knowledge Connect (TKC)	<p>The Technology and Knowledge Connect (TKC) service, as part of the Business Review process, is available for you to access at no charge. TKC aims to help established businesses who have completed or are undertaking an Enterprise Connect Business Review. Its team of technology experts will work closely with the Business Advisers and the partner organisations to:</p> <ul style="list-style-type: none"> <li>• Diagnose the technology and technical knowledge related issues/opportunities (i.e. processes, plant and equipment)</li> <li>• Connect the Business Adviser to the most appropriate domestic and international sources of expertise, suppliers of technology and technical knowledge advice for your business</li> <li>• Assist the business to access prototyping and testing facilities</li> <li>• Give advice about other relevant Innovation grant programs</li> </ul>
Workshops, Industry Intelligence & Networking	<p>WIIN activities are held nationally in metropolitan, regional and remote locations to help gain the skills and knowledge needed. Activities are delivered free of charge on a range of topics to provide you with new information on innovative ways to utilise new technologies, expertise and best practice methods to improve the performance and sustainability of business. Activities also provide networking opportunities to help build knowledge of current industry trends.</p>
Enterprise Learning and Mentoring	<p>Enterprise Learning workshops combine the host firms ‘hands-on’ experience in implementing improvement initiatives with the experience of a subject specialist, who can demonstrate how these changes can be implemented within one’s business. Enterprise Mentoring builds on the outcomes of the EC business review through informal learning sessions and one-on-one mentoring. Enterprise Mentoring utilizes an independent and skilled external mentor to guide one’s business through the implementation of the business review internal recommendations and supported through the continuous improvement process.</p>
<p><b>Commercialisation Australia (CA)</b> is a component of the Australian Government’s 10 year vision – Powering Ideas: an innovation agenda for the 21<sup>st</sup> Century. CA is the primary source of Australian Government assistance for commercialization. It structures support around the key development stages in the commercialization process. CA has funding of \$196.1M over years to 2013, with ongoing funding of \$82M a year thereafter. It is a competitive, merit-based assistance program offering funding and resources to accelerate the business building process for Australian companies, entrepreneurs,</p>	

<p>researchers and inventors. It offers a range of funding options as well as multi-layered networking opportunities to help you achieve business success. Participants in the program work with dedicated Case Managers and benefit from our Volunteer Business Mentor Network. It replaces the Commercialising Emerging Technologies (COMET) program and the Commercial Ready program. COMET is a competitive, merit based grant program which supports early-stage growth companies, spin-off companies from research organisations and individuals to increase the commercialization of innovative products, processes and services. Commercial Ready is a grant program for small to medium sized businesses provided on a matching basis to encourage growth and successful innovation by increasing the levels of R&amp;D, proof of concept and early-stage commercialisation.</p>	
<p>Funding</p> <p>Flexible options to suit your stage of commercialisation</p>	<p>Skills and Knowledge - Up to \$50,000 to access specialist advice and services</p> <p>Experienced Executives - Up to \$350,000 to engage a CEO or other senior executive</p> <p>Proof of Concept - \$50,000 to \$250,000 to prove the commercial viability of new IP</p> <p>Early Stage Commercialisation - \$50,000 to \$2 million to take a new product, service or process to market</p>
<p>Resources</p> <p>Professional resources to add value to your business</p>	<p>Case Managers - All Commercialisation Australia participants work with a Case Manager to assist them through the commercialisation process. We have a national network of Case Managers who are experienced business builders and understand the challenges of commercialising new IP.</p> <p>Volunteer Business Mentors - Successful applicants are linked to mentors willing to share their skills and experience. Our database of qualified mentors includes entrepreneurs who have successfully commercialised IP, technology, domain and industry sector experts, and professional investors.</p>

#### 4.4.7 Artifacts - Policy Development of Australian Government

The Australian government has been attempting via policy development and funding to increase innovation and international competitiveness since the *Backing Australia's Ability* (2001). The *Backing Australia's Ability* packages seek to encourage innovation to 'enhance... international competitiveness, economic prosperity and social wellbeing' (Backing Australia's Ability, 2001 and 2004). There is recognition that innovation needs to be embedded into the national culture in government, economic policy, business strategy, workplaces and the community. Traditionally, wealth was thought to have its source in land, labour and capital as factors of production, but with the joining of information to technology the world changed forever. This new industrial revolution has forged greater understanding among business leaders, researchers and policy-makers of the dynamic role of innovation in creating value for organisations and, in doing so, transforming the productive performance of whole economies. Australia is currently experiencing an unprecedented boom in its commodity exports, and a reversal in the decades-long deterioration of its terms of trade, as markets are reshaped by China's entry into the world economy. Whether this boom proves to be temporary or longer lasting, it can be argued that Australia cannot take its current high levels of prosperity for granted. There is a need to make the most of our current position to

make the reforms and adjustments needed to minimise potential risks to continuing growth and maximize new opportunities. Table 9 below outlines and describes artifacts containing the innovation policies developed by the Australian government from 2001 to 2008.

**Table 9: Innovation Policy Development of Australian Government from 2001 to 2008**

Report / Policy Document	Description of Policy
<p>Backing Australia Ability (2001)</p> <p>Australian Government (2001), <i>Backing Australia's Ability – An Innovation Action Plan for the Future</i>, Australian Government, Canberra.</p>	<p><b>backing Australia's research capabilities</b></p> <p>The Government will invest more to encourage quality research and development and to provide our universities with the facilities they need for research to flourish. We will:</p> <ul style="list-style-type: none"> <li>• Boost incentives for business to increase their investment in research and development (R&amp;D) including: a new premium R&amp;D tax concession rate of 175% for additional, labour related, R&amp;D expenditure; a tax rebate, equivalent to the R&amp;D Tax Concession, to help the growth of small companies in tax loss; providing \$535 million over 5 years to continue R&amp;D START grants to support businesses undertaking R&amp;D.</li> <li>• Double funding for Australian Research Council grants over the next 5 years to boost world quality research, and increase funding for associated infrastructure.</li> <li>• Increase funding for universities to upgrade their research infrastructure, such as scientific and research equipment, libraries and laboratory facilities.</li> <li>• Ensure Australia participates in key emerging technologies by establishing World Class Centres of Excellence in information and communications technology (ICT) and biotechnology research.</li> <li>• Create Major National Research Facilities to undertake large scale research of national significance.</li> </ul> <p><b>backing Australia's ideas for commercial success</b></p> <p>It is important to bring together the skills of those in business, universities and government to ensure that the best Australian ideas are transformed into products and jobs. We will:</p> <ul style="list-style-type: none"> <li>• Expand the Cooperative Research Centres Program, linking universities with business and giving small and medium enterprises greater access.</li> <li>• Double the value of the Commercialising Emerging Technologies (COMET) Program, to provide early assistance to help firms commercialise skills.</li> <li>• Introduce a \$100 million Innovation Access Program to help business access the best technology and science from Australia and overseas, especially small and medium enterprises.</li> <li>• Establish a competitive pre-seed fund for universities and public sector research agencies to help turn ideas into products and jobs.</li> <li>• Double funding for the Biotechnology Investment Fund to encourage the growth of new biotechnology firms.</li> <li>• Extend and develop the commercialisation of new agribusiness products, services and technologies.</li> <li>• Monitor the impacts of new business tax arrangements, particularly entity taxation, on venture capital investment.</li> </ul>



	<ul style="list-style-type: none"> <li>• Strengthen the system for protecting Australia’s intellectual property.</li> </ul> <p><b>backing Australia’s skills</b></p> <p>The Government is determined to help Australians equip themselves for the jobs of the future and to attract the best minds to this country. We will:</p> <ul style="list-style-type: none"> <li>• Fund an additional 2000 university places a year, with priority given to ICT, mathematics and science places.</li> <li>• Introduce a loan scheme for postgraduate fee-paying students to help Australians upgrade and acquire new skills so they can better contribute to emerging industries.</li> <li>• Develop on-line curriculum content for schools focused on innovation and enterprise-related careers.</li> <li>• Attract more people from overseas with the right skills to work alongside our brightest talent.</li> <li>• Commit \$130 million to raise scientific, mathematical and technological standards in government schools.</li> </ul>
Mapping Australian Science and Innovation (2002) Report	<p>The study was to lay the groundwork for future policy development by identifying:</p> <ul style="list-style-type: none"> <li>• strengths that should be maintained and developed</li> <li>• weaknesses and gaps in science and innovation performance that need to be addressed</li> <li>• complementarities and areas of possible greater cooperation between activities of the national government and those of the states and territories.</li> </ul> <p>KEY FINDING 1: Australia’s overall science performance is among the strongest of all countries and has been leading-edge in a number of scientific fields, notably medical and health sciences and biological sciences and astronomy. Performance has been best in science niches that complement Australia’s resource and geographical endowments and in areas where stocks of knowledge have built over time through sustained investment of resources. Australia has a solid research presence in some emerging science and technology fields such as photonics and biotechnology.</p> <p>KEY FINDING 2: Australia has invested heavily in public good research and evidence suggests that the commercial and non-commercial benefits from this investment have been considerable, although by their nature they are difficult to measure.</p> <p>KEY FINDING 3: Business innovation has been strong in the take up of ICT and there is some evidence that large firms perform well in organisational innovation, especially in using ICT as a tool to improve business performance.</p> <p>KEY FINDING 4: Australia’s IP protection framework is among world’s best practice. A range of issues associated with effective public sector IP management have been identified. Patenting is becoming less significant for the business sector. Patenting reform is likely to be an ongoing issue, with the objective of maximising the amount of innovation without stifling research and competition.</p> <p>KEY FINDING 5: Among emerging fields of science and technology, the Australian commercial biotechnology sector has experienced a high rate of growth and has a promising if high risk outlook as it seeks to mature. Challenges include building and sustaining critical mass as well as the supply of technical and commercial skills and access to capital.</p> <p>KEY FINDING 6: Collaboration has grown between researchers in universities and publicly funded organisations and firms and other research users in Australia.</p> <p>KEY FINDING 7: Australia has a broad human capital base to underpin</p>

science and innovation, including a qualified workforce and a population with positive attitudes to science and a willingness to take up new technologies.

KEY FINDING 8: Australia's level of government expenditure on R&D is relatively high by international standards, reflecting factors such as our industrial structure, unique biodiversity and the importance of the agricultural sector. Support for, and coordination of, science and innovation has increased and become more strategically focused at all levels of government, signalling strong policy interest and recognition of the links to economic, social and environmental outcomes.

KEY FINDING 9: Australia's scientific standing in the world may be at risk and, in general, Australian science and patented technology has limited visibility and impact on the development of world technologies.

KEY FINDING 10: Business innovation involving R&D and development of new technology remains low by international standards, with only a few Australian businesses strong in the development of innovative new technologies, products and processes, notably exporters in the mining and the agricultural sectors. For a range of reasons specific to our circumstances, such as the size and composition of our manufacturing sector, Australia continues to rank towards the bottom of the OECD in the share of business expenditure on R&D in GDP.

KEY FINDING 11: Notwithstanding increased investment by business and government, investment in the development of strategic ICT capability is low, which may weaken the innovation base and the future competitiveness of the economy.

KEY FINDING 12: Australia's commercialisation record has improved over time, but remains low compared to other countries and is uneven within and across different research sectors. Continuing barriers to commercialisation include lack of access to early stage capital, a shortage of management and entrepreneurial skills and lack of fully effective links between researchers and industry. Data on Australia's commercialisation performance are improving, but are particularly weak in the business sector.

KEY FINDING 13: Challenges remain in fostering science and innovation collaboration and linkages, especially between publicly funded research providers and industry. Australia lacks a strategic approach to coordination of support for international S&T collaboration, and funding mechanisms to support this appear to be insufficient.

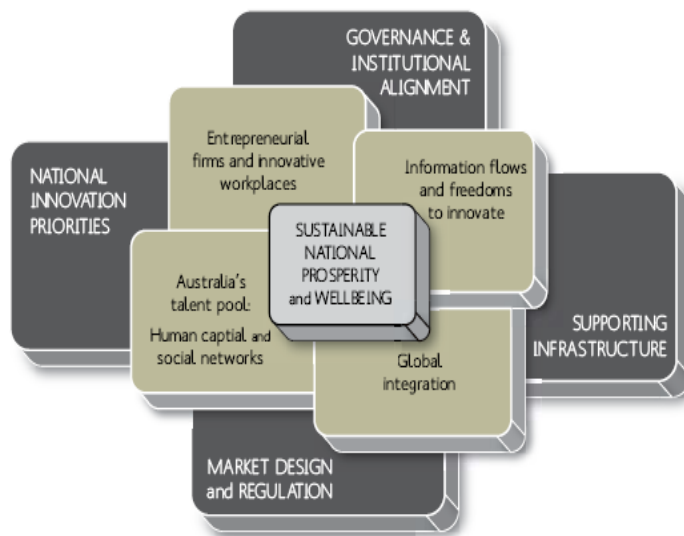
KEY FINDING 14: Australia's research infrastructure is under pressure in terms of investment and maintenance, and in leveraging access to international research infrastructure in an environment of increasing scale, costs and technical complexity. The country faces significant challenges in building broadband infrastructure to support participation in e-science. There are opportunities for a more strategic and nationally coordinated approach to infrastructure funding, but this may be hampered by lack of data on key dimensions of infrastructure.

KEY FINDING 15: The long-term sustainability of Australia's skills base in the enabling sciences is under pressure in some areas with declines in participation in most science subjects in Year 12 and in S&T subjects at the undergraduate level at university. There is an anticipated shortage of maths, science and ICT teachers in schools. Predicted growth in demand for workers with science qualifications is high.

KEY FINDING 16: Availability of innovation skills and cultural attitudes towards innovation limit Australia's innovation potential. In particular, there is a shortage in the number of Australians with sufficient entrepreneurial skills and experience in management, marketing and business development, especially in high-growth start-ups. There has been increasing recognition of the need for cross-disciplinary courses in higher education, but

	<p>few courses offer integrated development of innovation skills. There are persistent areas of weakness in Australia’s innovation culture around attitudes to entrepreneurship, risk aversion and learning from failure.</p> <p>KEY FINDING 17: Regional areas benefit considerably from the science and innovation system but face barriers to participating fully in it.</p> <p>KEY FINDING 18: While total gross expenditure on R&amp;D as a proportion of GDP is now some 50% higher than in 1981, Australia continues to rank towards the bottom of OECD countries in terms of R&amp;D investment.</p> <p>KEY FINDING 19: Support by governments for science and innovation is complex, reflecting the nature of the activity, the multiplicity of government objectives and funding sources, and perceptions of compliance costs. Support from national, state and territory governments has largely focused on building R&amp;D capacity rather than on enhancing commercialisation and strengthening skills development. Government support for business R&amp;D is low by international standards, being less than half that of the leading OECD countries.</p> <p>KEY FINDING 20: There are some major areas of complementary interest between the Australian Government and the state and territory governments. Complementarities are particularly evident in research infrastructure and emerging sciences and technologies, where increased cooperation could yield benefits for the national interest.</p>
<p>Backing Australia’s Ability (2004)</p> <p>Backing Australia’s Ability – Our Future Through Innovation and Science</p>	<p>Building our Future through Science and Innovation (a second plan).was announced on 4 May 2004. The objectives were:</p> <ul style="list-style-type: none"> <li>• \$1 billion for a new Commercial Ready programme</li> <li>• \$542 million for a new National Collaborative Research Infrastructure Strategy</li> <li>• an additional \$305 million for CSIRO National Research Flagships</li> <li>• an additional \$200 million for National Health and Medical Research Council to assist independent medical research institutions</li> <li>• an additional \$100 million for the Commercialising Emerging Technologies (COMET) programme</li> <li>• \$38.8 million for a new Maths, Science and Innovation Teaching initiative that will involve research bodies and undergraduates in primary and secondary school classes</li> <li>• \$7.2 million to co-ordinate and focus research in support of Australia's counter-terrorism needs</li> </ul>
<p>Venturous Australia (2008)</p> <p>Cutler, T. (2008) <i>Venturous Australia: building strength in innovation</i>, A Review of the National Innovation System, Commonwealth of Australia.</p>	<p>Venturing means enterprise and a major, bold undertaking. It also connotes being forward looking and prepared to seize opportunity. This is the innovative spirit we need to nurture in all Australians. At a time when the importance of innovation to our prosperity is clear, this Review has provided the Australian community with a wonderful opportunity to shape the future innovation landscape. The Panel has been impressed by the enthusiasm of participants in the Review process and delighted by both the quality and quantity of contributions made. The breadth of the task of looking across the entire national innovation system was somewhat daunting. The Review received over 700 submissions, and conducted a series of roundtable seminars on specific issues. Pressures of time and space in the report have prevented us from fully reflecting all of the excellent material and input received. We have, however, attempted to capture most of it in a series of annexes that will be published on the internet. Some of these annexes include suggestions for further action in specific areas, which will be brought to the attention of relevant parties.</p> <p>So now is the time to shape our national innovation system to ensure that it enables us to meet all the challenges we face. We will know we have succeeded when:</p> <ul style="list-style-type: none"> <li>• Productivity is again growing above the average of high income countries;</li> </ul>

- Our people and workplaces are well equipped with the skills to innovate;
- Increasing numbers of Australian businesses are investing in innovation to secure their competitive future;
- Consumers are sufficiently well informed to demand the highest standards with firms innovating to meet them;
- Those with new ideas feel they have the freedom to develop them.;
- Australian businesses and research organisations are actively involved in international collaboration;
- Australia’s innovation system is properly coordinated and integrated with our national innovation priorities;
- The cost of research is fully funded in Australian tertiary institutions, which also face strong incentives to specialise in research excellence;
- Research and development tax incentives are rationalised and the basic concession increased;
- Markets are better enabled through the improved flow and transparency of information;
- A new culture of innovation is embedded within the public sector; and
- There is a single body effectively coordinating the innovation activities of public sector research agencies.



**The innovation landscape**

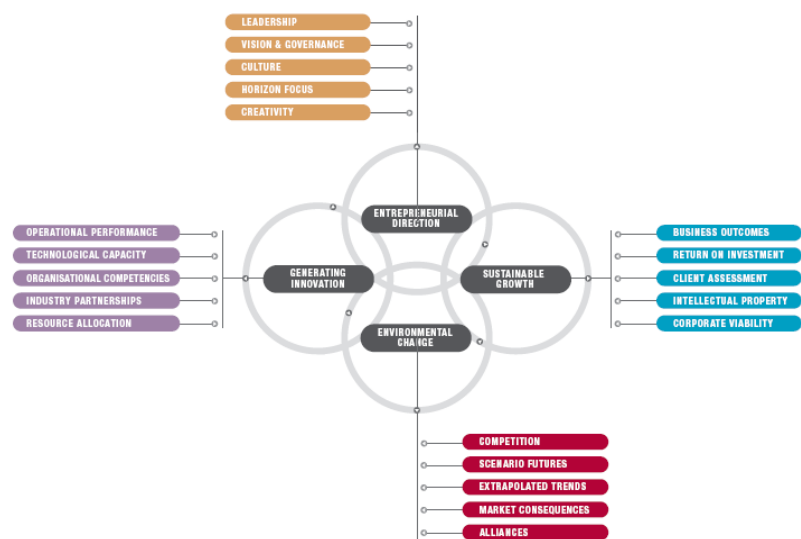
2008 Australian National Innovation Survey

Over 350 Australian organizations participated in the inaugural National Innovation Survey. The major premise is that growing organisations are adept at building existing operations while creating new business initiatives. This Survey is part of the Australian Business, Innovation and Growth (ABIG) Index, established to analyse business innovation and review emerging trends that underpin sustainable corporate growth. The ABIG index has been extensively reviewed and an eminent Advisory Board formed to review and validate survey findings at all stages. The purpose of this National Innovation Survey was to measure the relative importance of key drivers of, and barriers to, innovation across a broad spectrum of Australian organizations, identify “patterns of innovation” and particular combination of factors that lead to innovation success for different organizations. The overall market, legal, profit and other related factors that affect an organization’s ability to innovate are well documented. What is less well understood is the relative importance

of each of the drivers of and barriers to innovation, and how these vary with the size, type and nature of the organization. The purpose of this research is to measure the relative importance of each of the key drivers of and barriers to innovation across a broad spectrum of Australian organizations, to identify “patterns of innovation” ... the particular combination of factors that lead to innovation success for different organizational types.

The research also looks at: the ecosystem support for innovation; the relative importance of different sources of information; the mechanisms by which intellectual property is protected, role models for “best practice” in innovation; and industry trends that are expected to affect Australian organizations’ ability to innovate and prosper. This research is based on a study of over 350 Australian organizations that participated in a (20 minute) online survey conducted in the November 2007 - February 2008 time frame. The responding organizations represent a broad cross section of Australian organizations based on industry type (ANZSIC code), size of organization, nature of business (Commercial versus Not-for-Profit), and scope of operation (local, national, and international). The targeted respondents were senior/executive level managers in the organization and/or those who played a significant role in the formal innovation processes in the organization. The results are broadly representative of Australian organizations that have a formal focus on innovation related activities.

### E.2 ABIG innovation Model



This dynamic Innovation Model to analyse and better understand the complexity inherent with innovative organisational performance (large, SME and emerging). We continually research business innovation in Australia and overseas, so that we can advise our partners of major trends and environmental changes affecting industry sectors in the future.

This dynamic Innovation Model to analyse and better understand the complexity inherent with innovative organisational performance (large, SME and emerging).

#### 4.4.8 Artifacts - Policy Development of Business Council of Australia

The Business Council of Australia (BCA) is an association of Chief Executives of 100 of Australia’s leading corporations. BCA Member companies employ nearly one million Australians, generate \$340 billion in the economy and produce 30 per cent of Australia’s exports. They also contribute a significant proportion of the \$49 billion in federal taxes that companies are forecast to pay this financial year. The BCA has a deep interest in policies that promote sustained growth and prosperity in the global economy through strengthening Australia’s economic competitiveness (Business Council of Australia 2006a). Table 10 outlines and describe the innovation policy submissions of Business Council of Australia from 1993 to 2006.

**Table 10: Innovation Policy Development of Business Council of Australia**

Policy Document	Descriptions of Policy
<p>Managing the Innovating Enterprise: Australian Companies Competing with the World’s Best (1993)</p>	<p>This recent report from two years research by the Business Council’s Innovation Study Commission is an important addition to the current thinking on building internationally competitive enterprises in Australia. The book is directed towards providing both inspiration and instruction to managers and public policy makers to create and sustain more innovative enterprises.</p> <p>The Commission has drawn together a unique fact base of the practical experience of 120 leading edge Australian innovators across a range of manufacturing and service industries. This enterprise-focused approach follows recent work with similar attention at the level of the firm by the Australian Manufacturing Council (Pappas Carter Evans and Koop/Telesis 1990; McKinsey and Company and Australian Manufacturing Council 1993).</p> <p>The inspiration derives from the case studies of success from the leading innovators examined. Perhaps it’s time this country had some commercial heroes of its own! In this sense the book is almost an “In Search of Excellence (Peters and Waterman 1982) for Australian conditions”. The instruction for business and government is based on a robust framework of factors for innovation success drawn from the case studies—in some ways a more robust framework than the popular Peters and Waterman prescriptions (see Figure 1).</p> <p>In reviewing this book I have reflected on some of my own experiences with innovating enterprises as a business strategy consultant over the last ten years. My exposure to innovation, particularly in the food and beverage industries, in building materials and in information and financial services by firms exposed to international competition, has helped shape my own views.</p> <p>This review is structured into four sections. The first three sections outline and comment on the Commission’s key findings:</p> <ul style="list-style-type: none"> <li>• Be Inspired: innovation is the key to enterprise and, thus, the nation’s success;</li> <li>• Use a Framework: successful innovating enterprises have a number of characteristics; and,</li> <li>• Change Public Policy: the government should seek to reform its own trading enterprises, remove regulatory impediments and focus innovation support at the enterprise level.</li> </ul> <p>There are interesting parallels between the Commission’s work and another study of innovation—In Search of Excellence (Peters and Waterman 1982). Excellence, as Peters and Waterman defined it in 1982, was all about “continuously innovative big companies”. Now apart from the “big” and the fact that the examples were American rather than Australian, we seem to be on the same territory as the BCA’s Innovation Study Commission. In their prescriptions on excellence, Peters and</p>

Waterman also talk about:

- Being “close to the customer” as the key source of improvement ideas and building defensible value in a similar way to the Commission’s customer focus;
- “Sticking to the knitting”, which in the Commission’s terms has become the more popular recent idea of incremental improvements from and around a set of core competences; and,
- “Productivity through people” which is the analogue of the Commission’s flexible employee relations and bottom-up empowerment.

But here the prescriptions diverge—the Commission emphasises the importance of building a competitively strong supply chain and systematic ways of generating, culling, assessing and acting on innovations. Excellence emphasises some organisation structure and cultural characteristics: autonomy, skunk works, walking the floors, lean staff, action not analysis-paralysis, chaos held together by strong values.

It appears clear that building a competitively strong supply platform is the key to capturing the value from innovation—and in my view is a serious omission from the Excellence framework. Unfortunately, some of Peters’ and Waterman’s excellent companies are no longer performing well, perhaps in part due to problems in this area. All of the other factors could conceivably contribute to the success of innovating enterprises—the key is which factors are necessary and sufficient.

The Commission defines innovation in business very broadly, as “something that is new or improved done by an enterprise to create significantly added value either directly for the enterprise or indirectly for its customers”. An innovation is defined as successful when the enterprise captures some added value, rather than all being dissipated to competitors or customers. New or improved products and processes that are strongly directed towards better satisfying customers’ needs in terms of utility, timeliness or price, provide the innovating enterprise with the opportunity extract higher margins or greater share.

The book contrasts this view with a more narrow but more popular conception of innovation as all about science and technology, laboratories and R&D, or invention plus commercialisation. Indeed, while the Commission acknowledges the “strategic leaps” or breakthroughs that are often driven by new product inventions and process technologies, the focus of the book is on lower risk and return “continuous incremental improvements with occasional smaller step changes”, for which appropriately developed and applied technologies may be an input. Based on this wider definition of largely incremental newness and added value, the Commission, in an almost evangelical mode, delivers two inspirational messages:

1. Innovation may be the key to the nation’s competitive success; and,
2. Many firms are doing it and many more could follow.

It is argued that innovation in this broadest sense may be the key way local manufacturing and service firms can overcome their cost disadvantages due to the small scale, dispersed nature and high labour costs of the domestic market:

- Either by finding unique ways to add value to customers—in terms of better tailored product features, higher product quality, faster delivery, more responsive after sales service for which customers will reward the enterprise with a higher price or volume preference that more than offsets the cost disadvantage. Examples from the Commission’s case studies include ICI Polypropylene, APM Cartonboards, Jac Adhesives succeeding against lower cost importers into the domestic market; Faulding in drug delivery systems; and Praxa in software succeeding in international market niches against much larger scale competitors; Or,
- By finding unique ways to redesign processes so that smaller plants with shorter run lengths can deliver lower costs than larger scale international competitors. In this category the examples include Burns Philp’s international success with low cost small fermentation plants vs. larger scale plants, and South Pacific.

Tyres development of a fast changeover tyre making machine to defend against large scale importers. The Commission continues that “the message from the best enterprises is clear: dramatic improvement of performance is within reach of many enterprises”. In scanning the evidence from the 120 leading innovators surveyed

they concluded that the innovating enterprises could be big or small, across a wide range of industries, be local or foreign owned, and private or public. Indeed, on the basis of innovative approaches to overcoming disadvantages, “the range of industries that are competitive in Australia is significantly wider than is popularly thought”.

Overall, “the evidence of a fundamental change in management practices is overwhelming . . . we have found great cause for optimism and confidence”. The power and richness of the many case studies they quote make these inspirational messages quite compelling. Certainly, our own consulting experience would support the view that there are sustainable ways to side step significant disadvantages versus international competitors across a wide range of industries from financial services to building materials—in some cases making a virtue out of experience in small remote markets. And that the level of innovation, outward orientation and sophistication has increased significantly over the last ten years.

Most of the book is devoted to describing the key features of successful innovating enterprises. This is not quite a guide on “how to innovate”, rather it distils the factors for successful innovation into a robust framework. The Commission suggests these factors are as follows:

- Focusing on satisfying customer needs;
- Building a profitable, competitive supply position;
- Building systems for innovation; and,
- Providing leadership and a strong commitment of resources.

It is argued that three themes permeate these factors in successful innovating enterprises: first rate management, applied technical development and flexible employee relations.

With regard to the focus on satisfying the customers’ needs, the Commission suggests many of the prescriptions one might expect in the search to discover what turns customers on: encouraging a wide range of employees to listen to customers, undertaking selective market research, knowing the benefits of competitors offerings, understanding the causes of dissatisfaction, learning from close contact with leading edge customers. To reinforce this understanding of customer needs we are predictably urged to convert the insights into choices about how the firm can deliver value and to consider redesigning the organisation along customer segment lines, communicating the new focus internally via performance measures and building in customer feedback mechanisms.

There is nothing revolutionary in these methods, nor does the Commission claim them to be so. But in our experience the notions of customer focus receive lip service and little else from many enterprises. We have seen some of our well regarded manufacturing exporters continue to sell overseas in a highly opportunistic manner, with little deep understanding of the sources of customer value. So perhaps all this bears repeating. The suggestions on customer focus could have been enriched by more than a passing reference to developing an understanding of the customer’s economics.

Particularly, in industrial markets, we have found that just listening to what customers say may not be enough—since often their wants can only be expressed in terms of what’s already on offer. An additional technique is to understand, at a more fundamental level, what is it that makes different customers profitable, how do they compete and, therefore, how can we as suppliers enhance their success.

For example, we have found that quantifying the impact of our clients’ product quality or delivery predictability on their customers’ costs can yield key insights into the true value of alternate innovations, and can also guide price setting.

The second success factor—building on a profitable and competitive supply position—is a very welcome inclusion. It doesn’t make much sense to go to all the effort of developing a customer focus, systems for innovating, and flexible crossfunctional work place teams if the supply platform is in an endemically weak competitive position. The gains from innovation will go to competitors if, for example;

- The enterprise’s cost position is so poor that incremental innovation on premium



priced product features or delivery speed will not be sufficient to restore margins; or,

- The enterprise is seeking to launch a new product into a market in which it has poor leverage with distributors relative to competitors.

Of course, innovation may also provide the means to convert a weak position into a strong one: process improvements to overcome cost disadvantages or the development of new distribution channels to sidestep traditional competition. The key here is for managers to make the choices about what businesses and parts of the supply chain can be built into competitively strong platforms for further innovation. All too often in our experience these assessments are either not made or are over-optimistic about the timing or magnitude of the improvements. A lot of continuous improvement in deck chair arrangement can then be expended on the deck of a Titanic.

The section on systems required for successful innovation has some most instructive insights. These systems are the way the enterprise organises to generate, cull, evaluate and execute new product or process ideas while managing the risks of . . .

- Will customers want it?
- Will competitors respond, to appropriate the benefits?
- Will it work?
- Can we supply it?

The Commission argues that the attributes of good systems are that they are focused - culling initial ideas down to those with an impact on value; fast - to gain a time advantage over competitors; integrated across functions - to ensure technical, manufacturing and marketing risks are managed coherently; self-learning - to derive value from both successes and failures. Our work certainly bears out the importance of these system attributes in order to appropriately manage the risks of innovation. But the key is often the quality of the risk assessments made and the true openness to learning from past performance. Too often we see the risks from customers, competitors, technology and supply being talked up or down to justify a previously determined course rather than subjected to objective scrutiny. Similarly, it is crucial to understand the true reasons for past success and failure since they rapidly enter the corporate mythology for judging future action.

Several chapters detail systems for product/service innovation and for process innovation, the latter drawing out the common lessons for “continuous process improvement” from the techniques of TQM, Kaizen, JIT and lean manufacturing, all well illustrated with examples from innovating enterprises:

- Devolve responsibility for ideas evaluation and execution to workplace teams (activity-up);
- Set a strategic framework of what to improve to deliver high levels of customer value (policy-down);
- Provide tools, specialised skills and training;
- Seek to reduce the variability of the process to be improved; and,
- Acknowledge and encourage superior performance.

On leadership, the final factor for successful innovation, the Commission contrasts the styles of the Driver versus the Team Builder, preferring the latter for sustainable success: to communicate the customer-focused vision and make the choices on how to add value, to build and be involved in the systems for innovation, to commit scarce people and capital resources to promising ideas.

On the basis of our own work with innovating companies, we would argue that leaders also need to have some capacity to integrate an understanding of the key sources of customer value with the application of relevant technologies. It is not enough that there are marketing, technical and production people together in cross-functional teams—our experience indicates that leaders who lack an appreciation of the capabilities and limits of core technologies or are marketing shy are unlikely to provide the appropriate vision or resource allocation for successful innovation. On the other hand, innovations often occur where these linkages can be formulated in

new ways. Perhaps this argues for a Team Builder with sleeves rolled up!

The Commission exhorts leaders to set expectations high, somewhat in the manner of Hamel and Prahalad's strategic intent (Hamel and Prahalad 1989) and resource leverage (Hamel and Prahalad 1993). Similar caveats apply—if the stretch demanded by the leader is too dramatic, the newly empowered workplace teams will take on unacceptably high risks in their quest to find new sources of value. Clearly, the extent of stretch and the systems for managing innovation risk need to be aligned.

Using the framework developed above, the Commission argues for a number of public policy reforms:

- Applying the framework to government business enterprises—our experience would support the suggestion that there are significant efficiency and effectiveness gains available from commercialising public enterprises and removing them from political interference.

- Removing regulatory impediments—particularly in terms of labour market reforms where the Commission notes that the pace has slowed and that government intervention may be required to rationalise the fragmentation of bargaining units/unions.

- Emphasising more of an enterprise focus in industry policy—not “picking winners” but assisting in building strong enterprises. This theme is consistent with the recent thinking from the Australian Manufacturing Council (Pappas et al. 1990; McKinsey and Company and Australian Manufacturing Council 1993). A number of interesting ideas are proposed:

- Ensuring that competition policy is sufficiently flexible to allow the agglomeration of linked businesses—keiretsu—to develop capabilities to take on international competitors;
- Integrating disparate enterprise programs from AUSTRADE, R&D, NEIS to better serve enterprise “customers”;
- Giving enterprise “customers” a greater share of R&D grants to spend with research suppliers;
- Removing corporate regulatory burdens which impose high transaction costs on capital raisings particularly for smaller innovators; and,
- Facilitating the sharing of lessons and experience on best practices and innovation systems across enterprises.

My major criticism of the Commission's approach is the under-emphasis on the role of discontinuities in the process of innovation. While I accept that “strategic leaps” are rare, and that most of the effort often goes into “continuous incremental improvement”, I feel that the role and different characteristics of the “occasional step changes” do not receive sufficient attention. From our work, two types of step change are generally crucial to determining the success of an

innovating enterprise . . .

1. The initial and subsequent periodic assessment of the sources of customer value and the bases for competition. This is generally where the firm can get it very right or very wrong: in terms of which customers to focus on, which needs to satisfy, what elements of the supply platform can be used to build a strong position.

2. The response to external shocks and discontinuities such as changes to raw material supply, regulatory changes, technical developments, where significant reassessments of strategy may be necessary.

On one hand it could be argued that the self-learning, continuously incrementally improving enterprise may have more capacity to flexibly deal with the “preventative and breakdown maintenance” assessments described above. On the other hand, we have seen such organisations who are particularly successful at small delta improvement processes . . .

- Forgo the wide reaching preventative assessments because somewhat smugly “we are already so close to customers”, and thus risk not seeing more fundamental

	<p>threats from substitutes, competitors, and the customers' competitors; or,</p> <ul style="list-style-type: none"> <li>• Seek unsuccessfully to respond to external shocks and breakdowns with incremental improvements of insufficient scale, scope or speed. Indeed, while In Search of Excellence (Peters and Waterman 1982) attributed success to doing lots of little things well, ten years later many of the “excellent” companies are no longer top financial performers—skunk works and strong values have not been enough for IBM.</li> </ul> <p>On the Commission's own evidence, the key drivers in getting the sample innovators started were external discontinuities, spurred on by the opening of the Australian economy:</p> <ul style="list-style-type: none"> <li>• An emerging threat or immediate crises from import competitors and tariff reductions; or,</li> <li>• A new leader with fresh energy and approaches, or new opportunities opening up in new markets.</li> </ul> <p>Furthermore, a number of the innovators that were case studied by the Commission can attribute a lot of their success to good quality up-front choices: not just the one-time technical breakthroughs from the NSW Roads and Traffic Authority, Cochlear, P&amp;O Cold Storage and South Pacific Tyres, but also the initial strategies of:</p> <ul style="list-style-type: none"> <li>• APM in assessing that redesigning for speed, high variety and quality at a premium price could combat import competition;</li> <li>• G&amp;K O'Connor and Monash University in choosing unique approaches to export marketing;</li> <li>• Burns Philp in choosing to exploit its low-cost small scale fermentation plant technology world-wide; and,</li> <li>• F.J. Walker in using its solution to meat freezer burn, a problem in small remote markets, to expand with McDonalds in Asia.</li> </ul> <p>In these examples, no doubt continuous improvement has helped to refine and strengthen these strategies over time, however, the first step change was key. In dealing with systems for occasional step change innovations to products and processes the Commission observed only briefly that they tended to be similar to the continuous systems but with more senior management input. Perhaps this suggests some areas for further enquiry and thought:</p> <ul style="list-style-type: none"> <li>• What characterises the systems, structure, values and leadership of organisations who make successful step change innovations?</li> <li>• Under what organisational circumstances are occasional successful step changes compatible with sustained incremental improvement?</li> </ul> <p>Despite these reservations, overall I find the Commission's work a source of inspiration and some instruction, and would encourage managers and policy makers alike to give it considered attention.</p> <p>References</p> <p>Hamel, G. and C.K. Prahalad, 1989, Strategic intent, Harvard Business Review, 67, 9, May-June, 63–76.</p> <p>Hamel, G. and C.K. Prahalad, 1993, Strategy as Stretch and Leverage, Harvard Business Review, 71, 2, March-April, 75–84.</p> <p>McKinsey and Company and Australian Manufacturing Council, 1993, Emerging Exporters— Australia's High Value-Added Manufacturing Exporters (Melbourne, Australian Manufacturing Council).</p> <p>Pappas, Carter, Evans and Koop/Telesis, 1990, The Global Challenge: Australian Manufacturing in the 1990s (Melbourne, Australian Manufacturing Council).</p> <p>Peters, T.J. and R.H. Waterman, 1982, In Search of Excellence—Lessons from America's Best Run Companies (Sydney, Harper and Row).</p> <p>Peter Orlay, Australian Consulting Partners.</p>
New concepts in	The research which the BCA is publishing in this report consists of 19 innovation

<p>innovation: the keys to growing Australia (2006)</p>	<p>case studies from among BCA Member companies. The key findings of the case studies highlight that the traditional view of innovation as R&amp;D is no longer appropriate.</p> <p>In particular, the case studies indicate that:</p> <ul style="list-style-type: none"> <li>• innovative activity extends across all parts of a business – it is not confined to research work;</li> <li>• the imperative to deliver customer value drives the need for, and nature of, innovation; and innovation, in some circumstances, has more to do with human capital than with technology and invention.</li> <li>• A more complete understanding of business innovation in Australia, particularly within Government, will result in policy frameworks that assist Australia to achieve greater innovation</li> </ul> <p>Broad reform to foster innovation culture success. In particular, it will enable public policy to take a broader, more holistic view of the range of policy structures that influence business innovation, rather than the current narrow focus on science and technology policy.</p> <p>The BCA has identified four priorities, based on the case studies, aimed at strengthening Australia’s capacity for innovation. These are to:</p> <ol style="list-style-type: none"> <li>1 Build a better understanding of innovation within Governments and among policy makers and other relevant institutions, beginning with the introduction of a new whole-of-government definition of innovation.</li> <li>2 Emphasise the importance to innovation of public policy reform in the areas of taxation, workplace relations, infrastructure and regulation.</li> <li>3 Build stronger innovation capabilities through our education and training systems.</li> <li>4 Deliver innovation outcomes by providing the best possible environments for innovation within our workplaces.</li> </ol>
<p>Changing Paradigms: Rethinking Innovation Policies, Practices and Programs (2006)</p>	<p>The <i>Changing Paradigms</i> report provides detailed information about the innovation process within a range of Australian businesses. It is clear from this report that how companies perceive the innovation challenge, how they undertake the innovation process and the factors that influence innovation within their businesses varies greatly depending on the nature of their businesses and the market environments in which they operate.</p> <p>Importantly, there are a number of major themes arising from the evidence provided in the <i>Changing Paradigms</i> report that provide insights into innovation from a business perspective.</p> <p>+ Innovation occurs across a business.</p> <p>The findings highlight that innovation within businesses does not simply occur in research units. Rather, innovative activity extends across all parts of the business, to all levels and through a wide variety of functions.</p> <p>+ Customer value is central.</p> <p>The imperative to deliver customer value drives the need for, and nature of, innovation within business. In a competitive market economy, business sustainability is achieved through continually enhancing the value of products and services to customers. From this perspective, developments in technologies are viewed as enablers, but not drivers, of business innovation, whose successful application to business production systems is aimed at delivering enhanced value to business customers.</p> <p>+ Human capital is crucial.</p> <p>Business innovation in some circumstances has more to do with the human capital of its employees and how these skills and capabilities are applied and managed than it does with technology and invention. The findings highlight the vital importance of a skilled workforce, effective workplace relations systems and management capabilities, and strong corporate leadership in delivering a culture of innovation and enabling innovation success.</p>

+ Broader, more holistic public policy settings are needed.

The *Changing Paradigms* report's assessment of public policy impacts on business innovation highlights the need to take a broader, more holistic view to creating a policy environment in which business innovation can thrive. The findings of the report make it clear that understanding innovation from a business perspective requires a substantial reassessment of the public policy structures required to encourage business innovation. In particular, recognising that many businesses compete and innovate in a global marketplace requires a re-examination of public policies that set the conditions for competition and innovation at a domestic level.

Given the variety of ways businesses undertake innovative activities and the innovation process within businesses, policy-makers must recognize that the public policy impact on business innovation extends beyond science and technology policy. The *Changing Paradigms* report details the public policy frameworks that influence innovation within businesses in Australia, including general macroeconomic policy settings, competition policy, corporate governance regulation, infrastructure systems, workplace relations frameworks and taxation policy.

The results show the importance of a strong commitment to science and technology policies and frameworks that encourage companies to collaborate with other companies and with other bodies while protecting intellectual property. However, they also signal two important policy initiatives that Governments in Australia need to focus on if innovation within businesses is to be maximised.

+ The role of wider economic reform.

The results of the *Changing Paradigms* report highlight the vital importance of implementing the BCA's reform agenda in the areas of workplace relations, regulation, taxation and infrastructure. Over the past year the BCA has strongly argued the importance of reform in these policy areas to delivering strong and sustainable future economic growth in Australia.

The findings of the *Changing Paradigms* report re-emphasise the importance of these policy frameworks to business innovation in Australia and demonstrate how they are currently acting as barriers to business innovation success.

The *Changing Paradigms* report finds that businesses are increasingly concerned that the overall regulatory environment in Australia, in particular the corporate governance framework, is becoming focused on compliance, engendering risk aversion among companies and working against a culture of innovation and entrepreneurship. Many companies also noted that regulations were restricting their ability to transform their businesses and innovate by using assets in new ways.

Companies argued that the tax system requires reform to encourage business innovation in Australia. They noted that the structure of the personal taxation system is a major constraint in attracting highly qualified and talented people from overseas and in retaining skilled local workers. The R&D tax concession framework was seen to be too restricted to science-based innovation and insufficient to encourage greater R&D activities. The depreciation schedules on capital investment were also raised as an inhibitor to innovative activity. The poor state of the nation's infrastructure assets was raised as a factor that inhibited business operations in Australia. Companies emphasised the vital importance of quality economic infrastructure for business innovation in Australia, particularly in the area of supply chain management and logistics.

The findings of the *Changing Paradigms* report also highlight the importance placed by businesses on recent workplace relations reforms in enabling greater business innovation in Australia. A wide range of research, including *Managing the Innovating Enterprise*, has emphasised the role of flexible workplace relations systems in enabling the creation of a culture of innovation within businesses.

*Changing Paradigms* highlights that Australian businesses see the recent workplace relations reforms as an opportunity to unlock the creativity of their employees to improve business innovation, productivity and competitiveness; not as a mechanism to follow a low-cost, low-wage business strategy.

+ The importance of education and training. The public policy analysis of the *Changing Paradigms* report highlights the importance of education and training systems in providing people with the capabilities to contribute to business

innovation success. The *Changing Paradigms* report shows the importance of not only the development of strong technical skills in the workforce but also those associated with communication, teamwork, problem solving, ongoing learning, creativity, cultural understanding, entrepreneurship and leadership. Furthermore, it raises concerns by businesses about the extent to which education and training systems are currently providing people with these capabilities.

These major themes from the *Changing Paradigms* report are strikingly similar to the findings of the BCA's *Managing the Innovative Enterprise* from the early 1990s. As such they emphasise the need for a renewed effort to expand understanding of the innovation process from a business perspective among the community and throughout policy-making circles.

Moreover, they signal a number of policy reform imperatives that are essential for improved business innovation success in Australia. Australia, and Australian business, may not have 'missed the innovation boat', but that does not mean that it won't set sail without us if we do not create the right policy settings for innovation to thrive. It is these conclusions that inform the future priorities for the BCA in the area of business innovation research and policy advocacy.

The policy framework for innovation must extend beyond science and technology policy.

The *Changing Paradigms* report presents the findings of a series of interviews conducted with 19 BCA Member companies concerning innovation within their businesses. The aim of the study is to examine the nature of innovation approaches within BCA Member companies and to assess the various public policy frameworks that influence business innovation. In particular, it:

- analyses how businesses conceptualise the innovation task;
- identifies the factors that influence business innovation;
- assesses the ways in which businesses achieve innovative outcomes;
- determines the public policy structures that influence business innovation; and
- assesses whether current public policy frameworks are creating the appropriate environment for business innovation to thrive.

The report finds a wide diversity of views among companies about how they perceive innovation, which main factors influence innovation within their businesses, and activities that they undertake to achieve innovative results.

Businesses conceptualised innovation in different ways. Some tended to associate innovation with new product development. For example, innovation at **Foster's** is being driven by the 'i-nova' group, which has a primary focus on product and packaging development. A number saw innovation as exploiting a technology that arises from research and development. For example, **Woodside** has a continuous focus on technology development and its application in its mining business.

Many companies also viewed innovation in terms of nurturing ideas and bringing them to practical application through projects. For example, **Deloitte** has a formal process for nurturing innovative ideas within the business. The process includes an online Innovation Zone, where employees submit ideas, collaborate and rate ideas. This is supported by an Innovation Council of 12 Partners who reviews new ideas weekly for approval. Council members sponsor approved ideas throughout the pipeline using a stage-gate process. Division heads provide the resources to bring approved ideas to fruition.

A number of companies saw innovation through the lens of identifying and adopting 'disruptive innovations', i.e. innovations that initiate significant change or create new businesses or industries. For example, **Holden Innovation** argues that there is no innovation that isn't disruptive and it sees its role as attempting to drive disruptive innovation into a stable mainstream. Many companies viewed innovation as a process of continuous improvement. For example, **Australia Post** sees innovation as a continuous process of improvement around some clear and simple business objectives. While such continuous improvements in business offerings are not often widely associated with innovative activity, this process of incremental

innovation enables firms to respond speedily to changes in market conditions and consumer preferences and is becoming increasingly acknowledged as an important source of competitiveness.

Despite such diversity in the perceptions of innovation by businesses, the report found that meeting customer expectations was a specific innovation objective in most companies included in the study. For example, **Telstra** regards innovation as understanding customer needs and creating customer focused solutions that are simple to use and help make life easier. *Changing Paradigms* found that, at the most strategic level, many companies saw innovation as a need to constantly change, adapt and redefine the nature, purpose and direction of their business.

The report found that many businesses were undertaking such transformational innovation through:

- Changing the way in which physical assets, intellectual property assets, intangible assets and knowledge are used, either on their own or in combination, in the creation and delivery of products and services. For example, **Australia Post** has used its network of Post Offices to deliver a new range of services as well as its knowledge of distribution and logistics to enter into new areas of business.
- Achieving a substantial shift in the way people work and think about the business through attitudinal, behavioural, and cultural change strategies and programs. For example, firms **PricewaterhouseCoopers** and **Deloitte** have transformed themselves from conservative, internally focused compliance-based audit, accounting and taxation practices to proficient business service enterprises providing highly valued advisory and consulting services.
- Entering into new lines of business related to core competencies and capabilities through investments, partnerships, mergers and acquisitions. For example, the **Shell** and **Coles Myer** service station alliance is seen as a major innovation using petrol stations in a new way to create income and wealth for both companies.
- The sale or divestment of under-performing business assets. For example, internationally **DuPont** has an active acquisition and divestment strategy aimed at facilitating business transformation.

The *Changing Paradigms* report found that such innovation provided the greatest returns from innovation over time and was vital for successful large businesses.<sup>16</sup> For example, **ResMed** noted that as businesses grow and build wealth they tend to progress from a strong capability in product innovation to building competencies in customer and supplier relationships based around superior service offerings, through to transformational innovation as they look to new possibilities for creating wealth. An example of this process is evident in the case of **Microsoft**, which has shifted focus over time from hardware and software manufacturing to service offerings based on the installation and integration of systems, and then into new business areas associated with the management of information technology services.

Businesses conceptualise innovation in different ways. The report concluded that transformational innovation entails the continuous updating of business models in the light of changes in market conditions and consumer tastes and preferences, and required strong management and leadership capabilities to be undertaken successfully.

The role of professional services firms in facilitating transformational innovation within businesses by providing assurance, advisory and consulting services was also highlighted by the report. For example, **Deloitte** specifically helps its clients address their own 'growth gap', i.e. the difference between the revenue growth they believe they can deliver through their existing organisations and what they want or often have already committed to deliver. **Deloitte** works with clients to develop a tailored sustainable growth and innovation program to address the growth gap, establishing a growth management office to systematically identify and fast track high-value opportunities from concept development to approval and implementation.

Companies' views on the factors that influence innovations within their businesses were focused on the importance of corporate strategy and customer needs and expectations in driving the focus and nature of innovative activity. For example,

**DuPont** regards innovation as core to its business strategy, while **Woolworths Big W** considers that anticipating what customers want is a significant driver behind product innovation and new store formats.

Furthermore, there was an overwhelming view from the study that technologies are not seen by businesses to be drivers or sources of innovation. Instead technology was seen as an enabler that can deliver significant value benefits for customers and the business if applied successfully. For example, **Qantas** sees the application of technologies, particularly ICT, as a fundamental aspect of improving customer experience and competitive advantage.

The innovation benefits of technology are viewed as largely dependent on how effectively it is applied to create value. The importance of this point has been widely raised regarding the innovation benefits of ICT where it is increasingly recognised that value from such technology is dependent on factors such as workplace reorganisation in response to ICT implementation and how ICT is integrated and used in product and service delivery to enhance customer value.

The *Changing Paradigms* report also noted that a number of businesses saw important sources and drivers of business innovation emanating from such groups as:

- Suppliers and business partners – for example, **Transurban** partners with organisations like **Telstra** to design and deliver new product and service innovation, while the **Commonwealth Bank** partnered with **Microsoft** in the development of the CommSee project.
- Staff – for example, the **Commonwealth Bank** encourages its customer-service staff to come up with ideas to improve service provision.
- External ‘thought-leaders’ on innovation and management – for example, the executive team at **Deloitte** has travelled to North America to meet Gary Hamel, Michael Tushman and Charles O’Reilly, and to hear from similarly innovative thinkers at Harvard and MIT.

The *Changing Paradigms* report also found that businesses undertook innovation through a wide range of different activities. Many of these activities have been previously highlighted in research on business innovation. Many companies emphasised the importance of innovation within their businesses occurring through corporate and executive leadership. For example, **Visy** sees innovation as fundamentally a management and leadership issue. The association between effective Board and CEO leadership and innovative performance has been raised extensively in business research. Businesses also noted that they undertook innovation through the traditionally recognized means of developing new services or physical products, often involving the results of business R&D. For example, **Shell** has been innovating in the product area by introducing cleaner fuels and differing octane levels.

The *Changing Paradigms* report also noted that increasingly, new product development in companies is linked to a service offering on the understanding that customers purchase the service value of the product rather than the product itself. For example, **Foster’s** is linking product to service through its wine clubs.

In a parallel strategy, service sector companies were increasingly looking to model their businesses on ‘product platforms’ as a basis for building and sustaining their service offerings. For example, **Minter Ellison** has developed a software product, SAFETRAC, to assist companies to manage their compliance obligations. This emerging process of bundling together products and services in new innovative offerings to improve customer value has also been raised in research for the Australian Business Foundation.

Many businesses were undertaking innovation through improving efficiency and enhancing quality in their business processes and supply chains. For example, **Woolworths** has made a very substantial commitment to Project Refresh, which is a framework for improving business performance and business restructuring programs through end-to-end supply chain improvement.

The important enabling role of ICT in such innovation was raised by many companies and has been noted in a wide range of research. For example, **MBF** noted that information and communication technologies have allowed a high degree of



automation in its business processes, which has led to a number of innovative outcomes. A major focus of innovative activity by companies in the study involved innovation in marketing and customer relationships aimed at identifying market opportunities and better satisfying customer needs and wants. For example, **Holden Innovation** seeks to identify the determinants of vehicle choice through market research and data mining. The importance of this type of innovative activity in delivering customer and business value has also been raised by a number of other studies.

Many companies also highlighted the importance of their recruiting, training and education, and human resource management systems in delivering innovative outcomes for their businesses. For example, **PricewaterhouseCoopers** has developed the I-Challenge (Innovation Challenge) Program for graduates to help develop skills in areas such as project management, presentations delivery, teamwork, conflict management and proposal preparation, while at the same time producing real business solutions to real business problems.

Companies in the study saw workplace culture as a major factor in delivering innovation outcomes and many actively sought to create within their businesses a culture that is supportive of innovation. For example, **Telstra** has recently implemented a company-wide Innovation Community to help embed innovation principles into work practices across the business.

Companies noted the vital role of management in creating the structures for an innovation culture within business. The importance of enterprise culture and ways it can be used to support innovative performance has also been raised in other research. A number of companies were also committed to innovation strategies and action plans and have developed formal structures, processes and procedures to capture and implement innovative ideas and transfer them into application and commercial outcomes. **Deloitte**, for example, has created an ‘innovation community’ consisting of six elements to drive the innovation agenda.

These elements are: an Innovation Executive team that serves as a steering committee for innovation; an Innovation Council that reviews new ideas and manages ideas throughout a pipeline; Innovation Communicators who promote innovation at the local level; Innovation Coaches who help idea owners further develop their ideas; an Innovation Capability Team that has specialist technical and commercialisation skills; and a National Innovation Team that drives communications, rewards and recognition, training and business performance.

Companies in the study were also involved in a wide variety of partnerships and collaborations. A number of companies had collaborations with other businesses; for example **Qantas** is involved in strategic alliances and partnerships through the ‘oneworld’ alliance and has worked with SMEs in the development of new products such as in-flight food. Many companies had established partnerships with public research institutions to produce innovative outcomes. For example, **IAG** works with the CSIRO on weather forecasting, building material design and building codes, while the development of flood insurance has involved collaboration between insurers, re-insurers and Macquarie University.

Businesses noted that such partnerships aimed to achieve innovative outcomes by sharing and applying knowledge and using resources in new ways to create value and wealth. Some businesses also noted the use of outsourcing to achieve innovative outcomes. For example, **Woolworths Food and Liquor** identified the engagement of consultants and the outsourcing of IT development as delivering innovation benefits for its business. A number of companies noted that they used innovation clusters and networks to drive innovation within their businesses. For example, **Holden Innovation** is involved in a number of round-table arrangements to share ideas among players.

Although the above findings suggest that innovation perceptions, drivers and activities vary greatly throughout businesses, the results of the report do suggest that the market environment in which businesses operate has an important effect on the nature of their business innovation. For example, manufacturers tended to conceptualise their innovation tasks within the framework of product development and technology exploitation and had a focus on product innovation, although, as noted, they are increasingly recognising the service value of their products.

Service innovation tended to be a focus of professional service companies and businesses in the fast moving consumer goods (FMCG) sector where products tended to be relatively undifferentiated. Companies in the FMCG sector also tended to focus on continuous or incremental innovation as they relied on a constant stream of incremental innovations to maintain market share and position.

Finally, although many companies in the study placed importance on business transformational innovation, the companies in which it was a significant business strategy tended to operate in rapidly changing market environments or were former or current Government-owned enterprises dealing with increased stakeholder expectations.

The overarching message from the results of the *Changing Paradigms* report regarding the public policy structures that impacted on business innovation is that science and technology policy frameworks are only a small subset of a wider range of policy areas that Governments need to consider when trying to foster an environment in which innovation can thrive.

Generally, companies noted the vital importance of stability in macroeconomic conditions for business innovation in Australia. Strong growth and low and stable inflation and interest rates provided the vital conditions that supported longterm innovation investment decisions. Companies were generally happy with the macroeconomic policy framework in Australia. They also noted the importance of microeconomic reforms over the last two decades in enabling business innovation in Australia. In particular, workplace relations reform and the deregulation and global orientation of the Australian financial services sector were seen as having made an important contribution to innovation performance.

Nevertheless many companies raised concerns about a variety of public policy frameworks and how they impacted on innovative activity. Many companies noted the need for Governments to recognise that they compete and innovate in a global market environment. They noted that policy frameworks which were set in a national or local context often prevented them from effectively competing in the global marketplace. For example, the importance of business scale in competing and innovating globally was raised, but due to the small Australian market, domestic competition policy often prevented the attainment of sufficient scale.

The *Changing Paradigms* report found that businesses are increasingly concerned that the overall **regulatory environment** in Australia, in particular the corporate governance framework, is becoming focused on compliance, engendering risk aversion among companies and working against a culture of innovation and entrepreneurship. Many companies noted that regulations were restricting their ability to transform their businesses and innovate by using assets in new ways.

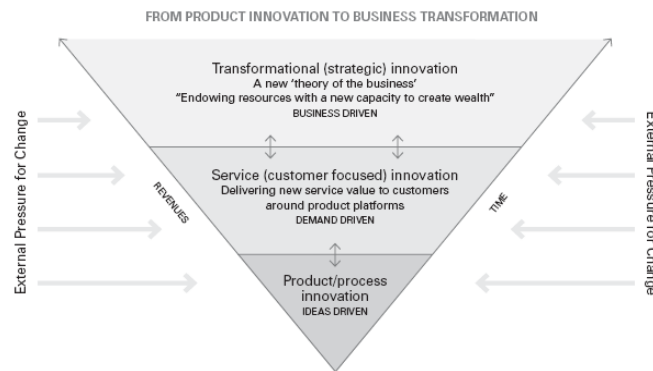
Companies argued that the **tax system** requires reform to encourage business innovation in Australia. They noted that the structure of the personal taxation system is a major constraint in attracting highly qualified and talented people from overseas and in retaining skilled local workers. The R&D tax concession framework was seen to be too restricted to science-based innovation and insufficient to encourage greater R&D activities. The depreciation schedules on capital investment were also raised as an inhibitor to innovative activity.

The poor state of the nation's **infrastructure assets** was raised as a factor that inhibited business operations in Australia. Many companies emphasised the vital importance of quality economic infrastructure for business innovation in Australia, particularly in the area of supply chain management and logistics. Many companies also raised various concerns about the ability of the **education and training system** to deliver the skills that were essential for business innovation success. Many companies noted that the education and training system was not providing graduates with technical skills appropriate to industry innovation needs – for example, a number of companies noted that university engineering graduates were not skilled in simulation techniques that were being increasingly used throughout business.

Companies were concerned that education and training systems were not providing people with appropriate skills in areas that were increasingly vital in creating the type of workplace culture in which innovation thrives. In particular, a number of companies noted that management education was focused on finance and marketing but was not providing graduates with the 'soft' skills, such as teamwork, that

enabled the innovative use of these capabilities.

Various companies also noted the need for a change in focus in industry policy to recognise the need to develop flexible niche manufacturing; raised concerns about how university intellectual property policy constrained ideas from being developed and applied; highlighted the importance of frameworks to support collaboration and knowledge transfer from a research environment into industrial and commercial application; and emphasised the importance to innovation of continuing trade liberalisation and improving trade and commercial links with other countries. Governments need to consider a wide range of policies to foster an environment in which innovation can thrive.



2 The contribution of Don Dakin from ResMed in developing this framework is gratefully acknowledged.

New Pathways to Prosperity (2006)

The future growth and prosperity of Australia will depend on its ability to find new ways to increase productivity. Australia's ageing population and the emergence of strong global competition mean that our productivity performance is increasingly important as a source of growth and determinant of international competitiveness.

While productivity has become the primary determinant of our economic prosperity as a nation, the ability to innovate has become an increasingly important factor in productivity growth. Improvements in Australia's productivity growth as a result of two decades of micro-economic reform are beginning to fade. In a global and domestic economy in which knowledge and know-how is becoming increasingly important, the way we use and apply knowledge is now as important to the value-add in the economy as efficiencies in production.

This trend is being further amplified by the changing nature of global competition, particularly from low-cost emerging economies, and the steadily increasing rate of technological change. Competing through efficiencies delivered by structural reform and competition is no longer enough for developed economies such as Australia.

Instead, 21st-century economies are increasingly competing on the basis of unique value delivered through the application of knowledge in the production process and the development of new and better products and services.

The changing nature of our economic challenges is pushing to the fore the importance of innovation for future economic prosperity in Australia. That is why governments, together with the private sector, must make innovation a national economic priority. As in the 1980s when we began to recognise the importance of micro-economic reform to future prosperity, we now need to recognise the critical role that a comprehensive and strategic innovation policy will play in our economic future. This paper sets out what innovation is, why it is important and why a more focused and strategic approach is needed by Australia to capture greater benefits in the form of increased productivity and higher value for the goods and services we produce.

**Governments and the private sector must make innovation a national economic priority**

The paper outlines why a National Innovation Framework is needed to identify and harness the benefits of Australia's innovation potential and allow it to take a lead role in global innovation. It provides a series of integrated recommendations as critical 'pointers' the BCA believes are vital to the creation of a comprehensive National Innovation Framework for Australia. The key theme throughout the paper

and its recommendations is ‘collaboration’. Each agent in the innovation process brings its own capabilities and strengths to this process. Business brings the commercial know-how, capital and access to markets, educational institutions the intellectual capital and linkages, while the key input from government is policy leadership, strategic focus and overarching vision that enable these other agents and their capabilities to be ‘joined together’ into a coherent whole.

### **NEW PATHWAYS TO PROSPERITY: A NATIONAL INNOVATION FRAMEWORK FOR AUSTRALIA**

1) Achieve consensus on a broad-based definition of innovation that recognises the importance of organisational and institutional innovation as well as R&D-based innovation.

2) Federal and state governments to set innovation as a new national reform priority for COAG.

3) Establish a new governance framework for Australia’s innovation system that seeks to overcome weaknesses in the current system, in particular the need to improve focus and better align policies within and between governments. This would include:

– Establishing a new body, ‘Innovation Australia’, with an advisory committee of business leaders and stakeholders in innovation policy. The objectives of ‘Innovation Australia’ would include providing whole-of-government policy coordination within and between governments, and between governments, business and the education and research sectors.

4) Establish medium- to long-term strategic objectives and measures for Australia’s innovation system. This would include: Benchmarking Australia’s innovation performance internationally and conducting a ‘Knowledge Foresight 2025’ exercise that enables collaborative planning for the future between government, business and education.

5) Investigate the feasibility of federal and state government investment fund arrangements to finance innovative activities where there are currently barriers to private sector investment.

– The feasibility study could investigate reasons for private sector under-funding of certain innovative activities, and possible arrangements to improve funding for innovative activities such as early-stage venture development and activities that involve the creation or use of intangible assets.

– Consideration should be given to whether Enterprise Ireland, the Finnish Funding Agency for Technology and Innovation (Tekes) or other similar foreign initiatives might be useful as models for setting up an investment agency or vehicle.

6) Ensure Australia’s place as a knowledge economy through policy frameworks that allow the appropriate availability and application of ICT.

– Increase the availability of people with the necessary skills to deploy and support ICT across industry.

### **Technological Innovation**

Technological innovation is often identified with the formal, codified knowledge arising from basic research in science and technology and its application to product and process development. In this sense, it can be measured by the output of scientific papers and patents, and a strong correlation with public investment in research and education is suggested by the international data. However, such innovation may also reflect continuous improvement in technology, which results from an internal focus on quality and externally from a broader process of networking and collaboration, including with customers and suppliers. Such activity is more difficult to quantify.

Australia has always compared well in scientific output, but a lower proportion of investment in education and research as a proportion of GDP when compared to other developed nations threatens this achievement. There are also serious gaps and weaknesses in our R&D performance and in the transfer of knowledge to markets by industry and public research organisations. While technological innovation in Australia has been stepped up in the past decade, so has the performance of the rest

of the world, and in many countries at a faster pace. According to OECD data for 2004–05, Australia spent 1.76% of GDP on R&D, lagging the OECD average of 2.26% and far short of leaders such as Finland (3.5%), Japan (3.13%) and the US (2.68%). While R&D may not be a comprehensive performance measure, it is an important indicator of levels of technological innovation.

ABS data points to a 25% increase in higher education expenditure on R&D to 0.48% of GDP in the two years to 2004, which is still behind leaders such as Sweden (0.88%, 2003) and Canada (0.73%), but a clear improvement. On the other hand, the modest increase in business expenditure on R&D to 0.95% of GDP in 2005 compares much less favourably with the position in Sweden (2.95%), Finland (2.46%), Japan (2.36%) and Korea (2.01%). Aggregating expenditure on R&D, higher education and software into an index of ‘investment in knowledge’, OECD data shows Australia (at 4.1% of GDP) trailing comparable countries, including Canada at 4.7% with a similarly substantial resources sector, Denmark at 5.5%, Finland at 6.1% and Sweden at 6.8%.

The structure of Australian industry, with a large services sector, smaller scale manufacturing operators and a significant resource base, may provide a potential explanation for Australia’s low business R&D expenditure. However, R&D is an important input into the innovation process in the mining and agricultural sectors, and increasingly so in services industries. Not only does it generate new technologies, even in ‘low-tech’ industries, it also drives competitive advantage by increasing the absorptive capacity (i.e. the ability to absorb knowledge and technology) of firms and organisations. We should be concerned if Australia’s business R&D intensity is substantially less than its international competitors.

### **Organisational Innovation**

Clearly, as can be seen for the case of technological innovation, not all knowledge is codified and measurable, and nor does innovation always embody R&D in new products and processes. The second element of innovation is organisational innovation, where knowledge and learning may be tacit as well as codified, and has the capacity to transform organisations through adaptation and absorption of new technologies, introduction of new operational processes and implementation of new workplace structures and practices.

Significantly, a recent survey by the ABS and the Department of Industry, Tourism and Resources (DITR), *Patterns of Innovation in Australian Businesses* (2006), found that non- R&D spending accounted for over two-thirds of total business expenditure on innovation. While most innovating firms reported changes that were ‘new to the business’ rather than ‘new to the world’, research suggests that organisational innovation can result in substantially improved performance through structural flexibility and agility, high-performance workplaces and good practices associated with new product and service development, quality and supply chain management.

This applies equally to organisations within the public sector. The organisational challenge, identified in the innovation management literature, is how to do two things at once: how to be ‘ambidextrous’ – to explore and exploit, to be fluid and organic and structured and systematic.

There is support for this approach in IBM’s 2006 global CEO survey, *Expanding the Innovation Horizon*. While CEOs continue to place more emphasis on technological innovation, according to the survey they now focus 30% of their efforts on organizational innovation, particularly changes in their business models. Further, ‘companies that have grown their operating margins faster than their competitors were putting twice as much emphasis on business model innovation as underperformers’. In this context, CEOs identified ‘organisation structure changes’ and ‘major strategic partnerships’ as key features of business model innovation. Innovation can transform many practices at the organisational level

### **Institutional Innovation**

Firms engaged in innovation clearly do not operate in isolation from the external economic and policy environments. Innovating firms benefit from structured collaboration, technology spillovers, networking and knowledge diffusion, where the boundaries of the extended enterprise become less easy to draw. Recent research has highlighted the emergence of ‘open systems’ approaches to innovation,

including increasing engagement with the innovative feedback loop generated by customer engagement. In Australia, a recent DITR (2006) analysis, *Collaboration and Other Factors Influencing Innovation Novelty in Australian Businesses*, found that firms that collaborated for innovation had a much greater chance of achieving a ‘new to the world’ degree of novelty, especially in technology intensive sectors.

Internationally, a Frost & Sullivan (2006) research program, *Meetings Around the World: The Impact of Collaboration on Business Performance*, supported by Verizon Business and Microsoft found that ‘collaboration works in conjunction with strategic orientation and opportunities inherent in the market environment ... to improve business performance’, and that collaboration was more than twice as significant for performance than several other factors.

This is why the external environment of innovating firms is necessarily shaped by the third element of innovation: institutional innovation. Successful and emerging knowledge-based economies are typified by ‘national innovation systems’, which have been defined by Richard Nelson as a ‘set of institutions whose interactions determine the innovative performance of ... national firms’. These institutions support not only the internal capabilities of firms and organizations but also the interrelationships that allow them to realise their full productive potential.

International comparative studies by Michael Porter and others suggest that national innovation capacity generated by systems of innovation – including research, education and networking infrastructure – is as important as internal technological capabilities in driving competitiveness. Institutional innovation helps companies to realise their full productive potential. Australia’s efforts to create a coherent and effective national innovation system have made insufficient progress. The Australian Government report, *Mapping Australian Science and Innovation* (2002), restated ‘the importance of strengthening our ability to generate ideas and undertake research, accelerating the commercial application of these ideas, and developing and retaining skills’. *Backing Australia’s Ability* (2004) emphasised ‘the complex nature of innovation and the importance of the people, linkages and interactions between the different system elements’.

Australia’s national innovation system has pockets of excellence, such as the CSIRO and its National Flagships Program, the various Cooperative Research Centres, and sector specific R&D institutions such as the Australian Centre for Minerals Extension and Research (ACMER). But the effectiveness of this system is compromised by the lack of innovation policy alignment and ‘joined-up thinking’ in government, public agencies, business and universities, as much as by funding deficiencies (OECD report on *Governance of Innovation*, 2005). These key agents or ‘actors’ in the innovation system (see Figure 2) must have a shared understanding of their role and interrelationships as well as a willingness to collaborate for the system to deliver results and to build innovation capabilities at the level of individual firms and organisations.

For example, if there was a substantial increase in research funding for priority areas of science, engineering and technology, how would resulting inventions and disclosures find their way to market as products with commercial potential? By what mechanisms and linkages would partnership opportunities between business and universities be maximised? How would infrastructure and expertise be deployed for intellectual property protection, licensing arrangements, equity stakes and spin-offs? The UK’s Lambert Review of Business–University Collaboration (2003) noted the additional challenge of not only increasing the supply of commercial ideas from universities into business but also raising ‘the overall supply of demand by business for research from all sources’.

***Australia’s national innovation system is compromised by the lack of innovation policy alignment and ‘joined-up thinking’ across government***

At the strategic level, there is little understanding of the long-term advantages conferred by a comprehensive innovation system that promotes both the generation and systematic application of knowledge within and across sectors. There is no strategic vision for Australia’s role in the global innovation system. While Australia faces a huge challenge in becoming a significant global ‘technology maker’ in its own right, research (such as *No Simple Solutions: How Sectoral Innovation Systems can be Transformed*, 2005) suggests that Australia is a successful technology integrator – adding value to existing products and services and creating new ones by

providing business solutions. There needs to be a more strategic approach to emphasise and capitalise on this role through a comprehensive policy focus.

At the operational level, innovation agencies in Australia do not have the support or funding linkages to allow them to emulate the role of their counterparts in other countries, such as the Fraunhofer institutes in Germany, Finland's Tekes and the highly effective Enterprise Ireland. These agencies work with business and public research organisations to identify and evaluate opportunities and then to exploit them in a systematic way, from 'proof of concept' stage to commercial application, including opportunities for business and technology integration. In some cases, these agencies also support technology transfer and commercialisation to ensure research funding is used for public benefit, either individually or on a 'shared services' basis as in Switzerland, Israel, Midlands in the UK and the University of California system (Cunningham and Harney

2006), and to encourage universities to become 'innovation hubs' for business networks and clusters. Public agencies of this kind are part of the new emerging technology and innovation infrastructure of 'innovation intermediaries' (Dodgson, Gann and Salter 2005). While this paper does not necessarily advocate the establishment in Australia of institutions identical in structure and function to these overseas organisations, it is important to recognise that Australian innovation agencies currently do not have the capabilities or mandates to perform similar roles in the Australian innovation system.

Given the strategic and operational deficiencies of Australia's current innovation system, it is important to ask what our innovation system should be designed to achieve. Ultimately, the purpose of a national innovation system is to transform knowledge and resources into dynamic capabilities at the level of firms and organisations, which are then better placed to contribute to the innovation performance of the economy as a whole.

Integral to this process are three key innovation drivers: a business environment conducive to innovative activity; building education and training systems to provide people with skills to become innovative; and enabling collaboration and diffusion of knowledge between different sectors of the economy. A national innovation system transforms knowledge and resources into dynamic

### **The Business Environment**

Innovative capabilities are strongly influenced by the business environment in which firms compete and innovate. The BCA's *New Concepts in Innovation* report highlighted the critical importance of policy frameworks that affect this business environment. These frameworks include general macro-economic policy settings, competition policy, regulatory frameworks, infrastructure systems, workplace relations frameworks and taxation policy.

The report highlighted business concerns that many of these existing policy frameworks are inhibiting innovation in Australia. For example, firms expressed increasing concern that the overall regulatory environment in Australia is reducing their desire to engage in entrepreneurial risk and affecting their ability to transform their businesses.

The poor state of the nation's infrastructure assets was also raised as an inhibitor to innovative activity in Australia. In particular, continued focus needs to be placed on further developing a quality broadband system in Australia with comprehensive access. Various aspects of the taxation system that failed to adequately support business innovation expenditure and acted as a constraint to the attraction and retention of skilled workers were also highlighted.

These findings emphasise the importance of continued efforts by governments to undertake economic reform to provide the type of business environment in Australia that encourages and enables innovative activity among firms, and the vital nature of such reforms to successful innovation policy. Importantly, research indicates that ICT has contributed significantly to improvements in productivity and GDP growth over the last 15 years. Policy frameworks need to ensure the appropriate availability and application of ICT in Australia to support our position as a knowledge economy.

### **Human Capital**

A focus on economic reform, however, is not sufficient to provide businesses with

the capabilities to perceive innovative opportunities and respond. The development of world-class innovation capacity requires as its precondition a national commitment to invest in human capital and infrastructure, including schools and universities, vocational education and training and provision for life-long learning. Such an investment will ensure a skilled and adaptable workforce, ready to meet the challenge of innovation and change. Such an investment should also be directed at building a more entrepreneurial culture that encourages new ideas and risk taking.

While Australia performs well on some education and training indicators, we must remain vigilant in ensuring that our education and training systems have sufficient resources and effective frameworks to maintain and improve the innovation capabilities of our people. According to an independent working group for the Prime Minister's Science, Engineering and Innovation Council (PMSEIC), China and India, as well as the US and Europe, are increasing the rate of investment in human capital as a matter of priority: 'Today we stand at the brink of a new era – investing in our education and research base now will create opportunities to build a technology-based Australian economy that is internationally engaged.'

A key priority for a national innovation framework is the development of education and training systems that provide people with the capabilities to contribute to innovation success. Research suggests not only the importance of the development of strong technical skills in the workforce but also those associated with communication, teamwork, problem solving, entrepreneurship and leadership.

However, there is evidence to suggest that education and training systems are not meeting the innovation needs of industry. For example, the Allen Consulting report, *World Class Skills for World Class Industries* (2006), found that many employers have difficulty recruiting employees with appropriate levels of 'soft skills'. Furthermore, the importance of management skills associated with managing knowledge and innovation within organisations is being increasingly recognised. Education and training systems provide people with the capabilities to contribute to innovation success

Knowledge management entails the development, tracking, measuring and sharing of intangible assets, particularly the knowledge and expertise employees may apply to products and services, and to the operations of the organisation itself. A recent OECD report, *The Significance of Knowledge Management in the Business Sector* (2004), identified key knowledge management practices as:

- (1) creating a knowledge sharing culture,
- (2) incentives policy to retain employees,
- (3) alliances for acquiring knowledge, and
- (4) written knowledge management policy.

The study found that these practices were becoming more widespread internationally, and that a clear association could be observed between such practices and innovation and productivity, though not one that is well researched or understood. A recent Economist Intelligence Unit (2006) world-wide survey of executives and managers found that most identified knowledge and innovation management, in preference to areas such as marketing and product development, as the source of the greatest anticipated productivity gains over the next 15 years.

Evidence suggests that Australian managers need to better develop their innovation management skills. A new international survey of manufacturing firms conducted by Mark Dodgson and Peter Innes for the Australian Business Foundation (2006) concludes that in relation to the local sample that 'while there is evidence of manufacturers engaging in some innovative business practices, especially towards achieving production efficiencies, they generally fail to appreciate and employ innovation as a decisive competitive strategy.'

The success of Australia's national innovation system will increasingly depend on the quality and relevance of capabilities at the organisational level. Accordingly, as workplaces become more flexible and responsive in a changing competitive environment, the emphasis of economic reform will need to evolve to a new stage – the leadership and management of Australian organisations, and the educational infrastructure and programs required to support the development of innovative



capabilities within organisations.

### **Collaboration and Knowledge Diffusion**

As noted above, the level of effective collaboration between businesses and universities and research institutions and more broadly between the private and public sectors is of fundamental importance to innovation success. It is now widely accepted within business that the main sources of innovation are likely to come from outside the organisation. As noted by Howard (2005), ‘access to new knowledge through networks is recognised as an important way of accessing and acquiring new ideas, insights and technologies for new products and services, for new approaches to business processes (both within and between businesses), and new ways of responding to consumer behaviour and wants.’

While Australia has benefited from examples of highly effective collaboration, there continues to be considerable scope to improve the level and quality in all sectors – in particular between industry and public sector research institutions and universities. The 2003 ABS Innovation Survey found that only 27% of innovating businesses in Australia were involved in any form of collaboration or alliance. Furthermore, only 6.5% of innovating businesses had collaborative links to universities, governments or research institutions.

A DITR–DEST (2005) report on collaboration and commercialisation of research in the Australian science industry highlighted that the main institutional impediments to more effective collaboration in Australia remain a poor alignment of public research with industry needs, poor interaction between industry and researchers, and high costs associated with transferring IP from the public sector to industry. Similar factors were also identified by the BCA–Australian Vice-Chancellors’ Committee report, *Building Effective Systems for the Commercialisation of University Research* in 2004.

Measures aimed at more effective collaboration between sectors of the economy need to be viewed as a priority for a national innovation framework. In this respect, organisations such as the Australian Institute for Commercialisation and the Society for Knowledge Economics (established with the support of Westpac, Microsoft, CPA Australia, the Institute of Actuaries and the Australian Government Information Office) that bring together thought leaders across the public and private sectors have a vital role to play in driving discussion, insight, and collaborative recommendations that can advance Australia’s productivity and sustain prosperity through knowledge and innovation. Such organisations represent a new model of working in a highly collaborative, technology-enabled world for the common good of a knowledge-based economy. However, this increasing collaboration at a business and thought leadership level underlines the importance of government playing a more proactive role in developing innovation policy and encouraging stronger linkages between the important agents of innovation.

Innovation has been encouraged and supported by governments and business in recent years. But despite its growing importance to sustainable growth and competitiveness, it has not been treated as a key priority for the nation. In its *New Concepts in Innovation* report, the BCA called for a major reassessment of public policy settings required to encourage innovation.

The challenge of innovation is not just for the innovators but for the whole range of stakeholders in a modern and prosperous economy, positioning itself for long-term competitive success in global markets. These stakeholders include government, research and educational institutions, business and individuals. According to *Backing Australia’s Ability* (2004), ‘People and their interactions are critical in innovation. Collaboration increases the ‘interconnectedness’ of the system, providing more and varied pathways to use and the marketplace’. It must be accepted and understood that all have a part to play in building innovation capabilities at the organisational level and, as a result, delivering high performance across Australian industries and services.

The priorities outlined in the National Innovation Framework are underpinned by the need for a clearer understanding of roles and responsibilities around building Australia’s innovation system and capacities, including at the state and regional levels. The framework and its recommendations recognise that only with a clearer understanding of these roles and responsibilities will a sustained and strategic effort

to improve our innovation capabilities be possible.

## **A NATIONAL INNOVATION FRAMEWORK FOR AUSTRALIA**

**1 Recognise innovation as a critical national priority and align efforts by governments and business to boost innovation.**

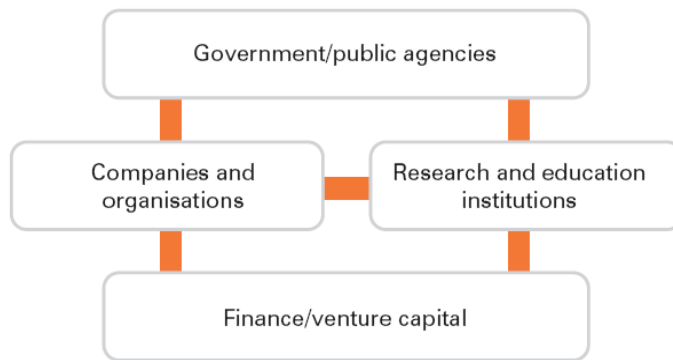
**2 Strengthen linkages and collaboration between all elements of Australia’s innovation system.**

**3 Implement specific policy and investment measures to strengthen Australia’s research networks and institutions.**

**4 Enhance policy focus and strategic investment in education and training to improve the innovation capabilities and culture of our people.**

Put simply, innovation means ‘creating or doing new things or doing things in new or better ways’ drawing on knowledge, creativity and collaboration to add value to products, services and processes. While research and development activities make a vital contribution to innovation, it is essential that we recognise, define and promote innovation across a much broader range of sectors and activities than R&D. There is increasing recognition around the world that innovation is a key driver of the competitiveness of firms and organisations in the global economy, and the quality of both private and publicly provided services. Both the Australian Government and the federal Opposition have highlighted the importance of innovation to Australia’s economic success.

**FIGURE 2: THE NATIONAL INNOVATION SYSTEM – ROLES, RESPONSIBILITIES AND LINKAGES**



#### 4.4.9 Artifacts - Society for Knowledge Economics

Artifacts from policy reviews and submissions developed by the Society for Knowledge Economics were collected as part of triangulation of policy data that were collected, and these are outlined and described in Table 11. These artifacts provide a critique and review of the policies developed by governments.

**Table 11: Innovation Policy Development of Society for Knowledge Economics**

Author(s) and Policy Document	Description of Policy
<p>Vamos, S. (2008) A letter in response to the “venturousaustralia” Green Paper dated 22<sup>nd</sup> September 2008, Society for Knowledge Economics.</p>	<p><i>The Society for Knowledge Economics</i>, and our stakeholders, welcome the “venturousaustralia” Green Paper and congratulate the expert panel members and all concerned responsible for its development.</p> <p>We are very pleased with the clear message and multiple references to the importance of “<i>innovative workplaces</i>” to a healthy Australian Innovation System and that “<i>innovation largely revolves around what happens in business</i>”. Also welcome is the focus on the need for innovation in the Public Sector.</p> <p>The point on Page 19 that “<i>the pursuit of innovation involves change processes within a societal or community context</i>” is also an important one worthy of attention. Innovation is about leading change for economic and social benefit. As Mark Dodgson points out on Page 33, this requires a range of “<i>strategic and leadership competencies</i>” and on Page 35 “<i>to reset Australia’s innovation policy to foster a critical mass of Australian firms with the skills and capabilities to make innovation a decisive business strategy</i>”.</p> <p><b>Hence, we strongly support Recommendation 3.1 and the suggestion of a <i>National Forum on the Workplace of the Future</i>, with one point of significant amplification that; we need to invest in and develop Australia’s workplace leadership, culture and management capabilities across both private and public sector enterprises.</b></p> <p><b>Attached is a submission we are happy to submit in response to the Green Paper, a <i>Society for Knowledge Economics report</i> commissioned by the Victorian Government “<i>Enabling Innovation: Leadership, Culture and Management at the Workplace Level</i>”, prepared in collaboration with University of New South Wales and Copenhagen Business School. This report has been endorsed widely by leaders from across all sectors of our economy.</b></p> <p><b>It is our strong recommendation that the leadership, culture and management aspects of workplace innovation are given much more attention as part of Government support for the development of Australia’s innovation system and is reflected as such in your response to the Green Paper.</b></p> <p>As stated on Page 54 regarding “Workplace Innovation”;</p> <p><i>“The public policy objective here is twofold. First we want to promote greater investment in skill upgrading and development to achieve an outcome of increased firm productivity and innovativeness. The second objective is to support everyone in the workforce to be able to develop and hone their skills and talents over the course of their whole careers.”</i></p> <p>What is not adequately stated and addressed in the <i>venturousaustralia</i> report (despite references on Page 56 and 57) is that <b>this aim is highly dependent on having workplace leaders across our economy with the capability to create cultures and management systems that encourage workplace innovation and enable their people to achieve to their potential, leveraging the possibilities of information and communications technology.</b></p> <p><b>Hence we believe Government policy must invest and have involvement in the development of Australia’s workplace leadership capabilities for innovation and hence productivity.</b></p> <p><i>The Society for Knowledge Economics</i> would welcome the opportunity to lead or participate in a process to define action that can and should be taken to address this vital</p>

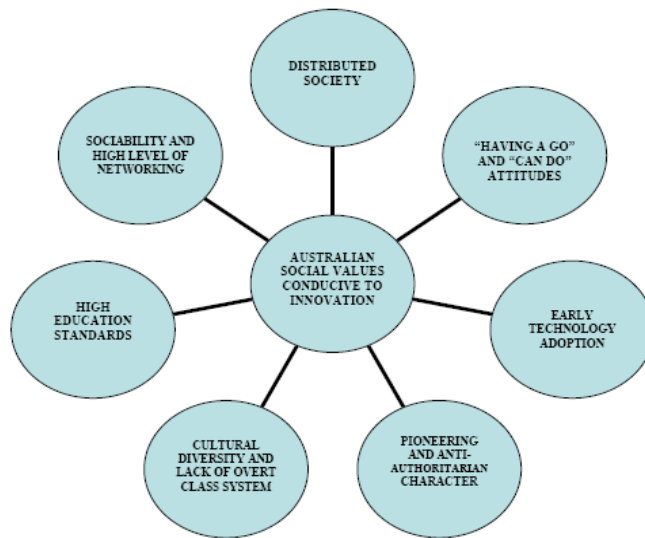
	<p>and foundational (and often overlooked) aspect of our innovation system;</p> <p><b>leadership, culture and management at the workplace level.</b></p> <p>We agree that as stated on Page 56 there is a “<i>need to revisit the issue of management education and leadership skills that were flagged in the Karpin Report</i>”.</p> <p>We believe that, as mentioned, on Page 73 and Recommendation 6.5, we need to “<i>build concentrations of excellence, encourage collaboration and achieve better dissemination of knowledge.....</i>” There is no more worthy of area of such focus than our Nation’s leadership capacity and capabilities in the work place.</p> <p>Just as on Page 151 “<i>A common problem for many Governments is that they use yesterday’s institutions to meet tomorrow’s problems</i>” the same applies to the private sector. Old styles of leadership, culture and management are not adequate for the connected world economy we live in today, which requires all organisations to connect with and collaborate with a wide range of stakeholders and to understand how to leverage the potential of communications and information technology.</p> <p>The Innovation leadership challenge closely aligns with the same leadership challenges organisations face in addressing sustainability. <i>The Society for Knowledge Economics</i> is collaborating with the OECD and the US Extended Business Reporting Consortium on matters related to development of better measurement of intangibles and aspects of organisational performance related to innovation. We see these matters as needing focus as part of the workplace leadership, culture and management elements of our innovation system.</p> <p><i>The Society</i> is also currently examining options for operationalising the concept of the Workplace of the Future via a project commissioned by the Department of Education, Employment and Workplace Relations. For this project, we are leveraging the expertise of key stakeholders in our network, including Professor Roy Green from UTS and Danny Samson from Melbourne University, a member of the original Karpin task force.</p> <p>The “leadership, culture and management” aspects of our innovation system need much greater attention. Cross sectoral focus, including business, academia, unions and government is the key to making progress in this vital aspect of our innovation system.</p> <p><b><i>The Society for Knowledge Economics</i> believes a “lighthouse” organisation needs to exist that brings key stakeholders together from all sectors to better understand the challenges, and identify effective means to develop and distribute leading practices in leadership, culture and management. Such an entity can develop and recommend broad workplace development programs promoted by Government and implemented across the public and private sector.</b></p> <p>Such an entity needs to be strongly connected to programs such as Enterprise Connect, Comet, IBSA, and the Industry Innovation Councils, to ensure that leading practices are distributed to business and industry through these vehicles as well.</p>
<p>Innovation Attitudes in Australia (2008)</p>	<p><b>An innovation survey (Dec 2007 – Jan 2008), conducted by Open Forum for the Society for Knowledge Economics, identifies the ‘enablers’ and ‘impediments’ to innovation in Australian society.</b></p> <p>Enablers of innovation: technology adoption, a ‘can do’ and pioneering attitude, cultural diversity, high education standards, networking and sociability, and a distributed society.</p> <p>Impediments to innovation: the tall poppy syndrome, short-termism in business thinking, under-investment in education and infrastructure, a lack of systemic support for innovation, social and political conservatism including a tendency for risk-averse and ‘insurance driven’ thinking, a lack of creative jobs, excessive regulation, and a lack of leadership and communication in business.</p> <p>Open Forum recently conducted an online qualitative survey on innovation attitudes in Australia. The open-ended survey was conducted on behalf of the Society for Knowledge Economics (SKE) among the Open Forum community, which comprises some 1500 top decision makers in the public and private sector, as well as academics and members of the wider community.</p> <p>The survey asked the respondents to share their thoughts on key attitudes, values and beliefs impacting Australia’s innovation ability. Specific policy suggestions were sought on the proposal for the establishment of a standalone national innovation</p>

portfolio, its purpose and desired outcomes.

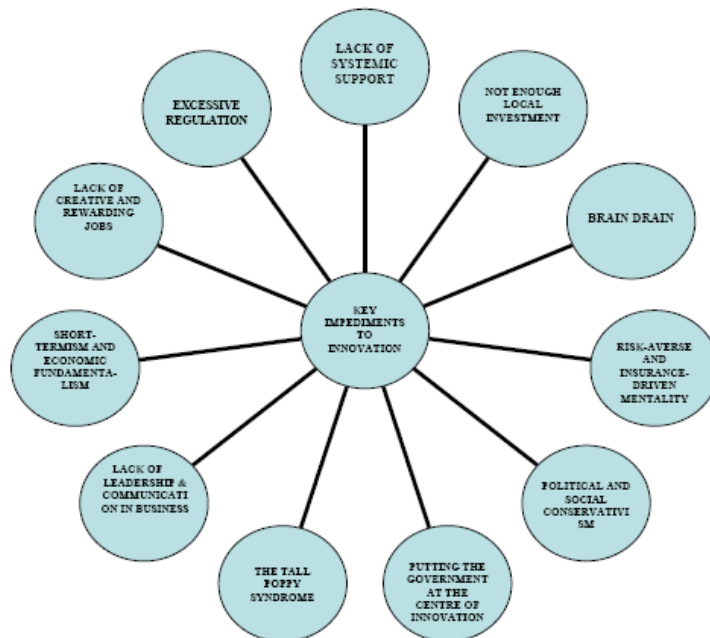
The survey was motivated by the recent national inquiry into the National Innovation Agenda proposal by the Victorian Government, and the general urgency shown by the business community in asking the country’s leaders to show more commitment in dealing with innovation hurdles in a more systematic manner.

The respondents provided a number of high-level policy suggestions, which will be used by the Australian Society for Knowledge Economics to inform the Society’s input into the national policy debate.

The overwhelming majority of the respondents believe the nation is in urgent need of a co-ordinated national policy on innovation, and are in favour of establishing a stand-alone innovation portfolio to co-ordinate innovation activities across sectors and institutions, and facilitate a cultural shift towards ‘a distributed solutions society’.



**Key social values identified as conducive to innovation in Australia**



**Key impediments to the fostering of innovation**

Enabling Innovation: Leadership, Culture and Management at the Workplace Level (2008)

A research study prepared by the SKE on behalf of the Department of Innovation, Industry and Regional Development, the Victorian Government. Calls for national debate and strategic action to lift innovation management at the workplace level. Reviews existing innovation survey and calls for better insights into workplace performance and practices, including more facts and statistics. Let’s open up the ‘black box’ of management and become clearer about what it means to manage innovation at

the enterprise level, including the leadership styles, workplace cultures and management techniques most successful in producing innovation outcomes. Provides practical examples via five mini-case studies with Microsoft, PwC, AMP, ABC, and Acquire of what it means to enable innovation at the workplace level and the effects it produces. Reviews international government policy initiatives and compares these to Australia. Consults with key stakeholders across Unions, Associations, Universities, Public and Private Sector Organisations and finds strong support for more debate, insights and strategic action to make leadership, culture and innovation management at the workplace level strategic national priorities.

The engine of innovation in Australia is our people at work. The workplace (be it large or small, public or private) is where the needs of an organisation's customers and key stakeholders are identified, analysed and transformed into new or improved products, services and business processes. The degree to which people are enabled, encouraged and motivated to innovate at work determines, by and large, a nation's capacity to innovate. In Australia, only around 34% of businesses are 'active innovators'. Research in this report indicates that lifting the participation rates of Australia businesses above the 34% level and closer to the 55-60%, as seen in parts of Europe, will require renewed attention by industry and government to leadership and management at the workplace level.

**Aim and Focus of this Report:**

The overarching aim of this report is to examine the demand and need for a Karpin report II in Australia and strategic action to strengthen leadership and management at the workplace level. This has been done through consultations with key stakeholders and a series of research analyses, as presented in this report.

The Karpin report of 1995 was the largest inquiry ever in Australia into the leadership and management skills that make for productive, innovative and successful workplaces, and how Australia prepares its managers for work. Whilst the original Karpin report focused on management more broadly, this report focuses on innovation management and leadership in the workplace.

Many of the elements of Australia's National Innovation System (i.e. Research and Development, Tax Policy, Cooperative Research Centres, Commercialisation, Venture Capital, Export Grants, etc) are currently under review in the National Innovation Review. This submission focuses specifically on the attributes essential to creating an innovative workplace. For the purpose of this report, we limit our focus to:

- Leadership: Visionary leaders, who involve people at all levels of work in defining workplace priorities and purpose, and who make innovation a desired and commonly accepted organisational activity.
- Culture: The shared organisational values and beliefs (including the invisible 'codes of conduct' and 'ways of doing') that enable ideas to be born and transformed into new products, services and processes.
- Management: The management systems, tools and techniques (including technology) that support and give life to innovation.

Ultimately these attributes of Australia's innovation system define workplace productivity and national economic performance. That is why they need much greater focus and strategic development if we are to make Australia a leading innovative nation. The report finds that:

- There is strong support amongst key stakeholders for ensuring that leadership and management at the workplace level becomes a strategic, national priority. Stakeholders consulted commented that a Karpin II and strategic action is well overdue and that leadership and management in Australian organisations, large or small, public or private, are critical to enterprise productivity, innovation in the workplace, and the continued growth and sustainability of our national economy.
- Existing national innovation surveys in Australia, by and large, fail to consider how innovation is managed at the enterprise level. We know too little about the enablers and barriers to innovation in the workplace; the strengths and weaknesses of Australian organisations; and the optimal configurations of leadership, culture and management techniques to lifting innovation rates and

	<p>performance.</p> <ul style="list-style-type: none"> <li>• Most government workplace and innovation development initiatives and programmes in Australia are directed at technological or scientific innovation while only a few policy initiatives are directed at strengthening innovation management inside organisations, including leadership and culture.</li> <li>• There is no national, cross-departmental, workplace development strategy in place in Australia that focuses on innovation capabilities at the workplace level. This compares poorly with overseas nations, specifically Ireland and Finland, who have made workplace development and innovation a policy priority supported by strong funding and ‘joined-up thinking’ in key government departments.</li> </ul> <p>Recommendations: The reports suggests that Australia can and should do more to help businesses develop the leadership skills, workplace cultures and management techniques necessary to lift innovation rates. This is a challenge for all Australian organisations - small and large, public and private. The report makes the following recommendations to this end:</p> <ul style="list-style-type: none"> <li>• As a first step, we need better insights into and understanding of workplace performance and practices, including more facts and statistics. Specifically, there is a need to open up the ‘black box’ of management and investigate what it means to manage innovation at the enterprise level, including the leadership styles, workplace cultures and management techniques most successful in producing innovation outcomes. We need to start a national debate which articulates leadership and management as a strategic national priority. To this end, the report recommends starting a national dialogue with key stakeholders who work together to review Australia’s innovation management capabilities and performance in the workplace. Such an initiative can help provide insights into the enablers and barriers to innovation in the workplace; the strengths and weaknesses of Australian organisations; and any gaps between current practices and those most conducive to lifting innovation performance in the workplace.</li> <li>• Second, and in support of the above, an Implementation Group or Task Force on Leadership, Culture and Management at the Enterprise Level is recommended to oversee the national dialogue and importantly the formulation of national strategies and policy. This will bring together key stakeholders across public and private sector organisations, government, education and research institutions, unions, professional associations and others charged with making Australia competitive though innovation.</li> </ul> <p>A collaborative approach is key to successful strategy development and workplace transformation, and to strengthening enterprise productivity. There are benefits associated with commencing a national dialogue and strategic action;</p> <ul style="list-style-type: none"> <li>• First, it can inform national policies to strengthen innovation management and workplace development more broadly. It can help ensure that leadership, culture and innovation management at the enterprise level are incorporated into the National Innovation Agenda and articulated as strategic priorities and areas for investment and policy development going forward.</li> <li>• Second, it can feed into education curriculum across all levels of education (including professional bodies) to ensure that Australia’s education system is focused on delivering the capability needs of managers and workers in coming decades.</li> <li>• Third, it can help create a shared vision for the future for Australian organisations and society and help align the thinking and activities of the many, often fragmented and disparate, actors charged with making Australia an innovative nation (be it unions, policy makers, associations, public or private organisations, universities and research).</li> </ul>
Submission to the Review of Australia’s National Innovation System	Those who have collaborated on this submission believe that we need to make Australia the most advanced nation in the world in which to foster innovation. This requires leadership, a strategic approach to policy formulation, collaboration and ‘joined-up’ thinking in government and across industry, policy, research and academia.

(2008)

Innovation is critical to ensure continued economic prosperity and social wellbeing in Australia. Indeed, the future growth and prosperity of Australia will depend on our ability to innovate. Innovation offers many benefits. It enables us to respond more effectively to economic and social challenges, for example, climate change and skills shortages. It helps increase Australia's international competitiveness and create a sustainable economy. It also plays a vital role in the creation of social wellbeing and the maintenance of high living standards for Australians.

Innovation can be broadly defined as the application of knowledge to create additional value, wealth and wellbeing. Innovation is much more than invention, and occurs not just in laboratories and universities but across society and the workforce. Specifically, innovation requires that knowledge and ideas be transformed into new goods, services, or production processes to provide additional social and economic benefits.

Those who have collaborated to develop this submission consider that Australia needs a clearer framework of strategic support at government, business and community levels to lift innovation in Australia. Currently, there are areas of relative weakness in Australia's national innovation system, which act as barriers to Australia reaching its full potential and lifting innovation performance. The areas where Australia is performing poorly include:

- Collaboration and value networks (notably between businesses and researchers)
- Research and development (R&D) (notably business investments into R&D, as well as availability of scientists and engineers and 'brain drain')
- Public expenditure on education
- Leadership, culture and management at the workplace level (specifically, the number of businesses that innovate, and their capacity for innovation)
- Broadband subscribers and technological readiness
- The business environment and regulation (specifically, burdens of business regulation and total tax rate).

Table 1: How Do We Fare? Barriers to Innovation in Australia

Indicator	Rank (% rank)	Performance
<b>1. Collaboration and Value Networks</b>		
All types of external collaboration by companies (with clients, suppliers, public research institutions, etc)	29%. Australia ranks 20 as compared to the EU27	☹️
Collaboration with universities or other higher education institutes	2%. AU ranks 27 as compared to the EU27 nations. EU27 average is almost four times the AU measure.	☹️
Regional collaboration & Int. collaboration outside region	Indicators not available for Australia	N/A
<b>2. Research and Development</b>		
Gross domestic expenditure on R&D - GGERD (% of GDP)	1.78%. Australia ranks 17 out of 39 OECD nations	☹️
Business expenditure on R&D	53.5%. Australia ranks 26 out of 39 OECD nations	☹️
Research & Development indicator (patents and scientific journals)	Australia ranks 19 out of 140 nations	☹️
Availability of scientists & engineers	Australia ranks 34 out of 131 nations	☹️
Quality of scientific research institutions	Australia ranks 15 out of 131 nations	☹️
'Brain drain' (whether a country's talented people leave to pursue opportunities in other countries)	Australia ranks 38 out of 131 nations	☹️
Availability of venture capital	Australia ranks 15 out of 129 nations	☹️
<b>3. Education and Skills Development</b>		
Public expenditure on education (% of GDP)	4.28%. Australia ranks 25 out of 33 OECD nations	☹️
Quality of the educational system	Australia ranks 9 out of 131 nations	☹️
Education and human resources (secondary and tertiary enrollment)	Australia ranks 5 out of 137 nations	☹️
<b>4. Culture, Leadership and Management</b>		
Capacity for innovation	Australia ranks 20 out of 131 nations	☹️
% of AU companies that innovate	34%. Australia ranks 15 as compared to the EU27	☹️
Sophistication of business strategy and operations	Australia ranks 24 out of 131 nations	☹️
Production process sophistication	Australia ranks 23 out of 131 nations	☹️
Willingness to delegate authority	Australia ranks 14 out of 131 nations	☹️
National human capital survey	Indicators not available for Australia	N/A
<b>5. Technology Infrastructure</b>		
ICT coverage	Australia ranks 5 out of 131 nations	☹️
Broadband subscribers per 100 inhabitants	Australia ranks 12 out of 30 nations	☹️
Technological readiness	Australia ranks 17 out of 131 nations	☹️
<b>6. Business Environment and Regulation</b>		
Economic incentive and institutional regime (tariff and non-tariff barriers, regulatory quality, and rule of law)	Australia ranks 10 out of 137 nations	☹️
Burden of government regulation	Australia ranks 68 out of 131 nations	☹️
Total tax rate	Australia ranks 83 out of 131 nations	☹️

To this end, this submission suggest a number of strategic actions from government, starting with clear and aligned policy objectives, increased funding, strong leadership, and the strategic allocation of resources. Maximising our innovation potential requires, first and foremost, that innovation be recognised as a critical national priority, with



government’s full commitment. This could include strengthening (or replacing) the Prime Minister’s Science, Engineering and Innovation Council (PMSEIC) with a body of governance and custodianship, possibly labelled the ‘Innovation Council Australia’. Such a body would be chaired by the Prime Minister. It would lead the development of a new governance framework for Australia’s innovation system and seek to overcome weaknesses in the current system. In particular, it would be responsible for aligning policy initiatives and programmes within and between governments. Such a new body would also be tasked with establishing clear national innovation priorities. This could involve:

- Setting innovation policy as a new national reform priority for the Council of Australian Governments (COAG) to ensure coordination across the nation as a whole and eliminate duplication and fragmentation of programs across state and federal levels.
- Identifying critical national infrastructure and capability requirements, including delivery mechanisms to business, large and small.
- Ensuring that national challenges are turned into national opportunities (climate change being one example).
- Aligning incentives for all stakeholders involved.
- Embedding innovation into all areas of public service delivery. Strategic action would also include setting medium- to long-term strategic objectives and targets for Australia’s innovation system to enable forward thinking, track performance, and ensure accountability for all involved.

This could include:

- A ‘benchmarking exercise’ of Australia’s innovation performance internationally, focusing on national strengths and weaknesses, and leveraging the findings of this National Innovation Review to this end.
- A ‘Knowledge Foresight 2025’ exercise to further explore gaps in the national innovation system, and enable collaborative planning for the future.
- A National Innovation Scorecard to govern and monitor performance and progress.

**Table 2: Some Recommendations for Lifting Australia’s Innovation Potential**

<p><b>1. Collaboration and Value Networks</b></p> <p><i>Strengthen linkages and collaboration between all elements of Australia’s innovation system</i></p>	<ul style="list-style-type: none"> <li>• Prioritise the development of closer collaboration between business and the research and education sectors, for example, via a National Centre for Collaboration, Industry Placement Programs, intermediaries and Collaborative ‘Lighthouses’, and a new model for developing course curricula (see main body for more details).</li> <li>• Support innovation resource centres such as the <i>Enterprise Connect Network</i>.</li> <li>• Increase international collaborations, for example, by creating more incentives for multinational enterprises to invest in Australia and form partnerships with Australian businesses, including SMEs.</li> <li>• Consider establishing Australian Innovation Centres abroad, as done by some European countries.</li> <li>• Develop regional ‘centres of excellence’ to maximise the utilisation and development of local endowments and specialised regional competencies.</li> </ul>
<p><b>2. Research and Development</b></p> <p><i>Implement specific policy and investment measures to make Australia’s research institutions world leaders</i></p>	<ul style="list-style-type: none"> <li>• Develop a shared vision to transform Australian research institutions into world leading institutions, supported by strong leadership and measures, which aim to lift private and public sector investment into R&amp;D.</li> <li>• Implement measures to attract the best and brightest of our young people into research and academia. Future Fellowships is a welcomed initiative, but more is needed. This may include efforts at changing public perception and making research and academia attractive career paths for young people to pursue.</li> <li>• Strengthen the commercialisation and development of new products and services, for example, via funding agencies similar to the Finnish TEKES and ‘proofs of concepts’ to road-test commercial application and benefits.</li> <li>• Inquire into alternative measurement systems for incentivising businesses investments into R&amp;D and intangible resources.</li> </ul>
<p><b>3. Education and Training</b></p> <p><i>Enhance policy focus and strategic investment in education and training to improve the innovation capabilities of our people</i></p>	<ul style="list-style-type: none"> <li>• Ensure education and training systems, including VETs, are equipping Australian children and adults with the skills and capabilities to become innovative, aimed at developing both ‘soft’ and ‘hard’ skills (see the main body for more details).</li> <li>• Introduce measures to raise the percentage of people in business with tertiary qualifications in science and technology.</li> <li>• Develop a greater tolerance for change and ambiguity in students and recognise ‘change management’ as a key area of expertise that requires skills development.</li> <li>• Support teachers and, importantly, teaching methods that contribute to the development of innovation skills in primary, secondary and tertiary education.</li> <li>• Introduce a national adult learning program to ensure Australians across all socio-economic and ethnic groups have the basic skills that underpin innovation, specifically basic language, literacy and numeracy skills.</li> </ul>

Table 2: Some Recommendations for Lifting Australia's Innovation Potential (continued)	
<b>4. Leadership, Culture and Management</b> <i>Improve the innovation management practice of public and private organisations</i>	<ul style="list-style-type: none"> <li>Strengthen innovation capabilities, leadership skills and management practices at the workplace level, for example, by creating a 'National Forum for the Workplace of the Future' or a 'Futures Centre', which is jointly governed and managed by industry, government, researchers and other stakeholders.</li> </ul> <p>Such a centre would be charged with: 1) building learning networks; 2) running collaborative industry research projects; 3) analysing, researching and disseminating information about industry practices and needs; 4) communicating alternative leadership styles, management structures, organisational cultures, and people management practices that lift innovation activity; and 5) providing input to, and possibly coordinate, a national human capital survey.</p>
<b>5. Technology Infrastructure</b> <i>Improve the nation's technology infrastructure, recognising that ICT is an enabling source of innovation</i>	<ul style="list-style-type: none"> <li>Ensure Australia's information and communications infrastructure, specifically broadband, is 'leading edge' and globally competitive. The government's \$4.7 billion promise to establish a National Broadband Network is a welcome initiative, but more may need to be done to ensure future enhancement capacity.</li> <li>Align the governance of government information and communications technology (ICT) strategy (i.e. AGIMO) to the national innovation governance structure.</li> <li>Ensure government leads the acceleration and uptake of new ICT technologies in government service delivery.</li> <li>Actively encourage a supportive business climate and partnerships for and between SME ICT firms and global ICT players and develop a continued set of incentives to take local ICT innovations to the global market.</li> </ul>
<b>6. Business Environment and Regulation</b> <i>Undertake continuing micro-economic reforms that improve and sustain a business environment for innovation</i>	<ul style="list-style-type: none"> <li>Reduce the burden of government regulation to ensure corporate governance systems do not inhibit entrepreneurial behaviour, and continue to support schemes that work well, such as export grants.</li> <li>Support SMEs, for example, by improving Government Procurement Policy to provide equal access for SMEs, the US SBIR being one example.</li> <li>Review and reform the taxation system (individual and corporate) to ensure it encourages higher levels of innovation, specifically for SMEs (pay roll tax being an example of an area for possible inquiry).</li> </ul>

#### 4.4.10 Artifacts - Regional Business Development Policies

Artifacts from regional business development and innovation policies were collected as part of contextualizing the research within regional settings, and these are outlined and described in Table 12.

**Table 12: Innovation Policy Development for Regional Businesses**

Report / Policy Document	Description of Policy
Regional Business Development Literature Review (2002)  Department of Transport and Regional Services Regional Policy SGS Economic Planning Pty Ltd  2002 <a href="http://www.rbda.gov.au/">http://www.rbda.gov.au/</a>	<p>Collates, reviews and summarises articles reports and other literature on regional business development issues.</p> <p>Local government has a long-standing commitment to economic development. It is charged with nurturing the economies of its respective areas yet it has limited tools to provide substantial remedies. Local government through its state and national associations has become focussed on the realities of market failure in regional Australia, including population loss and accepts that new economic development tools are needed, otherwise market forces will continue to drive performance downward. The widespread use of enterprise zones, principally in the U.K., USA and Europe attracted the attention of ALGA and many in local government. While not a single 'magic bullet' for regional Australia, ALGA considers it is a substantial tool, which must be made available to stimulate business activity and to counter the effects of market failure.</p> <p>There is a sense that involvement in regional economic development has attempted to stimulate forces beyond realistic spheres of influence through the use of very low key mechanisms. There have been a plethora of reports, conferences and taskforces over many years. In a number of cases recommendations for change, desired by regional communities, from government commissioned studies have been ignored. Local, state and federal government and regional areas cannot substantially control the decisions of individual businesses. They can however create a climate within their area of responsibility that encourages investment. Each level of government has specific abilities to do this and also has limitations. The Federal Government could initiate a whole of government approach (the three tiers) to create such an environment, but it has to be a new approach geared towards the needs of business. We have to move beyond rhetoric to the realities of the business world.</p> <p>Local government at its grass roots level is faced with economic development issues and is increasingly concerned that much of what is offered by way of solutions is promotional, rather than addressing the issue</p>

	<p>of why the private sector is generally disinterested in regional Australia. We must develop new and powerful economic development tools to positively influence the private sector's interest in transacting business in regional Australia. There are significant barriers that have contributed to lack of private sector interest in regional areas. Some are perception based but others relate to genuine concerns that returns on investment are low, and that distance, costs, staffing, skills shortages and lack of rewarding activities mitigate against regional areas as a desirable location.</p> <p>In developing new economic tools it is important to objectively analyse likely areas of success. There are areas where government can be strong and others areas where it will be weak. New legislative powers via the enterprise zone model typically practised overseas, can substantially influence the likelihood of success. The notion that 'regional areas' can somehow organise themselves as regions to substantially reverse the effects of market failure is mistaken. Currently there is no facility to do this in Australia. International precedent on the other hand shows that enterprise zones and similar can provide the stimulus for areas to combine, knowing they will have some real tools for their future. ALGA offers additional resources not covered in the literature review in support of the proposal for government to take a more assertive approach rather than the passive market based approach at present. It is difficult to find a modern democracy that does not use mechanisms similar to those in enterprise zone models.</p> <p>Enterprise zones offer a way forward for regional communities on the basis that their benefits to businesses in approved areas are not a gift, but subject to communities making a concerted effort to present themselves as progressive having prospects, and capable of growth. In that way enterprise zones would support the Federal Government's desire for increased local and regional responsibility. Objections have been raised in respect of enterprise zones but these exist we believe, due to the fact that the idea was virtually unknown in Australia before 1999 and the concept is widely misunderstood. There are a wide range of models and mechanisms that Australia can use to design a model acceptable for our circumstances. ALGA has based its proposal for the way forward by suggesting a new type of economic tool for Australia. We look to business to increase investment and jobs but a market forces based approach has not been successful. ALGA's proposal is based on the successes of overseas regional areas and we commend it to the Panel. Recommendations are:</p> <ul style="list-style-type: none"> <li>• That the Federal Government recognise its fundamental role for regional Australia is to develop long term programs that assist in private sector investment and job creation.</li> <li>• That the Federal Government provides tax free status for local government and state government grants to business.</li> <li>• That the Federal Government develop policies which benefit individual business in regional areas that are prepared to commit to expansion and investment and are rewarded on the basis of their results.</li> <li>• That the Federal Government commit to developing and working with state and local government and business groups to develop a model of an enterprise zone for implementation in 2004 .</li> </ul>
<p>Vision 2025 – the Sunshine Coast Economic Development and Integrated Transport Strategy Project is supported by funding from the Australian Government under the Regional Partnerships Program (2004) SGS Economics and Planning Pty Ltd</p>	<p>The Sunshine Coast Regional Organisation of Councils (SunROC), under the auspices of Caloundra City, Maroochy Shire and Noosa Shire, and in partnership with the region's State and Commonwealth government agencies and institutional stakeholders, has overseen the preparation of the Sunshine Coast Regional Economic Development Strategy. The first of its kind for the region, the strategy is designed to provide a clear direction for the future, documenting a shared vision and co-ordinated plans for action to promote and facilitate regional prosperity on the Sunshine Coast. It identifies priorities for action to encourage investment and employment growth on the Sunshine Coast while ensuring that the region's attributes are protected, nurtured and capitalised upon for the</p>

benefit of all segments of the Sunshine Coast community.

The regional economic development strategy is informed by an agreed set of economic development planning principles. These reflect the Sunshine Coast's attributes and community aspirations about what sort of place the Sunshine Coast will be now and in future in the face of broader social, cultural and economic trends and influences, and acknowledging the region's economic strengths, challenges and opportunities.

Until now, the Sunshine Coast has not had a regional economic development strategy. However, there has been a great deal of work done by the Caloundra, Maroochy and Noosa Councils, and other agencies in the region (such as the Department of State Development & Innovation, the University of the Sunshine Coast, the Sunshine Coast Area Consultative Committee and others) in planning for local and regional economic prosperity. Rather than 'starting from scratch', the regional economic development strategy is designed to build on and add value to the good work already undertaken in the region.

Preparation of the regional strategy coincides with the development of policies, plans and actions by SunROC's three member Councils to facilitate local economic development within their respective areas of jurisdiction. Taking a broader regional approach and dealing with matters of regional (i.e. Sunshine Coast) significance, the regional economic development strategy informs many of the issues that each Council should deal with at a local level. The local plans and actions complement and inform the regional strategy, which also coincides with the preparation of Stage 1 of the SunTran Transport Strategy. The provision of quality transport and other strategic infrastructure is critical for supporting a competitive regional economic environment. For this reason, the respective regional project teams have worked in collaboration to ensure a consistent understanding of the region's infrastructure issues and priorities for regional prosperity. Presented overleaf is a graphical representation of the co-ordinated approach to planning for regional prosperity on the Sunshine Coast.

Another important outcome of the regional strategy development process has been the preparation of the Sunshine Coast Knowledge Economy Strategy. The Knowledge Economy Strategy responds to a core element of the regional economic development strategy, that is, that 'knowledge' job creation on the Sunshine Coast is crucial for future economic prosperity. The Knowledge Economy Strategy represents what is, in essence, a priority action of the regional strategy. As a result 'runs on the board' have already been made in the region with the completion of the Knowledge Economy Strategy, which provides a clear framework for institutional stakeholders to facilitate the growth of knowledge based industries in the Sunshine Coast region. A challenge that the strategy is designed to address, is providing and maintaining an investment environment that will assist in the creation of approximately 30,000 sustainable jobs in the region over the next 25 years. The strategy also aims to deliver the following 'economic development' outcomes:

1. Support sustainable business growth and development in the Sunshine Coast region;
2. Help adjust to economic dislocation in the region's traditional rural sectors;
3. Diversify the Sunshine Coast economy through the development of 'new economy' or 'knowledge based' industries;
4. Increase the level of industry value adding;
5. Deepen the Sunshine Coast region's 'value chain';
6. Increase the value of regional exports (i.e. exports to other regions in Queensland, throughout Australia and overseas); and
7. Reverse the trend towards greater casualisation of employment and

	<p>provide quality jobs that are sustainable and which keep pace with or exceed the region's population growth.</p> <p>The strategy also aims to deliver the following 'strategic planning' outcomes:</p> <ol style="list-style-type: none"> <li>1. Confirm and communicate to others, the Sunshine Coast's regional consensus and facilitate cooperative and coordinated approaches to promoting regional development;</li> <li>2. Provide a strategic information resource and economic planning tool for regional agents of change;</li> <li>3. Maximize the value of investment in regional infrastructure;</li> <li>4. Produce actionable strategies and measurable outcomes; and</li> <li>5. Provide the armour to give the Sunshine Coast region a stronger (collective) voice in George Street and in Canberra.</li> </ol> <p>In highlighting the above it is acknowledged that governments do not drive regional development. They do however influence the pre-conditions for a competitive and prosperous regional economy. This strategy represents what is for the three Sunshine Coast Councils and their partner agencies and institutions, a regional planning framework for prosperity. Importantly, the strategy does not propose an upheaval of existing Local, State and Commonwealth sponsored organisational frameworks for facilitating regional economic development. What it does highlight is that the Caloundra, Maroochy and Noosa Councils, through SunROC, are working together in partnership and with other agencies and institutions to establish agreed principles and objectives to facilitate the economic development of the region. The strategy therefore, reflects a spirit of open communication and willingness to co-operate and collaborate for the greater good of the Sunshine Coast region.</p>
<p>Lennon, Sasha, Hearn, Gregory N., Higgs, Peter L., &amp; Ninan, Abraham (2005) Mapping Queensland's Creative Industries: Economic Fundamentals.</p>	<p>'Creative industries' is a new term in academic, policy and industry communication. It captures new economy dynamics which older categorisations like 'the arts', 'media' and 'cultural industries' did not. This project – Queensland's Creative Industries Cluster Mapping &amp; Value Chain Analysis – has been undertaken to help advance the conceptualisation of creative industries, and to assist policy makers and industry by analysing creative industries' dynamics and value to the Queensland economy. Significantly, it highlights the integrated value chain relationships that exist between industries rather than concentrating on the 'silo' constructions of individual industry sectors.</p> <p>The creative industries cluster mapping and value chain analysis has been commissioned and led by the Creative Industries Research &amp; Applications Centre (CIRAC) within the Queensland University of Technology (QUT). CIRAC has administered the research for this project as part of its mission to contribute to the research and applications needs of the creative industries locally, at a state level, nationally and internationally.</p> <p>This report presents data that will assist industry partners in developing informed economic and cultural development strategies. By developing a better understanding of the scale and dynamics of creative industries in Queensland, the Creative Industries Cluster Mapping and Value Chain Analysis can inform the continual development of appropriate government policy that assists all businesses within and supporting the creative industries.</p> <p>In short, by enhancing the collective knowledge and understanding of the creative industries, the project outcomes will help inform policy planning, research priorities and investment strategies.</p>
<p>Lennon, S. &amp; O'Neil, W. (2003) Facilitating Regional Economic Development - Local Government Perceptions and What it Can Do, Paper presented</p>	<p>It is difficult to be prescriptive about exactly what role Local Government should have – given the variety and scope of issues and opportunities in different regions and locales. Nevertheless, it is important that some common ground be established so that Councils (and other government and non-government stakeholders) share a common view of</p>

to the ANZRSAI 27th Annual Conference, “Regional Development – Who Owns It?” Esplanade Hotel, Fremantle Western Australia, 28th September – 3rd October 2003

what that role is. The evolutionary nature of how Local Government has participated in the promotion and facilitation of economic development in Australia means that its role is not clear. While there are a number of expectations of Local Councils, there is no clearly defined constitutional law to state what its powers and responsibilities are in regards to economic development facilitation. What any individual Council’s role is in promoting and facilitating regional development will be largely determined by its capacity to respond to and manage regional development issues. This capacity is influenced by a number of factors including (but not limited to):

- broader (global) economic trends and impacts;
- the Commonwealth Government’s policy response to those impacts;
- government policy on the role of Local Government as a facilitator of economic development;
- Local Government’s changing organisational relationships with other agencies (and the private sector);
- community perceptions of Local Government; and
- the level of resources available to Councils to support their economic development roles and functions.

It is fair to conclude that as far as Local Government as a constituted entity is concerned, Local Councils have and should continue to have a leading role in the promotion and facilitation of the economic development of their areas of jurisdiction and of the wider regions of which they are a part. How they do this depends a great deal on their relative socio-economic prosperity (or otherwise), their ‘place’ in the regional, national and global chains of economic activity, the existence of local strengths and strategic competitive advantages, opportunities for future growth and development and constraints on growth.

As stated earlier, Local Government is not a homogenous entity. The issues, challenges and opportunities identified, and the responses considered to facilitate sustainable growth, will vary from Council to Council and from region to region.

The study of the Evolving Role of Local Government in Economic Development Facilitation identified a number of activities where Local Government could effectively expand its functions in the regional economic development field. They include:

- Working with other stakeholders (including neighbouring Councils) to establish regional planning frameworks. This does not suggest an upheaval of existing Local, State and Commonwealth sponsored organisational frameworks for facilitating regional development. What it does suggest is that Councils should work with other agencies to establish agreed principles and objectives to facilitate the economic development of their regions to the mutual benefit of constituent communities. Councils and other agents of change should be encouraged to communicate their regional development charters and look for ways to make the optimal use of their combined efforts and resources within existing frameworks.
- Engaging the private sector in regional planning frameworks. All too often, private enterprise, which is the principal driver of economic growth, is not embraced a key partner in the determination of regional priorities. Mechanisms to increase the private sector’s ‘buy-in’ into the regional economic development effort must be further explored.
- Understanding the key clusters that drive the regional economy. Building on the previous point, clusters must be industry led if they are to prosper. Local Government can provide the forums

	<p>through which the clusters might grow. It can support cluster growth through its role as an infrastructure provider and in its role as an economic lobbyist for its region.</p> <ul style="list-style-type: none"> <li>• Establishing and nurturing partnerships with the capital cities. For rural and remote regions, it is important to understand how local clusters are linked in to the capital cities, which are the engines of growth in the New Economy. A first step for Councils (and their partner agencies) is to establish partnerships with the capital city institutions to help strengthen their regions.</li> <li>• Investing in local skills and knowledge (particularly within Local Government) of the meaning and importance of economic development.</li> </ul> <p>It is postulated that these activities will only be widely embraced by Local Government once the Councils themselves are mandated to undertake such initiatives (via legislation or other means). This requires some serious thought on the part of the other two tiers of government as to how the role of Local Government as a facilitator of regional development might be formalised. And instead of developing policy and then seeking local partnerships, the Commonwealth and States should collaborate with Local Government in policy development from the outset. In this regard, it is noted that the 2003 Local Government survey identified the following matters as priorities for the Commonwealth Government in relation to facilitation of the economic development of Australia's regions:</p> <ul style="list-style-type: none"> <li>• Better direct program funding for economic development to the particular needs of individual regions.</li> <li>• Work to reduce the duplication of activities that exist between different agencies whose charter is to facilitate regional economic development.</li> <li>• Provide greater financial resources to Local Government to enable the employment of economic development officers / staff.</li> <li>• Increase the range of Commonwealth programs and funding support that individual non-exporting focused businesses can access.</li> <li>• Facilitate better working relationships directly with Local Government regarding economic development facilitation.</li> </ul>
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#### **4.4.11 Literature - Business and Engineering Management books**

Artifacts from business books and engineering management books were collected as part of the preparation and tools to be used in suggesting and implementing innovation strategies and practices. The aim here is to provide not just technical (industrial engineering focused) oriented solutions but a holistic examination of the innovation barriers and issues that influence it that are unique to SMEs. Hence, financial, information technology, marketing management resources in addition to the engineering management resources were collected, and outlined and described in Table 13.

**Table 13: Artifacts of Literature (Business and Engineering Management Books)**

Authors and Source	Description of Book
Shim, J.K. & Siegel, J.G. (1994) Budgeting Basics & Beyond: A step-by-step guide for non-financial managers, Prentice Halls, NJ.	This is a reference for non-financial managers in financial management. It covers topics from planning, budgets, reporting, analysis and evaluations. It details break-even analysis, margin analysis, cash flow, profits and costs. It emphasizes forecasting and profit planning, but also provides guidance on evaluating performance and manufacturing costs, marketing costs, R&D costs, capital expenditures. It illustrates some of the financial tools such as moving averages and smoothing techniques, regression analysis, zero-based method, present net value, and other financial modeling tools.
AusIndustry (1997) Practicing Balance: Integrating best financial practice into your business, Commonwealth of Australia.	This reference is a government compilation of resources useful for business and managers of small-to-medium manufacturing firms. It outlines best practices across the sector, and ways to implement best practice in systems, planning, and building partnership. It provides guidance on informed decision making process, managing difficulties, and a balanced approach to obtaining finance. It provides a best-financial-practice checklist as well as a lender requirement checklist.
Pride, Hughes, Kapoor (1993) Business, Houghton Mifflin, USA.	This book is a must for small business operators. It covers topics from the foundation of business, ethics and social responsibilities, forms of business ownership, management and organisation, entrepreneurship, operations and production management, and human resource management and workforce motivation, training, and compensation. It also covers key topics like marketing, product and price, distributions, advertising and promotion, information technology and systems, accounting and financial management, and securities markets, risks management, business, property and contract law, international trade, corporate governance, regulation and government assistance. The book is well supported by case studies.
Collins, R. & McLaughlin, Y. (1996) Effective Management (2 <sup>nd</sup> Ed), CCH Australia, Sydney.	This book is a reference useful more engineering managers straddled between operations and strategic levels. It expounds on organisation issues, change management, to managing individuals and groups, to managing departments supported by organizational design, ethics, values, leadership and cross-cultural issues. It also covers basic accounting and financial management, human resource management, marketing and sales, total quality management, and operations management.
Fogarty, D., Hoffman, P. & Stonebraker, P. (1989) Production and Operations Management, International Thomson Publishing, USQ.	This book is a text that provides a good reference for professional manufacturing managers. It provides a background and strategic perspective to operations management, functions, models and types of manufacturing and service organisations. It also provides guidance on product and resource planning, long-range capacity and facility location planning. It covers medium-range planning and scheduling as well as short-term planning supported by methods of measurements and data requisition. It details the methods of execution and control in manufacturing and service provision such as project management, purchasing management, distribution management, quality assurance and control. It also looks into operations management policy and strategy, as well as financial analysis, mathematical programming, process modeling and simulation, and waiting line theory.
Kanawaty, G. (ed) (1992) Introduction to Work Study (4 <sup>th</sup> Ed), International Labour Office, Geneva.	The book is a must for all production engineers outlining the practice of work/time study and method study, the human factors, productivity, production planning and management techniques, work sampling and measurements, quality and inventory control, maintenance planning and scheduling.

#### 4.4.12 Literature - Business Review Weekly

Artifacts from a well regarded business magazine were also collected, and these are presented in Table 14, which outlined and described the artifacts collected from Business Review Weekly, a multi-disciplinary business magazine. Most of the articles highlight the aspiration of small innovative businesses and their clusters but also emphasise the lack of success in



entrepreneurship and collaborative research and commercialisation when compared with overseas counterparts.

**Table 14: Artifacts of Literature (Business Review Weekly)**

Authors and Source	Description of article
Bryant, G (1999) Small size, big ideas, BRW, Jun 25, pp104-111.	Australia has a reputation for innovation and smaller companies are often the wellspring of invention. Despite its distance from the rest of the world, Australia is a country of inventors and innovators. Its inventions are used by people everywhere, with or without knowledge of their antipodean origins. Some of the better known Australian innovations include the wine cask, the aircraft flight recorder, plastic bank notes, heart pacemakers and the ultrasound technology. Australian scientists particularly have a distinguished record in innovation, a reputation that continues today. What is innovation? The managing director of the Strategic Industry Research Foundation, Dr Greg Smith, says it is usually regarded as the creation of a new or better product or process. However, it could just easily be the substitution of a cheaper material in an existing product, or a better way of marketing, distribution or delivering value through the support of a product or service. Smith says truly innovative products and processes have been found to yield far better returns than ordinary business ventures. On average, innovation-oriented businesses are seen to achieve higher sales, better rates of return and to employ significantly more employees in proportion to capital than those less focused on innovation.
Kavanagh, J (1999) A shake-up in the Making, BRW, June 4, pp30-33.	All over the world, the manufacturing sector is under enormous pressure. Some Australian companies are finding salvation in innovation. Castalloy's aluminum foundry in Adelaide is a hallmark of the new manufacturer where R&D is a central strategic plank. Adopting a value-chain perspective is particularly useful for those companies with a limited capacity to innovate in their manufacturing processes. AIG's Ridout acknowledges that the focus on the value chain has been an important development for many manufacturers, but she says that if manufacturing were to fall below 10% of GDP, it would start to lose the scale that provides for cross-fertilisation, which breeds product innovation and new business ideas.
Tabakoff, N & Featherstone, T (1999) The dumbing of Australia, BRW, July 2, pp52-57.	Research and development in Australia is falling behind the rest of the world. R&D tax concession and venture capital investment incentives. Public money in R&D.
Quinlivan, B (2001) The first wave, BRW, August 16-22, pp52-54.	Prof Andrew McAfee and Prof Warren McFarlan of Harvard Business School technology and operation management in the post-dot-com era. The effect of technology has varied between sectors and will continue to do so, but business managers cannot afford to ignore it. They should understand the potential effect of the new technology on their business, then devise strategies and invest accordingly. "The rate of technological change is accelerating... a massive growth worldwide in the number of people who are comfortable with technology". New online tools and technologies and improve efficiency, but quality of products is still critical factor in success or failure in the Manufacturing industry (as opposed to the financial services industry where internet has transformed it).
Gome, A (2001) no gains, BRW, July 20, pp45-46.	Both side of politics released innovation statements that have helped to soothe Australia's demanding scientific community by promising to nurture research. But both have failed to tackle a key part of innovation process. Despite the billions of dollars allocated every year to science and research, Australia has consistently failed to produce economic benefits by commercializing discoveries. The missing part of the knowledge nation scenario is not money; it is the skills and willingness to turn ideas into profitable industries. Sir Gustav Nossal, a celebrated Australian medical scientist and a principal of Foursight Associates, a company that consults on research, development, science and technology, says the gap between research in public institutions and the commercialisation process is one of Australia's biggest challenges. "We are good at brewing beer, selling food and digging in the ground, but we don't have a Sony or a Microsoft." The

	governments need to remove barriers to commercialization including changes to the tax law to encourage private equity investors to invest at early stages of innovation.
Gome, A (2001) Great Ideas, Shameful Returns, BRW, July 20, pp47-49.	Co-operative research centres (CRC programs) have had some spectacular successes, but they have come at a high price. In the 11 years prior, it had absorbed \$7.2 billion in funds. Chris Dawson, a director of several small companies that commercialise research was completing his PhD thesis on CRCs. He says, "The people running the CRCs believe if they create science it will create Australian businesses and wealth. It is a blind faith and in most cases it won't happen." There have been two inquiries into CRCs. One, in 1997 by David Mortimer, resulted in a report: Business programs for investment, innovation and export. The findings of the second, by Don Mercer in 1998, were detailed in Greater Commercialisation and Self-funding in the CRCs. Both reports emphasized the need to improve commercial outcomes and make CRCs more accountable.
Gome, A (2001) Think Together, BRW, Aug 30 – Sept 5, pp64-67.	Robin Batterham, the former chief scientist and architect of the Australian Government's innovation statement, suggested initiatives and ideas particularly on the commercialization of research. He said that several government initiatives and industry programs and market activities are "filling the gaps" and creating a commercialisation cycle. He suggested it required linking all the initiatives around Australia into a commercialisation "road maps".
Kavanagh, J (2001) The helping and hindering role of government, BRW, Sept 6-12, pp60-61.	A study of the levels of competition in Australian industry highlights the role of government policy and regulation in determining such issues as barriers to entry and pricing power. The overall direction of governments since the early 1980s has been towards deregulation of markets and increased competition in industry sectors, but in many industries the competitive forces are still shaped by government. The Merrill Lynch's Porter study indicated that the involvement of government or one of its regulators in an industry is a mixed blessing.
Hacki, R & Lighton, J (2001) The future of the networked company, BRW, August 30-September 5, pp58-62.	Companies go beyond outsourcing and actually collaborate in providing products and services to customers. Superior information technologies and real-time management enable networked companies to develop a seamless supply-chain system. The network can be made up of a tightly disciplined group of businesses resembling a Japanese keiretsu – a bloc of interdependent companies operating in a given industry. A network has the potential for moving business ideas quickly across organizational boundaries. Because product developers high in the supply chain are suddenly in touch with the customer, they can carry out market tests and avoid straying far from their market's needs and tastes. And they hear the reactions of customers and business partners alike, allowing the network's members, as a group, to avoid the insularity and blindness that can afflict free-standing companies. The network thrives only if the network orchestrator looks out for the welfare of all the companies on which it depends – business partner or customer. Value sharing mechanisms and incentives help to ensure co-operation and also build trust. Designed correctly, incentives can align the members' behaviour with the larger interest of the network, reducing the need for centralized control. Cisco System, Charles Schwab as case studies.
Hannen, M (2001) Service lane to success, BRW, Sept 6-12, pp92-97.	Getting to know the customers and their needs is as important as price points and technology. Data is generally not fed back as a learning tool to staff who are delivering front-line service or product.
Walters, K (1999) Software newcomer's blue-chip campaign, BRW, Aug 20, p48.	Presenting to venture capital, they looked at the people, the market, the technology, and the finances as part of the overall business plan.
Walker, J (1999) McKinsey breeds Web wunderkinder, BRW, Aug 20, pp64-69.	The operatives of McKinsey & Company have often been thought of as a management "secret service". MicKinsey people come in to research, to uncover intelligence, to recommend.
Skeffington, R (1999) New Skills	If there is a pool of like-minded industry officials and public servants

#### **4.4.13 Literature – Peter Switzer (SME Focused)**

This artifact is extracted from the Peter Switzer group of companies which include small business coaching and advisory and publishing. The Switzer Group (<http://www.switzer.com.au/>) is a publishing company that specialises in books and magazines. Peter also runs a financial planning company, Switzer Financial Services. As he wrote his book “350 Ways to Grow Your Small Business”, his publisher gave him the tip that books that have numbers in their title sell better than those that don’t. The tip made him analyse his 78 case studies of award winning businesses to see what gave them an edge and he was shocked when he came up with the number 350. It told him you can never be complacent in business and that you have to be always on the look out for innovations to put you ahead of your rivals. Here are 16 of his top tips:

- 1) Know your competitive edge: this is your point of difference to give the market cut through and to give the basis for growth.
- 2) Believe in yourself totally: Like sporting teams doubt at the top spreads throughout an organization. Talk up the troops to pull off Churchillian victories.
- 3) Use experts to beat the weak points: Even the nation’s top CEOs are using people like business coaches, life coaches and mentors to help them with their weak spots.
- 4) Work on your strengths: Once we talked about doing SWOT analyses on our businesses, but now smart leaders are even doing it on themselves and their key personnel.
- 5) Know your rivals’ weaknesses: Business opportunities can be created by being aware of what your rivals ‘don’t get’. Great sporting coaches create game plans not only on their team’s strength but their opponent’s weaknesses.
- 6) Measure your performance regularly: The old saying applies that if you can’t measure it you can’t manage it.
- 7) Set goals and review them: This not only tells you something about your progress, it helps the sharing of your vision with staff and other stakeholders.
- 8) Know your market and your position: This is a reality check and sets the sights for plans for growth.
- 9) Use a marketing plan to grow your competitive edge: At the core of great, well known businesses are enlightened marketing plans. This tells you where you are in the market, where you want to be and how you are going to do it.

- 10) Be the best at customer service and seek feedback: All great businesses know how important this one is to overall success. Seek customer feedback and learn how to cop your customer's view on you, even if you don't agree.
- 11) Never stop networking: Turn up and give more than your business cards to those who turn up.
- 12) Share your competitive vision: Don't only share it with your staff but even your suppliers. They can become advocates.
- 13) Celebrate your victories and learn from your losses: That's a tip I picked up from GE's CEO Jack Welsh described as the CEO of the 20<sup>th</sup> Century.
- 14) Be a quick adopter of technologies: This gives you an edge – no question.
- 15) Implement systems: This not only makes your business life more enjoyable but it helps when you want to sell your business.
- 16) Be a coach: Have a business plan like a sporting coach, fire up your team but understand them to get the best out of them.

Below is a list of his business tips as outlined in Table 15.

**Table 15: Peter Switzer's SME focused business tips**

Themes	Tips and Lessons
Start 2009 with a plan December 2008	<p>If you don't already have one, set out a plan for each week in January 2009.</p> <p>Set up your goals for the year ahead. Whether you think in calendar or financial years, January is either the beginning or the halfway mark and the time to think (or rethink) your plan.</p> <p>Switzer business coach, Lesley Ann Grimoldby shows you how:</p> <ul style="list-style-type: none"> <li>▪ Set out what you want to achieve and your strategies for doing it.</li> <li>▪ Study the business – do a SWOT. Write down the business's strengths, weaknesses, opportunities and threats.</li> <li>▪ Identify priorities to address. That is, the issues that have the greatest impact on the business and those which you have the highest ability to fix should head your list.</li> <li>▪ Make a list.</li> <li>▪ Put dates beside each item to show when each action will be done.</li> </ul>
Motivate your staff December 2008	<ul style="list-style-type: none"> <li>▪ Encourage your staff to better themselves</li> <li>▪ Let your staff know that you believe in them and their ability</li> <li>▪ Delegate jobs to staff, not just the bad jobs</li> <li>▪ Boost their morale by taking the time to talk to them and show them how to do tasks.</li> </ul>
Get the balance right November 2008	<p>Do you live to work, or work to live? Many business owners would have a hard time answering this question, and an even harder time finding the time to do so! It is very easy to justify long hours in the name of growth, and maintaining that ever-elusive work-life balance can be quite the struggle. Here are some tips to make sure you stay on top of your business and not the other way around.</p> <ul style="list-style-type: none"> <li>▪ <b>Learn to say 'no'</b>. Simple, yet incredibly effective.</li> <li>▪ <b>Schedule your breaks</b> – and take them! Just as you would schedule a conference call or a meeting, schedule some time away from your desk (and</li> </ul>

	<p>your work). Make sure that each day you do something that you really enjoy – go for a walk, do the crossword, or catch up with a friend. Stress accumulates and can hit you badly if you don't do things to take the pressure down.</p> <ul style="list-style-type: none"> <li>▪ <b>Turn off your phone and email</b> for a set period every day. Blackberrys and the like are both a blessing and a curse for business owners – make sure that you control your business, and not the other way around.</li> <li>▪ <b>Plan your longer breaks.</b> Include your holidays into your business plan and religiously take them. It may cost you, and you will have to perhaps pay for someone you can trust to run your business while you are away. This is a difficult area for many in business, but the lesson here is – you are your business. If your health fails because you push yourself too hard, your business could end up failing too.</li> <li>▪ <b>Eat right.</b> A poor diet means you will have no energy for work or play. Steer clear of too many business lunches, and don't get caught in the take-away meal trap.</li> <li>▪ <b>Get some sleep.</b> Being well-rested means you're ready for the challenges the day ahead brings. Make sure that you're not burning the candle at both ends – this is doing you and your business few favours.</li> <li>▪ <b>Keep a 'to do' list.</b> If you are overwhelmed by your workload, write a list of all the tasks you have to achieve and prioritise them. This way, you know exactly what you need to do and when you need to do it by. If the list is too long, you can see how unrealistic you are being and learn how to manage that time better.</li> <li>▪ <b>Plan and set goals for the future.</b> This applies to both your personal life and your professional life. Remember – a goal is just a dream with a date attached to it.</li> <li>▪ <b>Know how to relax.</b> If you don't know what does it for you, try different things to see if you can strike a winning combination – go for a walk, take a yoga class, or join a sporting team. This last one is a winner – if you have an obligation to a team, you will be more motivated to turn up to games on a weekly basis, achieving dedicated time away from your business.</li> <li>▪ <b>Get a coach.</b> In keeping with the sports theme, a business coach will be able to show you where you are spending your time unnecessarily and how you can run your business better. This does not mean that it will be easy – engaging a business coach and not doing the work is like saying, "I bought the diet book, so how come I haven't lost weight?" – but it will be worth it. Remember, coaching is an investment, not an expense!</li> </ul>
Go outside the office November 2008	<ul style="list-style-type: none"> <li>▪ Look to others for inspiration</li> <li>▪ Speak at conferences to get your business out there</li> <li>▪ Get people in who know what you don't</li> <li>▪ Know when to hand over control.</li> </ul>
Must-reads October 2008	<p><b>Great books to help you grow your business, no matter your needs – for everything from system development to strategic direction, from people problems to being in need of a little pick-me-up.</b></p> <p><b>For help with system development ...</b> read Michael Gerber's <b>The E-Myth Revisited</b> (HarperCollins). Develop systems to develop your business, so you can work on your business, not in your business. To be successful you have to free yourself from technical day-to-day work to take on the true role of the entrepreneur and grow your business. You can only do this with good systems in place.</p> <p><b>For strategic direction ...</b> read Jim Collins' <b>Built to Last</b> (Arrow) and <b>Good to Great</b> (Century). Building a business takes hard work and a clear vision, and like-minded people within your organisation to make a good business great. Collins shows you the best way to do this with his catch cry of "disciplined people, disciplined thought, disciplined action".</p> <p><b>To understand the marketing message ...</b> read Seth Godin's <b>Purple Cow</b> (Penguin). Learn how a point of difference can transform business.</p> <p><b>If you consider yourself a leader ...</b> read Bob Garratt's <b>The Fish Rots from the</b></p>

	<p><b>Head</b> (Profile Books). Taking its title from an ancient Chinese saying, this book proves that a company’s success depends on the performance of its board and, more specifically, its director. In light of recent times, no executive can afford to ignore this message.</p> <p><b>To know what not to do ...</b> read Bethany McLean and Peter Elkind’s <b>ENRON: The Smartest Guys in the Room</b> (Penguin). This cautionary tale warns against a corporate philosophy devoid of morals, and reveals the almost unbelievable personal excesses of the upper Enron echelons, charting their rise and, more importantly, their spectacular fall.</p> <p><b>If you need a little pick-me-up ...</b> read Richard Branson’s <b>Losing My Virginity</b> (Random House). There isn’t a valley low enough, nor a hot air balloon high enough to keep the insatiable Branson from chasing his dreams, and that ought to be a lesson to everyone in business.</p> <p><b>If you’ve got people problems ...</b> read Dale Carnegie’s <b>How To Win Friends and Influence People</b> (Ebury). As relevant and useful today as it was almost seven decades ago when it was first published, this gem covers the fundamentals of communication and teaches you, well, how to win friends and influence people.</p> <p><b>If you need to lift your game ...</b> read Jacques Van Schalkwyk’s <b>On Track to the Top</b> (McGraw Hill). Combining the best of sports psychology and business leadership in a single practical manual, this read aims to help you achieve excellence by harnessing the skills that Van Schalkwyk insists are within us all, but are used by only few of us. Be inspired by words from former Australian rugby union captains Nick Farr Jones and John Eales.</p>
Customer Service October 2008	<ul style="list-style-type: none"> <li>▪ Meet and exceed the clients needs</li> <li>▪ Provide added-value by bringing the customer more than they expected upon their arrival</li> <li>▪ Listen, listen and listen some more</li> <li>▪ Always show integrity</li> </ul>
Customer Service 101 September 2008	<p>What is customer service? Or better still, what is good customer service?</p> <p>Customer service is all customer correspondence – it’s how you and your staff answer telephone calls and emails; it’s the way customers are treated when they purchase a product or service; the way complaints are handled and problems are resolved. Customer service is the overall impression the customer has of the company’s employees, premises, products and services, and even the way staff members talk about the business to family, friends and neighbours.</p> <ul style="list-style-type: none"> <li>▪ Make yourself available. It is simple things like avoiding the phone ringing more than three times that make a difference. When speaking to a customer, forget whatever else you are doing and focus completely on them.</li> <li>▪ Know your business. “I don’t know” is a phrase that customers should never hear. Ensure all staff are informed and empowered.</li> <li>▪ Don’t let your phone ring out. Voicemail was invented for a good reason. If a customer can’t reach you the first time they call, they might not try again.</li> <li>▪ Under-promise and over-deliver. Apply this rule to every aspect of your business: order processing, call outs, delivery times. Give yourself a competitive edge by aiming to return calls, emails and faxes within minutes rather than hours. Remember that customers need to feel important and nothing is more important to your business than your customers.</li> <li>▪ Answer all calls, not just the ones that you want to take. Many organisations really lack communication skills and do not train their staff on how to return calls and emails – even unwanted ones. Consequently, their staff just ignore these messages, which is not only rude, it also sends the message to the caller that you don’t value them at all.</li> <li>▪ Customers aren’t psychic. Customers don’t come equipped with functioning crystal balls, so be sure to keep them informed with every step of the fulfilment process.</li> <li>▪ Follow up to ensure your customers received the order and that everything is</li> </ul>

	<p>to their satisfaction.</p> <ul style="list-style-type: none"> <li>▪ If there's a problem, or a customer has a complaint, resolve it. When you make a mistake, correct it without delay. Don't ever be too proud to say you are sorry.</li> <li>▪ Value all business. Treat small orders the same as large ones. Small customers become big customers, and new customers are unlikely to give you a big order until you've proven yourself. Opinions are formed after the first transaction. Your first chance may be your last.</li> </ul> <p>Show your appreciation. This does not take you a lot of time, but it can pay big dividends for your business. Write 'thank you' notes, send small gifts, provide frequent-buyer benefits such as discount coupons or specials and reward those who refer new clients.</p>
Leadership September 2008	<ul style="list-style-type: none"> <li>▪ Leadership is as important in small business as it is in big business.</li> <li>▪ Most people are not trained in the role of leadership. You can learn to be a leader!</li> <li>▪ Be objective about yourself. Do a S.W.O.T analysis on yourself.</li> <li>▪ Concentrate on the 'F' word. Focus on yourself and make yourself as strong and as competitive as you can be.</li> </ul>
How to be a good boss August 2008	<p>Remember that boss you had years ago who made your working life miserable? Who was reason enough for not wanting to get out of bed of a morning? What about your own leadership style? Do you ever have moments of déjà vu? Or do they remain a constant textbook example of what not to do?</p> <p>Good bosses understand the vital ingredient in the execution of their business strategy is the passion and commitment of their people. Highly effective leaders in these organisations work hard to connect employees to the business through effective communication, offer employees challenges and growth through their day-to-day work and future opportunities and build a differentiated high-performance culture that harnesses the power and passion of employees.</p> <p>One of the greatest CEO's of the twentieth century, Jack Welch of General Electric, used to cut 10% of his staff each year and he reckoned he did it to do his company and those sacked a favour. "They would often thank me," he says. "They weren't happy and they needed a push."</p> <p>A good boss must be able to negotiate with staff. One of the most common mistakes employers make is to assume that everyone is motivated by more money. It's important to understand that different people are motivated by different things. A good boss finds out what motivates them rather than offers what motivates you.</p> <p>Misunderstandings occur when we assume that everyone is motivated by the same things we are. When someone offers us more money when what we really value is flexible time, the result is still dissatisfaction.</p>
Who's the boss?	<p>Here are some important questions for a boss to consider:</p> <ul style="list-style-type: none"> <li>▪ When was the last time you rewarded staff with time off when you saw them working long hours to complete a project?</li> <li>▪ When did you last write a personal thank-you note letting staff know how appreciative you are for them completing a task on time and within budget? Reward your staff when they excel.</li> <li>▪ Have you taken time out to have lunch with staff? It doesn't have to be at the best restaurant in town, but simply somewhere you can spend time with them and you get to know them a little better? This could be used as an opportunity for giving positive, constructive feedback.</li> <li>▪ Do you have avenues for your employees to vent their frustrations? Can they freely give feedback without feeling that their job could be in jeopardy?</li> <li>▪ Do you take your staff for granted by not meeting your deadlines and meeting times but expect them to meet theirs? Show strong leadership – remember, a fish rots from the head down.</li> <li>▪ Are the conditions your employees work under satisfactory?</li> <li>▪ Do you take the time to enter your business in awards so your employees can</li> </ul>

	<p>share in the joy of winning?</p> <ul style="list-style-type: none"> <li>▪ Are you proud of your work and your business? Do you openly communicate this to staff? Or do they only see your serious side?</li> <li>▪ Do you give adequate pay increases when the business has financial wins?</li> <li>▪ Do you give staff job titles that make them feel proud?</li> <li>▪ Do you communicate in a clear and open manner or are you aloof?</li> <li>▪ Do your employees know what's expected of them at all times? Are your business systems sound and accessible so that employees know their job and to whom they're accountable? Have systems in place so staff knows what their job is and how it can be done effectively.</li> <li>▪ Have you ensured that you have covered off all legislative requirements in respect to occupational health and safety, harassment, discrimination, surveillance, etc?</li> </ul>
<p>Plan to Succeed August 2008</p>	<ul style="list-style-type: none"> <li>▪ Think about the problems and frustrations you have in your business life and create a system to eliminate them</li> <li>▪ If you fail to plan, you plan to fail</li> <li>▪ Be prepared to pay experts for help – you can't do it alone</li> <li>▪ View every crisis or complaint as an opportunity to do things better</li> <li>▪ Create a business that works for you instead of you for the business.</li> </ul>
<p>Help your employees achieve their best July 2008</p>	<p>There are many things that you can do to encourage your employees to achieve the best they can – for their own growth and for that of your business. Here are some tips:</p> <ul style="list-style-type: none"> <li>▪ If you develop and encourage them, your staff can be an inspiration</li> <li>▪ Hire sales people who really know clients or train them so they do</li> <li>▪ Train management and staff regularly: it is an investment for your business</li> <li>▪ Empowering your staff makes them feel they can make some decisions in the business and have a degree of ownership</li> <li>▪ You can't expect to retain good staff unless you pay and/or reward them</li> <li>▪ Create a 'family' atmosphere to reduce staff turnover. Many people are happy working for others as long as they feel valued</li> <li>▪ Provide scope for staff equity to improve loyalty and commitment</li> <li>▪ Have regular training to teach your business system</li> <li>▪ Delegate key management tasks so staff understand everyone's role, including that of the principals. You can't hold on to or do everything yourself in your business and the art of delegating is something that needs to be learned</li> <li>▪ Don't use half-measures with training. If you can't afford training in the early days then pass on as much information as you can to your staff. Then allocate part of your profits to training. It is always an investment in your business.</li> </ul>
<p>On leadership July 2008</p>	<ul style="list-style-type: none"> <li>▪ have a vision</li> <li>▪ share the vision with your team</li> <li>▪ create core values for your organization</li> <li>▪ live these values</li> <li>▪ repeat these values regularly</li> </ul>
<p>Learn how to sell June 2008</p>	<p>The price may not always be right but if you learn to understand your customer nine times out of 10, your sales pitch will be right on the money. Some sales people just have the knack, but for most people there are things to be learned about selling. These include:</p> <ul style="list-style-type: none"> <li>▪ develop a love for your work and pride in the product or service you are selling</li> <li>▪ believe in your product – you won't be an effective salesperson if you don't</li> <li>▪ be positive and create a positive attitude from the beginning</li> <li>▪ establish what the prospect really wants</li> <li>▪ always dress appropriately when dealing with prospects or clients</li> <li>▪ set aside time to meet to regularly meet with clients or prospects</li> <li>▪ prepare professional-looking proposals and presentations</li> <li>▪ test how committed a prospect is to your proposal</li> <li>▪ be confident and ask for the sale</li> </ul>



<p>On successful selling June 2008</p>	<ul style="list-style-type: none"> <li>▪ ask questions</li> <li>▪ solve problems</li> <li>▪ provide solutions</li> <li>▪ build relationships</li> <li>▪ know the outcome you need to achieve</li> <li>▪ keep positive</li> </ul>
<p>Time Management May 2008</p>	<ul style="list-style-type: none"> <li>▪ Effective time management is about establishing habits that make the best of your time and decreasing the number of factors that steal your time</li> <li>▪ You need to understand how much time is spent on productive activities that help you achieve the results you want, and how much of your time is spent unproductively</li> <li>▪ Tracking and analysing the way you spend your time, objectively looking at your habits and deliberately choosing more productive habits, enables you to create an ideal daily routine</li> <li>▪ An ideal daily routine is a daily objective - the way you want your day to unfold and the outcomes you want to achieve. It's a guideline, not an inflexible template.</li> </ul>
<p>Customer service checklist April 2008</p>	<p>Use this checklist to ensure your customers are receiving the best possible service.</p> <ul style="list-style-type: none"> <li>▪ thoroughly research your customers to gauge their needs and wants. Build a profile of the different types of customers you may come across and use this to tailor your service to meet their requirements</li> <li>▪ be an expert on your service and industry. Your customers should be able to look to you and your staff for expert advice</li> <li>▪ add value to your service where you can. It may be as simple as offering a customer a cup of coffee when they visit</li> <li>▪ be predictable. Customers like to know what they should expect. Make sure your service is always of a consistently high standard</li> <li>▪ try to build morale with your regular customers. Everybody enjoys service when they feel it is personal</li> <li>▪ Brush up on your communication skills. In today's busy world many people forget their manners. Customers notice when staff are courteous and pleasant</li> <li>▪ always ask for feedback on your service. If you know your strengths and weaknesses, you have a much better chance of improving your service at large. And don't think that because there hasn't been any complaints, that your customers are all happy. You have to ask to find out for sure.</li> </ul>
<p>Tips on customers April 2008</p>	<ul style="list-style-type: none"> <li>▪ look to the US – the home of customer service – for an edge</li> <li>▪ give the customer what the customer needs and wants</li> <li>▪ don't be too dependent on one big customer. If you lose him or her you could be up 'you know what' creek without the proverbial paddle</li> <li>▪ create a system for dealing with customer complaints</li> <li>▪ remember that the customer is always right, as long as they are the 'right' customer.</li> </ul>
<p>Getting your marketing in to gear March 2008</p>	<p>Smart businesses constantly look for opportunities to market their business. Businesses that start to implement marketing plans are well on the way to setting themselves up for long-term success. So get serious about this now!</p> <p>Here some tips for getting your marketing into gear:</p> <ul style="list-style-type: none"> <li>▪ develop a 'relationship' based business, where good communications ensure all participants are heard and responded to, and are empowered by their role within the market.</li> <li>▪ join a powerful networking group to benefit from business contacts and brainstorming</li> <li>▪ embrace new technology for new marketing channels</li> <li>▪ giveaways to celebrities can give valuable exposure</li> <li>▪ pick up on social trends to keep your business relevant</li> <li>▪ if a better business name works think about the pros and cons of changing it</li> <li>▪ create local support for your business by sponsoring community activities</li> </ul>

	<ul style="list-style-type: none"> <li>▪ entering awards gives you the opportunity to take an objective look at your business</li> <li>▪ winning awards gives you a public relations and marketing boost that doesn't cost you a cent</li> <li>▪ smart businesses even look at the reasons why they don't win awards and aim to win the next time around.</li> </ul>
<p>How to think about financial management in your business. March 2008</p>	<ul style="list-style-type: none"> <li>▪ The key financial focus in your business is to maximise its value .</li> <li>▪ Consistently delivering value to your customers is the best way to deliver value to the owner.</li> <li>▪ Customer satisfaction leads to profit leads to company value.</li> <li>▪ Business finance is not just focusing on your tax responsibilities, it's paying as much or more attention to internal business management.</li> <li>▪ It's not "finance" it's business. The numbers are simply another way of understanding the business more accurately.</li> </ul>
<p>Budget basics February 2008</p>	<p>It's a familiar feeling that many business owners experience. A collection of invoices arrive, the tax man rears his head, a debtor is taking its time and the post-Christmas dent on the budget is starting to show. It's those situations where a financial strategy can help minimise the strain on your cash resources. Budgets are not only essential; they can make or break your bottom line. Gavan Ord from CPA Australia recommends a business owner prepare three interrelated budgets to gain a comprehensive picture of the business: budgeted profit and loss, budgeted balance sheet and budgeted cash flow statement. Ord highlights the following as key requirements of preparing a budget:</p> <ul style="list-style-type: none"> <li>▪ tie it into the business and strategic plan</li> <li>▪ incorporate the financial parameters/objectives from the strategic plan</li> <li>▪ include the sales forecast</li> <li>▪ include relevant intelligence about the business, customers, competitors and the industry</li> <li>▪ include relevant market research</li> <li>▪ include information from suppliers.</li> </ul> <p>"If you are in an existing business (it does not matter that you ran the business for a number of years or you recently acquired the business), past financial information will also help you construct a budget. Any assumptions that you make in preparing your budget should be articulated," Ord says.</p>
<p>Running your business effectively February 2008</p>	<p>These business tips are taken from the world renowned small business program the E-Myth Mastery Program.</p> <ul style="list-style-type: none"> <li>▪ your business is a way to get more out of your life. It's more than just a job</li> <li>▪ view your business as separate from you - as a product of you - and you will be able to reinvent it. It's about taking a step outside of your business and looking at it objectively</li> <li>▪ work on, not just in your business: The business as a whole is the product, not the things or the services the business produces. You need to be focused on building your business, not merely cranking out products or services</li> <li>▪ view your business as an integrated system. The system does the work, and the people run the system</li> <li>▪ the task of the owner is continuous development of the business through the ongoing process of innovation, quantification and orchestration.</li> </ul>
<p>Great holiday reading December 2007</p>	<p>With Christmas just around the corner we thought the best tip we could give would be some great readings for your Christmas stocking. Here are five books that are must read for any business builder.</p> <ul style="list-style-type: none"> <li>▪ <b>The Emyth Revisted: Why Small Businesses don't work and what to do about it</b> by Michael Gerber</li> <li>▪ <b>The Purple Cow - Transform your business by being remarkable</b> by Seth Godin</li> <li>▪ <b>Good to Great - Why some companies make the leap.... And others don't</b> by Jim Collins</li> </ul>

	<ul style="list-style-type: none"> <li>▪ <b>Built to Last - The successful habits of visionary companies</b> by Jim Collins</li> <li>▪ <b>Seven Habits of Highly Effective People</b> by Steven Covey</li> </ul>
<p>Protecting your intellectual property November 2007</p>	<p>Too many people in business have worked hard to develop a concept, nurture a business and create a name or reputation but have vastly underprotected themselves. Why? Because they have not formally taken out trademarks to look after their brand names, logos, original sounds and scents and even aspects of packaging. The 10 crucial steps for IP are:</p> <ul style="list-style-type: none"> <li>▪ treat intellectual property as a business asset and put a dollar value on it</li> <li>▪ understand the different types of IP. IP Australia's website gives you more details at <a href="http://www.ipaustralia.gov.au">www.ipaustralia.gov.au</a></li> <li>▪ keep your smart idea confidential – until it's protected</li> <li>▪ protect your idea using the IP system – wise innovators seek advice from an IP professional sooner rather than later</li> <li>▪ build a model to help prospective financial backers visualise your smart idea and its market potential</li> <li>▪ keep track of all your development and protection costs to help you put a value on your IP and give you an idea of how profitable the whole venture could be</li> <li>▪ research its potential market and understand its likely consumers, buyers, licensees, investors, manufacturers and distributors</li> <li>▪ commercialising your idea requires a variety of business skills. Take a course in business management or at least educating yourself via books or accessing information on the web is fundamental</li> <li>▪ there are different ways to make money from IP - you can sell it, license it or make products yourself. It might be more profitable in some cases not to manufacture it yourself. If you do this, get legal advice</li> <li>▪ protect your IP from unauthorised use. If this right is infringed you can seek legal action and even compensation through the courts against the offender. Keep an eye out for infringers.</li> </ul>
<p>Exporting products November 2007</p>	<p>Is your product or service good enough to export? If so here are some tips that can help will help you get started.</p> <ul style="list-style-type: none"> <li>▪ access government support from Austrade, <a href="http://www.austrade.gov.au">www.austrade.gov.au</a>, other government agencies at state and federal level, or industry associations</li> <li>▪ apply for government assistance, such as export marketing development grants</li> <li>▪ prepare an export plan as part of your business strategy</li> <li>▪ look at options in addition to exporting, such as franchising, investments, licensing, joint venture or strategic alliances</li> <li>▪ if you are in sports or event management business (for, say, the 2008 Beijing Olympics in 2008) make sure you join the Business Club Australia, <a href="http://www.businessclubaustralia.com.au">www.businessclubaustralia.com.au</a></li> <li>▪ read regular economics commentators such as Peter Switzer in The Australian and Tim Harcourt in BRW each week.</li> </ul>
<p>Introducing Systems to your Business October 2007</p>	<p>Introducing systems to your business will enhance productivity and consistency, enabling you to provide a better experience for your customers and greater satisfaction for staff. Systems free you to do the work of developing your business, and ultimately, if you want, systems free you from the business itself. Some keys things to know about systems are:</p> <ul style="list-style-type: none"> <li>▪ systems reduce inconsistencies</li> <li>▪ systems enable employees to understand exactly what their responsibilities are</li> <li>▪ systems provide a formula for success, by creating an efficient workplace where all operational guidelines and procedures are clearly documented</li> <li>▪ systems produce results</li> <li>▪ systems enhance productivity by providing order, predictability and reliability</li> </ul>

	<ul style="list-style-type: none"> <li>▪ systems reduce the "stress factor" when employees leave the business, enabling a smooth transition when new staff come onboard in their place</li> <li>▪ systems allow you to spend more time working ON rather than IN your business.</li> </ul>
Essential leadership capabilities October 2007	<p>Every business needs a leader and every leader needs four essential capabilities in order to be effective. These capabilities, as set out in the Full Spectrum Business Coaching Program are:</p> <ul style="list-style-type: none"> <li>▪ strategic thinking: the ability to formulate a vision, a mental picture of what is to be achieved</li> <li>▪ commitment to purpose: the determination, dedication and energy to make the vision a reality</li> <li>▪ right action: the ability to do what is most effective and conforms to an appropriate ethical code.</li> <li>▪ motivational influence: the ability to communicate the vision with enthusiasm, dedication and commitment.</li> </ul>
Networking Knowhow September 2007	<p>Getting involved with a peer network will open your business up to like minded individuals.</p> <ul style="list-style-type: none"> <li>▪ Business enterprise centres (<a href="http://www.beca.org.au">www.beca.org.au</a>) work with and on behalf of the micro and small business sectors</li> <li>▪ The Entrepreneurs Organisation (<a href="http://www.eonetwork.org">www.eonetwork.org</a>) is a global community in which business leaders can learn from others and share their experiences</li> <li>▪ The New South Wales Business Chamber (<a href="http://www.nswbusinesschamber.com.au">www.nswbusinesschamber.com.au</a>)</li> <li>▪ The Executive Connection (<a href="http://www.tec.com.au">www.tec.com.au</a>) is an international membership which provides ongoing learning and development for business leaders</li> <li>▪ The Australian Businesswomen's Network (<a href="http://www.abn.org.au">www.abn.org.au</a>) serves women in business by raising their profile and providing free education.</li> </ul>
Practice double vision August 2007	<p>A business owner has to keep everything in perspective, which means keeping the long-term interests of the business in mind while addressing the day-to-day pressures. We call this "double vision". It is about balance and there are five key areas in which "double vision" applies.</p> <p>Long term vision - Short term actions</p> <p>Entrepreneurial strategy - Operational strategy</p> <p>People as assets - People as individuals;</p> <p>The Business point of view - The Customer point of view</p> <p>Your life - Your business</p>
Walk in your customers' shoes July 2007	<p>When planning your marketing strategy, first put yourself into your ideal customer's shoes. Then, from that perspective, answer these questions:</p> <ul style="list-style-type: none"> <li>▪ What do they expect your products or services to do for them?</li> <li>▪ What features must your products and services have?</li> <li>▪ What positive and negative associations are generally held by your target customer about your industry?</li> <li>▪ What pricing strategy is appropriate and how will you convey a sense of value?</li> <li>▪ Is doing business with your company as convenient and easy as it needs to be?</li> </ul>
Think from the top	Think from the top of your business before you act, and after you have done the

June 2007	<p>thinking, begin creating a business that will do what you want it to do.</p> <ul style="list-style-type: none"> <li>▪ Think about your 'whole business strategy' - then develop it.</li> <li>▪ Think about your marketing strategy - then develop and implement it.</li> <li>▪ Think about your sales strategy - then develop it.</li> <li>▪ Think about your financial strategy - then act on it.</li> <li>▪ Think about your staffing strategy - then follow it through.</li> <li>▪ Think about your life strategy - and live it</li> </ul>
Get your recruitment right May 2007	<ul style="list-style-type: none"> <li>▪ When hiring new staff, determine the qualities you want first, then interview for them.</li> <li>▪ You can teach skills; qualities influence attitude and the way that person will work and fit into your organisation.</li> <li>▪ Have your questions prepared and listen, listen, listen - rather than talk, talk, talk. Before you throw people at a problem, throw systems at it first.</li> <li>▪ Desperation is a cruel taskmaster. The best time to develop your recruiting and hiring systems is when you don't need to hire someone.</li> </ul>
Manager your time effectively April 2007	<ul style="list-style-type: none"> <li>▪ Time is an irreplaceable resource; use it effectively.</li> <li>▪ Establish habits that make the best use of your time.</li> <li>▪ Don't postpone unpleasant tasks; get them done early in the day.</li> <li>▪ If your day is filled with interruptions, analyse them to find out what systems and information are missing to trigger the interruptions.</li> <li>▪ Plan and prioritise your day - the day before, so you start the day with a clear picture of what you are doing.</li> <li>▪ Set reasonable deadlines for all tasks and stick to them.</li> </ul>
Review your values March 2007	<ul style="list-style-type: none"> <li>▪ Remember: Your business is a reflection of you and your behaviours and attitudes.</li> <li>▪ Keep systems as simple as possible.</li> <li>▪ Respect and value complaints - they are opportunities.</li> <li>▪ Know the difference between delegating and abdicating.</li> <li>▪ Customers buy more on value and service than they do on price alone.</li> </ul>
How well does your business measure up February 2007	<p>There is a lot of competition out there for almost every business. How well does your business measure up?</p> <ul style="list-style-type: none"> <li>▪ Assess your business through the eyes of your customers.</li> <li>▪ Compare yourself frankly and honestly with your competition.</li> <li>▪ Review the quality of your product or service to ensure that it is consistently excellent.</li> <li>▪ Review what you do to make the experience of your customer more satisfactory.</li> <li>▪ Listen to customers' concerns and deal with them on a timely basis.</li> <li>▪ Every complaint is an opportunity to do it better.</li> </ul>
Communication is the key December 2006	<ul style="list-style-type: none"> <li>▪ Communicate. Communicate. Communicate.</li> <li>▪ Talk to and listen to your direct reporting staff, one-on-one at least once a week.</li> <li>▪ Talk to and listen to your customers regularly. Hear what they want rather than giving them what you think they should have.</li> <li>▪ Don't act on assumptions - clarify first, then act.</li> <li>▪ Build relationships with your suppliers.</li> <li>▪ Communicate. Communicate. Communicate.</li> </ul>
Plan to succeed November 2006	<ul style="list-style-type: none"> <li>▪ Create the finished picture: describe in detail what your business will look like when its 'done'.</li> <li>▪ Set aside time every day to work on the bigger picture and your business strategies.</li> <li>▪ Measure everything and make your business decisions based on the results.</li> <li>▪ Hire and train people to fit positions, don't create or modify positions to fit the people</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Learn how to be a leader as opposed to a "boss".</li> </ul>
Embrace change October 2006	<ul style="list-style-type: none"> <li>▪ Don't let tradition stop you from changing your focus</li> <li>▪ Strive to get an edge over your rivals, even if it means diversification</li> <li>▪ Keep up with technological change and community concerns</li> <li>▪ Think long term for enduring success</li> <li>▪ Be committed to innovation</li> </ul>
Convert issues into opportunities September 2006	<ul style="list-style-type: none"> <li>▪ Mistakes are a part of learning.</li> <li>▪ You only fail two ways: by not trying or by believing you've failed.</li> <li>▪ Every Frustration is the result of the lack of a system.</li> <li>▪ Complaints are opportunities</li> <li>▪ Value and service are more important than price alone.</li> </ul>
Leadership August 2006	<ul style="list-style-type: none"> <li>▪ Leadership is as important in small business as it is in big business.</li> <li>▪ Most people are not trained in the role of leadership. You can learn to be a leader!</li> <li>▪ Be objective about yourself.</li> <li>▪ Do a S.W.O.T analysis on yourself.</li> <li>▪ Concentrate on the 'F' word. Focus on yourself and make yourself as strong and as competitive as you can be.</li> </ul>
Make your business work July 2006	<ul style="list-style-type: none"> <li>▪ Think about the problems and frustrations you have in your business life and create a system to eliminate them</li> <li>▪ Fail to plan, plan to fail.</li> <li>▪ Be prepared to pay experts for help - you can't do it alone.</li> <li>▪ View every crisis or complaint as an opportunity to do things better.</li> <li>▪ Create a business that works for you instead of because of you.</li> </ul>

#### 4.4.14 Literature – Academic Research

Literature artifacts within the SME and manufacturing spaces among the academic research arena were wide reaching and numerous. Table 16 outlines 73 articles that were collected through a space of approx 2 years that were used to inform the author's thinking and approach to assisting the participating regional-based micro-manufacturer in the I&TT journey. The literature ranges from process-driven themes such as manufacturing productivity and information technology usage to regional industry-wide innovation studies. These artifacts collected indicate that when it comes down to deep ethnographical studies to seek reasons and meanings in the topic of SME innovation, there were found somewhat wanting. Though there were a number of well regarded qualitative studies, it was mainly revolved around human resource management or intrinsic and extrinsic innovation behaviours, the insights into the main driver of I&TT (how policy influence innovation behaviours) were lacking. In saying this, the academic literature were useful in providing a source of tools that can be utilized, lessons learnt from practice, and rigorous insights into the I&TT process for regional SMEs.

**Table 16: Artifacts of Literature ( Academic Research)**

Author	Title, Source	Abstract
Lahorgue, M.A. Da Cunha, N.	Introduction of innovations in the industrial structure of a developing region. International Journal of Technology Management & Sustainable Development; 2003, Vol. 2 Issue 3, p191-204	This paper focuses on the 'HomeBrokers' project developed by the Porto Alegre Tecnopole in Brazil. This project operated from May 1998 to December 1999 in a pilot phase. Its service addressed the socio-economic significance of small- and medium-size enterprises (SMEs), which largely thrive on traditional technologies, and the need to promote the innovation culture among such enterprises. A major challenge in this respect has been bridging the traditional gap between the researchers/academics and the small-and medium-size entrepreneurs. In developing countries like Brazil, creating a good environment for innovation to occur across the economic spectrum and for a robust and sustainable industrial base to emerge would call for policy provision aimed at fostering the transformation of traditional sector activities, especially the SMEs, by enabling them to interact with and learn from high-technology-based enterprises. This is important as SMEs contribute significantly to regional employment.
Roztocki, N. Porter, J. D. Thomas, R.M. Needy, Kim LaScola	A Procedure for Smooth Implementation of Activity-Based Costing in Small Companies. Engineering Management Journal; Dec2004, Vol. 16 Issue 4, p19-27	This article describes a procedure that allows companies to easily switch from a traditional costing system to an activity-based costing (ABC) system. The procedure is particularly useful to small companies (less than 100 employees) for which the standard implementation of ABC is too expensive and complex. The method, which consists of eight easy-to-follow steps, leads a company through the Cooper's two-stage activity-based costing model. At first, decision makers determine cost information, which can be obtained via an educated guess, a systematic appraisal or actual data collection. The method used to collect the data would depend on the level of accuracy desired and the amount of money assigned to this endeavor. Next the overhead expenses such as administration, rent, utilities and transportation are compiled into product cost information using newly developed matrices. Using these matrices, cost-related calculations become easy and overhead costs are traced without difficulty to the cost objects in the final step. The ease of use of the proposed procedure is illustrated using actual data from a small manufacturing company located in western Pennsylvania.
Needy, K. Nachtmann, H. Roztocki, N. Warner, R.C. Bidanda, B.	Implementing Activity-Based Costing Systems in Small Manufacturing Firms: A Field Study. Engineering Management Journal; Mar2003, Vol. 15 Issue 1, p3-10,	This article describes the results of a field study involving the implementation of activity-based costing (ABC) in three small manufacturing companies. Similarities and dissimilarities regarding company business, customer distribution, fixed-to-variable cost ratio, and costing system needs are presented. A cost and time efficient methodology for developing and implementing ABC in small manufacturing companies is presented. The ABC companies, implementation methodology, and research findings are discussed. In addition, the potential impacts of ABC implementation at these three companies are examined.
Vaz, Maria De Noronha Cesário, M. Fernandes, S.	Interaction between innovation in small firms and their environments: An exploratory study. European Planning Studies; Jan2006, Vol.	Small food firms make up an important sector in the European economy and are particularly significant in rural areas where they are potential sources of employment and growth. Despite this, their behaviour as regards innovation has been relatively little studied to date. This exploratory investigation finds different types of innovative behaviours among small agro-food firms in

	14 Issue 1, p95-117	peripheral regions and identifies some of the factors with which they are associated. The research reported here is based on a sample of 323 small and very small food and drink (hereafter “food”) firms drawn from 11 regions in six European countries. The food industry is generally regarded as a mature, low-technology industry, but this study identifies different clusters of small food firms according to innovative behaviours. It finds that, although a substantial number of firms may be defined as non-innovators, by far the largest cluster of food firms is involved in multiple forms of innovative activity. Recent studies have demonstrated the complexity of the determinants of technological progress. This may be modelled as a learning process in which small innovative firms tend to draw on internal and external sources of expertise and are both influenced by and influence the broader socio-economic environment in which they operate. This study uses cluster analyses to identify four types of innovative behaviours and examines the factors influencing these. It takes first steps to incorporate both measures of innovative capacity at the firm level as well as of the local development environment in order to explore links between the innovative capacity of small food firms and the characteristics of their regional contexts.
Martin, L.	Internet adoption and use in small firms: internal processes, organisational culture and the roles of the owner-manager and key staff. <i>New Technology, Work &amp; Employment</i> ; Nov2005, Vol. 20 Issue 3, p190-204, 15p, 5 charts, 1 graph	Emerging from a study of Internet adoption in UK Midlands manufacturing small firms is a new typology characterising owners and key staff as Warriors, Interpreters, Clerks and Priests. This typology is used to explore the impacts of internal factors and organisational culture on innovation and new technology usage in small firms.
Vermeulen, Patrick A. De Jong, Jeroen P. O'Shaughnessy, K.	Identifying key determinants for new product introductions and firm performance in small service firms. <i>Service Industries Journal</i> ; Jul2005, Vol. 25 Issue 5, p625-640	Small firms have gained increasing attention in the innovation literature. Focusing mainly on manufacturing based literature we identified several key factors that contribute to the innovative potential of small firms. However, we do not know if these factors are recognised and used in small service firms. Distinguishing various types of service industries, our goal with this paper is threefold. First, we describe to what extent service firms use the key factors to their advantage. Second, we try to establish if there is a relation between the key factors and new product introductions. Third, we want to see if new product introductions indeed contribute to firm performance. After a survey among 502 Dutch service firms, we reveal some major differences between various types of service industries.
Garengo, P. Biazzo, S. Bititci, U.	Performance measurement systems in SMEs: A review for a research agenda. <i>International Journal of Management Reviews</i> ; Mar2005, Vol. 7 Issue 1, p25-47,	In recent years, literature has identified the increasing complexity of small and medium-sized enterprises (SMEs) and highlighted their sensitivity to differences in managerial culture and management systems. Research has shown that performance measurement systems (PMSs) could play an important role in supporting managerial development in these companies. In this paper, the literature on performance measurement in manufacturing SMEs is reviewed and the diffusion, characteristics and determinants of performance measurement in SMEs are analysed. Shortcomings in the performance measurement systems are highlighted and



		<p>the many factors that seem to constrain PMSs in manufacturing SMEs are defined, e.g. lack of financial and human resources, wrong perception of the benefits of PMS implementation, short-term strategic planning. Moreover, using dimensions defined according to the information found in the literature, two PMS models specifically developed for SMEs are compared with generic PMS models. The comparison points out an evolution in PMS models over time; in particular, the models developed in the last 20 years are more horizontal, process-oriented and focus on stakeholder needs. However, it is not clear whether these changes are due to the evolution of the generic models or an attempt to introduce models suited to the needs of SMEs. To clarify this matter and better to understand PMSs in SMEs, further theoretical and empirical studies are necessary. The main issues still requiring investigation are listed in a research agenda at the end of the paper.</p>
<p>Beck, R. Wigand, R. König, W.</p>	<p>The Diffusion and Efficient Use of Electronic Commerce among Small and Medium - sized Enterprises: An International Three - Industry Survey. Electronic Markets; Feb2005, Vol. 15 Issue 1, p38-52</p>	<p>The diffusion of e-commerce applications and solutions in many countries and industry sectors seems to have reached a level of maturity. This applies not only for large firms, but also for SMEs in three analysed industry sectors, i.e. manufacturing, retail/wholesale and banking/insurance, in Denmark, France, Germany, and the US. With the exception of France, a rather large number of SMEs in these countries responded that the implementation of e-commerce contributed substantially to improve existing operational processes and to expand markets. Although e-commerce technologies may be available hypothetically in all industries and firms, an efficient usage of e-commerce is closely related to a comprehensive implementation of more sophisticated solutions, e.g., online procurement or Internet-based supply chain management. Firms with an all-embracing approach utilizing many e-commerce applications are more often efficient than firms with a lower e-commerce diffusion rate in the sample analysed.</p>
<p>Westhead, P. Wright, M. Ucbasaran, D.</p>	<p>Internationalization of private firms: environmental turbulence and organizational strategies and resources. Entrepreneurship &amp; Regional Development; Nov2004, Vol. 16 Issue 6, p501-522</p>	<p>Profiles of exporting and superior-performing private small and medium-sized enterprises (SMEs) are presented. Multivariate regression evidence suggests that SMEs focusing upon an offensive and market differentiation strategy of product/service protection is associated with the propensity and the intensity of exporting. Exporting SMEs are also associated with younger and manufacturing firms as well as firms with product or service quality and/or technology resources. The perceptions by SMEs of external environmental turbulence were not significantly associated with the exporting-dependent variables. Most notably, variables associated with exporting SMEs are not the same as those associated with superior firm performance. Moreover, exporting firms did not report superior levels of performance. Implications for policy-makers, practitioners and researchers are discussed.</p>
<p>Mole, K. Ghobadian, A. O'Regan, N. Liu, J.</p>	<p>The Use and Deployment of Soft Process Technologies within UK Manufacturing SMEs: An Empirical Assessment Using Logit Models. Journal of Small Business</p>	<p>This study assesses the adoption of different soft process technologies from a survey of 218 British engineering and electronics small and medium-sized firms (SMEs). The new process (soft) technologies that were modeled included total quality management, Kaizan, and statistical process control. Logit models demonstrate that the determinants of soft process technology adoption vary significantly from technology to technology. The study questions a blanket approach to technology</p>

	Management; Jul2004, Vol. 42 Issue 3, p303-324	adoption. Firm-specific factors make a larger difference to the adoption of process technologies than competitive factors. While on the whole small firms are slow to adopt new techniques, this does not hold for all technologies, and future research might investigate what technologies SMEs adopt and why. Benchmarking, suggestions schemes, problem-solving techniques and ISO 9000 adoption was unrelated to firm size, which holds out the prospect of soft process technologies as an alternative technological path for small firm productivity growth.
MacKinnon, D. Chapman, K. Cumbers, A.	Networking, trust and embeddedness amongst SMEs in the Aberdeen oil complex. Entrepreneurship & Regional Development; Mar2004, Vol. 16 Issue 2, p87-106	Over the last decade or so, networking has become a 'vogue concept' in small business research, connecting with wider debates on learning and regional development. Participation in inter-firm networks is seen to provide small firms with access to a broader pool of resources and knowledge, helping them to overcome size-related disadvantages. In particular, the role of such networks as channels for innovation and learning within regions and localities has been emphasized in the context of an apparent shift towards a knowledge-driven economy. In this paper, we provide an empirically-grounded analysis of networking, trust and embeddedness amongst small and medium-sized enterprises (SMEs) in the Aberdeen oil complex. Drawing upon survey and interview data, it is argued that connections to extra-local networks play a crucial role in providing access to wider sources of information and knowledge. At the same time, an Aberdeen location still matters to oil-related firms because of the access it offers to crucial forms of industry-specific information and expertise. In concurring with recent calls for more empirically-grounded research which seeks to 'test' theoretical propositions against relevant data, we suggest in conclusion that a combination of firm surveys and face-to-face interviews provides an appropriate way forward.
Gunasekaran, A Marri, H. McGaughey, R. Grieve, R.	Implications of organization and human behaviour on the implementation of CIM in SMEs: an empirical analysis. International Journal of Computer Integrated Manufacturing; Mar-Apr2001, Vol. 14 Issue 2, p175-185	Computer integrated manufacturing (CIM) requires cross-functional co-operation, and involvement of employees in product and process development. A successful CIM initiative in small and medium enterprises (SMEs) must have top management involvement and commitment and a CIM compatible organizational infrastructure which includes requisite skills, appropriate training and education, and adequate incentives and rewards. Top management must commit the resources necessary to acquire needed technology and bring about any necessary changes in the organizational infrastructure. Top management must likewise be willing to accept the long-term consequences of their decisions. SMEs play an increasingly important role in the competitiveness of many industries in the areas of product and process innovation, flexibility, and in the development of innovative management methods, organizational conventions, and human resource practices. One of the ways that SMEs can achieve a competitive advantage in manufacturing is through the implementation of CIM. To promote a better understanding of organizational issues pertaining to the implementation of CIM in SMEs, a framework is proposed for use in examining and explaining the organizational ramifications of CIM. A literature review and an empirical study provide the foundation for the proposed framework.

<p>Mariotti, S. Piscitello, L.</p>	<p>Localized capabilities and the internationalization of manufacturing activities by SMEs. Entrepreneurship &amp; Regional Development; Jan-Mar2001, Vol. 13 Issue 1, p65-80</p>	<p>In this paper it is argued that the internationalization of production through foreign direct investment (FDI) by small and medium-sized enterprises (SMEs) is influenced by local level idiosyncracies. Although SMEs suffer from inherent constraints to international growth (due to the scarce availability of financial and managerial resources), the presence of qualified localized capabilities strengthen and complement their competitive/ownership advantages, thus favouring their internationalization. These capabilities are related to the advanced specialized services available to the firms, the existence of a 'marshallian atmosphere', and an environment conducive to innovation and learning. However, it is argued that negative externalities stemming from protectionism-oriented public intervention discourage the international growth of firms and negatively influence the propensity of SMEs to internationalize. Empirical support for these premises is provided by this study of the Italian case over the decade 1986-1995.</p>
<p>Freel, Mark S.</p>	<p>Evolution, innovation and learning: evidence from case studies. Entrepreneurship &amp; Regional Development; Apr-Jun98, Vol. 10 Issue 2, p137-149</p>	<p>Whilst considerable work has addressed the characteristics of innovative small firms and their aggregate contribution to economic growth and development, the internal processes of learning and innovation have remained relatively neglected. Drawing upon evolutionary ideas within economics and the broader social sciences, this paper begins the development of an appropriate process theory of learning within innovative small firms. The theory conceptualizes the skills of the firm in terms of organizational routines. These routines are subject to self-reinforcing, path-dependent development which result in the tendency towards lock-in within product innovative small firms. Amongst other things suggested by the paper are the need to augment the knowledge bases of technically driven firms and the need for training policy differentiation between product innovative small firms and their more mainstream counterparts.</p>
<p>Khan, Arshad M. Manopichetwattana, V.</p>	<p>Innovative and Non-innovative small firms:types and characteristics. Management Science; May89, Vol. 35 Issue 5, p597-606</p>	<p>This study addresses the proposition that the characteristics of innovative and noninnovative small firms have significant differences. It is based on a sample of 50 Texas manufacturers. Cluster analysis yielded five distinct groups--two innovative and three noninnovative. The two innovative groups were either young firms dubbed the "Young Turks", or, established, managerially competent firms headed by newcomers called the "Blue Chips". Among the three noninnovative groups, the "Silver Spoons" appeared to be surviving on past success; the "Striving Stoics" displayed continuing managerial effort but were led by executives who had been at the helm far longer than average; and the "Kismets" showed lesser competence and effort, were highly centralized, and were headed by executives tending more towards an external locus of control. Correlational analysis indicated a significant positive relationship between scanning and innovation. Challenges to the firm in the form of environmental dynamism and heterogeneity evoked positive innovatory responses but environmental hostility was a weak negative correlate inducing the firm to "pull in its horns". Finally, an abundance of resources encouraged proactiveness.</p>
<p>Arcelus, F.J.</p>	<p>Implementation of Computer-integrated</p>	<p>Evaluates the process of implementing of computer-integrated manufacturing (CIM) in small manufacturing</p>

Wright, P.	Manufacturing in Small Manufacturing Firms. Technology Analysis & Strategic Management; Dec94, Vol. 6 Issue 4, p411	firms. Reasons for the slow adaptation of technological advances; Integration of human competence engineering concepts into the change process; Steps required for successful implementation of CIM.
Moreno-Luzon, M. Dolores	Can total quality management make small firms competitive? Total Quality Management; Mar93, Vol. 4 Issue 2, p165-181	Explores how total quality management (TQM) can help small firms to compete. Total quality management as a broad framework; Implementation of TQM programmes by small manufacturing firms in Valencia, Spain; Effectiveness of TQM programme; The future of TQM for small firms; Conclusion.
Young, R. Francis, J.	Innovation, high-technology use, and flexibility in small manufacturing firms. Growth & Change; Winter93, Vol. 24 Issue 1, p67, 20p, 8 charts	Studies the uses of innovation, high-technology use and flexibility response to customer needs of small manufacturing firms in New York and Pennsylvania. Description of attempts to classify industries; Relationship of process innovation to small firm growth; Analysis of firm-level measures of innovation, high-technology use and flexibility.
Young, R. Francis, J.	Entrepreneurship and Innovation in Small Manufacturing Firms. Social Science Quarterly (University of Texas Press); Mar91, Vol. 72 Issue 1, p149-162	This paper reports on an exploratory study recently conducted on small manufacturing firms with and without International Organisation for Standardisation (ISO) Certification in India. Through this study, the authors bring out certain significant differences in the adoption of Human Resource Management (HRM) practices and advanced technology of small manufacturing firms with and without ISO 9000 Certification. The findings show that there is a significant difference between firms with and without ISO 9000 certification with respect to the HRM practices and advanced technology adoption. It shows that small manufacturing firms have embraced advanced technologies overwhelmingly compared to non-ISO certified firms.
Swamy, D. Renuka Balaji, Venkateshwara A.	A Comparative Study of Human Resource Management Practices and Advanced Technology Adoption of SMEs with and without ISO Certification. Singapore Management Review; 2006 1st Half, Vol. 28 Issue 1, p41-61	The article presents an exploratory study of 123 manufacturing firms that studied the process of start-up and innovation in high- and low-technology firms. Both types of firms have founders with previous work experience in similar firms and are embedded in networks of manufacturing firms that buy and sell to each other. New firms tend to be small, serving only local markets, and do contract or small batch work with places demands on worker skills. Such firms are characterized as job shops having highly skilled workers using general purpose machinery and can be the seedbed for new high-technology firms because they provide the working environment in which the exploitation of advanced ideas is being pursued. There are a number of findings about how regional structure affects start-up, innovation, and the location of high-technology firms. Sociologists found that new firms are likely to emerge in the same industries that are prevalent in a region. Others have noted that entrepreneurship is less likely to take place in less prosperous regions. Innovation is also affected by regional structure. They concluded that product innovation occurs in disproportionate numbers in companies and units located in or near affluent markets with strong science-based universities or other research institutions.
Freel, M.	The characteristics of innovation-intensive small firms: Evidence	Drawing upon data from a sample of 597 small manufacturing firms, the current paper hopes to contribute to the emerging body of empirical literature,

	from Northern Britian. International Journal of Innovation Management; Dec2005, Vol. 9 Issue 4, p401-429	which seeks to distinguish the characteristics of more and less innovative small firms. Importantly, in so doing, a definition of innovation is employed which, at least partially, resolves many of the difficulties associated with operationalising the relativity of "innovativeness" and which places the emphasis upon innovation as a commercial, rather than a technological, phenomenon. To this end, a number of noteworthy observations are apparent. In broad terms, the paper points to the limits of viewing innovation output as a simple function of the volume of inputs. In other words, capability appears to matter at least as much as capacity. Moreover, the findings place the means of improving innovativeness firmly within the ambit of executives and suggest that these are likely to involve internal strategising and the development of human and intellectual capital.
MacPherson, A. Ziolkowski, M.	The role of university-based industrial extension services in the business performance of small manufacturing firms: case-study evidence from Western New York. Entrepreneurship & Regional Development; Nov2005, Vol. 17 Issue 6, p431-447	This paper investigates the role of university-based industrial extension services in the business performance of small manufacturing firms in an economically declining region of the United States (Western New York). The outreach initiatives of a specific University at Buffalo (UB) programme are described. Particular attention is given to the activities of UB's Centre for Industrial Effectiveness (CIE), an outreach unit with a mandate to improve the product and/or process development efforts of local manufacturing firms. Our data suggest positive returns on investment for firms that have sought technical support under CIE programmes. A key finding is that CIE's services typically entail the transmission of well-established procedures rather than radically new ways of doing things. A further finding is that firms that have used CIE to develop improved products have experienced stronger investment returns than their counterparts that have focused upon process development (although the returns are positive in both instances). More broadly, our data suggest positive correlations between levels of project investment and a variety of commercial outcomes, including sales growth, job-retention, and unit-cost reduction. The implications of these results for regional economic development policy are discussed. The paper also reviews some of the weaknesses that curtail the effectiveness of university-based centres such as CIE.
Briscoe, J. Fawcett, S. Todd, R.	The Implementation and Impact of ISO 9000 among Small Manufacturing Enterprises. Journal of Small Business Management; Jul2005, Vol. 43 Issue 3, p309-330	Quality is essential to customer satisfaction and competitive success. Unfortunately, resource constraints can place the small-firm manufacturer at a quality disadvantage. This paper considers the benefits and barriers to International Standards Organization (ISO) 9000 certification among small-firm manufacturers. An empirical study explores whether small manufacturers can successfully implement and benefit from a standardized and resource-intensive program such as ISO 9000. The answer is yes if management can internalize core ISO practices. Keys to success include inculcating a quality culture, reducing behaviors that inhibit ISO adoption, performing a readiness analysis that helps tailor the ISO program to company needs, and leveraging a dynamic environment to drive quality consciousness.
Voulgaris, F. Papadogonas, T. Agiomirgianakis, G.	Job Creation and Job Destruction in Greek Manufacturing. Review of Development Economics; May2005,	This paper examines job construction and destruction patterns in Greek manufacturing for the period 1995–99, just before Greece's entry to the European Monetary Union (EMU). The analysis uses descriptive statistics and regression models and is performed on a longitudinal

	Vol. 9 Issue 2, p289-301	sample of 6164 firms, classified by size of employment and by manufacturing sector. The results show the dynamic role small- and medium-sized firms play in net employment creation in Greek manufacturing. High technology and capital-intensive manufacturing sectors contribute mostly to net employment growth. Age of the firm is adversely connected to employment growth, while export activity and location of firms contribute significantly in net job creation. Significant determinants to employment growth are firm size, age, profitability, sales growth, reliance on debt and investment in new fixed assets. Economic policy measures are suggested to promote the establishment and survival of new small manufacturing firms, and the growth of the surviving ones.
Gilley, K. M. McGee, J. Rasheed, A.	Perceived Environmental Dynamism and Managerial Risk Aversion as Antecedents of Manufacturing Outsourcing: The Moderating Effects of Firm Maturity. <i>Journal of Small Business Management</i> ; Apr2004, Vol. 42 Issue 2, p117-133	This study investigates how perceived environmental dynamism and managerial risk aversion influence a firm's manufacturing outsourcing activities. Based on a survey of 86 small manufacturing firms, the study found that higher levels of perceived environmental dynamism and managerial risk aversion are associated with increased outsourcing activity. These relationships are moderated by firm maturity such that newer firms engage in more manufacturing outsourcing than their mature counterparts when the environment is perceived to be more dynamic. Mature firms were found to outsource more than newer firms when their top-management teams were relatively more risk averse.
Davig, W. Elbert, N. Brown, S.	Implementing a Strategic Planning Model for Small Manufacturing Firms: An Adaptation of the Balanced Scorecard. <i>SAM Advanced Management Journal</i> (07497075); Winter2004, Vol. 69 Issue 1, p18-24	Profitability and the maximization of shareholder wealth are at the root of the economic model of the firm. Therefore, financial and cost measures usually predominate in most firms and accounting data is readily available for this purpose. There is substantial evidence that management tends to focus on the variables that have standardized and accepted metrics rather than those that are difficult to measure, even if those measures are critical for the company's success. This article evaluates a relatively new management model called the balanced scorecard that has been adopted successfully by a considerable number of large organizations.
Brau, J. Brown, R. Osteryoung, J.	Journal of Small Do Venture Capitalists Add Value to Small Manufacturing Firms? An Empirical Analysis of Venture and Nonventure Capital-Backed Initial Public Offerings. <i>Business Management</i> ; Jan2004, Vol. 42 Issue 1, p78-92	We examine a set of small, venture capital (VC)-backed manufacturing firms and compare it to a control sample of nonVC-backed manufacturing firms going public between 1990 and 1996. We use the degree of underpricing, three-year sales growth, three-year cumulative stock return, and three-year survivability as measures of success. First, we test if the presence of VC backing results in significant differences in success between the two samples. Next, we test if certain VC and deal characteristics are discriminators within the VC-backed sample of firms. Despite previous literature, which argues for either inferior or superior VC post-initial public offering (IPO) performance, these tests indicate no significant differences between VC- and nonVC-backed firms. Additionally, it is found that VC and deal characteristics are not discriminating factors within the VC sample.
Lee, Choong Y.	Perception and Development of Total Quality Management in Small Manufacturers: An Exploratory Study in	The article focuses on total quality management (TQM) implementation in Chinese small manufacturing firms even though most of the Chinese manufacturers are small or medium-sized firms. Small firms are still dominant in many areas, such as services, trade, construction, textiles

	China. Journal of Small Business Management; Jan2004, Vol. 42 Issue 1, p102-115	and satellite suppliers to the larger firms. Small firms are very different from large ones in many areas, such as management style, production processes, available capital, purchasing practices, inventory systems and negotiating power. To obtain hard data about TQM and its practices in the Chinese small manufacturing industry, it is necessary to include as many different types of manufacturing firms as possible, in terms of product, size, manufacturing process and market. Data were collected by the survey questionnaires. After the mail survey, several field trips were made to gather more comprehensive data directly from small manufacturing firms in China. A small manufacturing firm was chosen randomly from each of five categories of products. The survey result shows that Chinese small manufacturers who were affiliated with foreign firms technically or financially are well ahead of most of local firms in implementation of TQM programs.
Weeks, J.	Small manufacturing establishments in developing countries: an empirical analysis. International Review of Applied Economics; Oct2003, Vol. 17 Issue 4, p339-359	There is considerable literature on the promotion of small and medium establishments (SMEs) in developing countries. Rather little attention has been given to the long-term performance of these in the development process. This paper considers the small literature on the trends in the SMEs' contribution to manufacturing in the long run, and the more recent discussion of the effect of policy on these trends. Using considerably more data than previous studies, the paper concludes that (1) it appears that the importance of SMEs tends to decline in early stages of development (as others have suggested), but that this is reversed as countries reach middle-income status, and (2) several of the generalisations frequently made about the impact of policy variables on SMEs cannot be sustained at the country level.
Rahimifard, S. Bagshaw, R. Newman, S. Bell, R.	IT tools to improve the performance of metalworking SMEs. International Journal of Production Research; 10/15/2002, Vol. 40 Issue 15, p3589-3604	The small manufacturing enterprise is typically recognized as a company that is heavily reliant on its human constituents, namely the skilled manufacturing operators who accept a high level of responsibility for the parts they produce, and also have a major influence on the existence of the company. The significant reduction in costs of IT technology and software tools over recent years has enabled the SME to use hardware and software systems that were previously only available to larger companies. This paper investigates the use of modern IT tools and their application within a metalworking SME. The work is based on a number of major research areas, namely the holonic manufacturing paradigm, distributed planning and control, and open controllers for CNC control. The major emphasis of the paper is the design of appropriate IT tools tailored for the requirements of 'human-centred manufacturing systems' based on holonic concepts to support an autonomous cooperative working environment.
Barad, M. Gien, D.	Linking improvement models to manufacturing strategies--a methodology for SMEs and other enterprises. International Journal of Production Research; 8/15/2001, Vol. 39 Issue 12, p2675-2695	Small Manufacturing Enterprises (SMES) are of major importance to the future economic growth of the European Community. To sustain this role, they need support in defining their specific technological and organizational needs and in finding the right approach to respond to these needs. The main objective of the research described in this article is to develop a supporting methodology for determining the improvement priorities of SMEs through a process similar to the manufacturing strategy formulation. However, the tools and techniques proposed in this paper

		are of a general nature and need not be restricted to SMEs. The methodology uses Quality Function Deployment (QFD), a product oriented quality technique, to apply a contingency oriented approach to improvement priorities. The essence of the QFD method is to extract the customer needs or desires and then to translate them into technical product quality characteristics. Here, the customers are interviewees from a sample of Small Manufacturing Enterprises. We assume that the manufacturing system improvement needs stem from strategic manufacturing priorities and from concerns that express unsatisfied needs. To propagate the improvement needs from the strategic level to the action level, two QFD oriented matrices were developed. The first matrix was used to define the operating improvement needs of an enterprise while the second was used to determine its improvement priorities. Cluster analysis, a multivariate technique, identified several generic improvement models of the sampled enterprises.
Spencer, M. Lomba, A.	Total Quality Management programmes at smaller manufacturers: benchmarking techniques and results. Total Quality Management; Aug2001, Vol. 12 Issue 5, p689-695, 7p, 7 charts	This article examines the Total Quality Management (TQM) practices employed by the smaller manufacturing firms in American industries and the results of those practices based on the data collected through a survey of APICS member firms. It aims to provide a benchmark of TQM practices for other smaller manufacturers to use. The result of the study should interest managers/policy-makers in small manufacturing firms trying to implement TQM.
Yizheng S.	Technological Capabilities and International Production Strategy of Firms: The Case of Foreign Direct Investment in China. Journal of World Business; Summer2001, Vol. 36 Issue 2, p184	In this paper, the author highlights the differing motives behind direct foreign investment (FDI) made by (1) large transnational corporations (TNCs) from industrial countries, and (2) small manufacturing firms from newly industrializing economies (NIEs). The basic premise is that TNCs that command sophisticated technologies wish to produce in China to exploit their technological advantages by gaining access to potentially substantial Chinese domestic markets. However, small firms from NIEs such as Hong Kong use more mundane technologies. They are more interested in using low cost inputs, such as labor and land in China, so that they can continue to export manufactured goods to third countries, thus avoiding rising input costs in their own domestic economies. The discussion is supported by the results of a survey and interviews with executives from both large TNCs and small NIE firms active in PRC.
Caillaud, E. Passemar, C.	CIM and virtual enterprises: a case study in a SME. International Journal of Computer Integrated Manufacturing; Mar-Apr2001, Vol. 14 Issue 2, p168-174, 7p, 2 diagrams, 1bw	In order to have an answer to the exigencies imposed by the market, production management must take into account and optimize the exchange of data with the environment of the firm (clients, providers, partners). Information technologies, such as Internet, can provide SMEs with appropriate solutions. We propose here a methodology to analyse and design an extended production management system. The agricultural cooperative case study illustrates the definition of a solution dedicated to the needs of reactivity in synergy with one's partners' network.
Baker, R. Maropoulos, P.	Cell design and continuous improvement. International Journal of Computer Integrated	This paper describes methods for the practical implementation of the following three stages of cell design: determining cell configurations, identifying a layout and carrying out capability analysis. Although emphasis is placed on how these stages were



	Manufacturing; Nov2000, Vol. 13 Issue 6, p522-532	implemented within a cell design software package called Collect, in order to ensure that the methods are suitable for use within small manufacturing firms, an attempt is also made to describe how cell design might be performed using office desktop software. In this respect, it has been shown that for the design of small cellular systems, a non-proprietary system can be used to implement the algorithms outlined herein, but for more advanced analysis, particularly that involving integration with external elements such as discrete event simulation, a requirement exists for a dedicated database driven system such as Collect.
Malecki, E. Poehling, R.	Extroverts and introverts: small manufacturers and their information sources. Entrepreneurship & Regional Development; Jul-Sep99, Vol. 11 Issue 3, p247-268	This paper investigates the information sources used by 50 small manufacturing firms in North Florida, USA, for a number of regulatory and competitive purposes. Some sources are used on a regular, ongoing basis, permitting the classification of firms as extroverts or introverts, depending on the number of sources used. The two groups are significantly different in their use of external information for non-routine issues that appear. Although customers are overall the most frequently used external information source, they are prominent only for competitive matters, such as product development, new mandates and exporting. Government agencies, on the other hand, are the sources most frequently turned to for regulatory matters, including environment, worker safety and local land use regulations. The most versatile information source for both extroverts and introverts is the small manufacturer's network of 'other firms', which is the only source used by most firms for problems concerning labour. The detailed examination of information source usage permits the preliminary identification of firm personality types with respect to external information.
Meade, L. M. Sarkis, J.	Analyzing organizational project alternatives for agile manufacturing processes: an analytical network approach. International Journal of Production Research; 01/20/99, Vol. 37 Issue 2, p241	The objective of this paper is to introduce a decision methodology and structure for manufacturing (and organizational) agility improvement. The methodology allows for the evaluation of alternatives (e.g. projects) to help organizations become more agile, with a specific objective of improving the manufacturing business processes. An agile enterprise is one whose processes are designed to respond effectively to unanticipated change. One of the difficulties in designing and analysing business processes, in general, is that they are operational designs that need to incorporate strategic attributes. In order to evaluate alternatives that impact the business processes, a networked hierarchical analysis model based on the various characteristics of agility, is proposed. This evaluation model will be based on the analytic network process methodology for solving complex and systemic decisions. An actual example of a small manufacturing enterprise provides some managerial insights into the methodology.
Young, Ruth Francis, Joe	Entrepreneurship and Innovation in Small Manufacturing Firms. Social Science Quarterly (University of Texas Press); Mar91, Vol. 72 Issue 1, p149-162	The article presents an exploratory study of 123 manufacturing firms that studied the process of start-up and innovation in high- and low-technology firms. Both types of firms have founders with previous work experience in similar firms and are embedded in networks of manufacturing firms that buy and sell to each other. New firms tend to be small, serving only local markets, and do contract or small batch work with places demands on worker skills. Such firms are characterized as job shops having highly skilled workers using general

		purpose machinery and can be the seedbed for new high-technology firms because they provide the working environment in which the exploitation of advanced ideas is being pursued. There are a number of findings about how regional structure affects start-up, innovation, and the location of high-technology firms. Sociologists found that new firms are likely to emerge in the same industries that are prevalent in a region. Others have noted that entrepreneurship is less likely to take place in less prosperous regions. Innovation is also affected by regional structure. They concluded that product innovation occurs in disproportionate numbers in companies and units located in or near affluent markets with strong science-based universities or other research institutions.
Wasley, Robert	A cash budget for small manufacturer. Accounting Review; Jul54, Vol. 29 Issue 3, p409	The cash budget is probably the most basic of all budgets for the small manufacturer. The cash budget can serve a multitude of purposes. It not only can help to assure adequate cash resources but also it can serve as a sort of expense budget of the business. In this way, several budgets have been rolled into one.
Hill, Susan Blois, Keith	Industrial Distributors and Small Manufacturers. European Journal of Marketing; 1989, Vol. 23 Issue 2, p154-162	There is considerable evidence that new technically-based small firms face substantial marketing problems. It would seem theoretically possible for some of these difficulties to be overcome if they could be "subcontracted" to industrial distributors. As part of a larger piece of research this article reports on the practical difficulties which make it less than easy for small firms and distributors to work together.
Lefebvre, Louis A. Mason, Robert	The influence prism in SMEs: The power of CEO's perceptions on technology policy and its... Management Science; Jun97, Vol. 43 Issue 6, p856	The research proposes a model, which relates the following variables: (a) the CEO's perceptions of the environment, (b) the strategic business orientation, scanning, and structural characteristics, (c) technology policy, (d) realized innovative efforts of the firm, and (e) measures of firm performance. The empirical data from small manufacturing enterprises (SMEs) that share a common economic and industrial environment show that CEOs' perceptions of external environment-and not objective measures-are key significant issues with respect to technology policy formulation and enactment in SMEs and its subsequent organizational impacts. In particular, perceived environmental hostility and dynamism are shown to have specific and differing moderating roles on the form and strength of the relationships between technology policy and its determinants and between technology policy and realized innovative efforts. Furthermore, a more aggressive technology policy leads to greater realized innovative efforts, which in turn are positively related to export performance and, to a lesser extent, to financial performance.
De Jong, J.P. Vermeulen, P.A.	Determinants of Product Innovation in Small Firms: A Comparison Across Industries, International Small Business Journal, 2006, vol. 24, no. 6, pp. 587-609.	Many studies have investigated the determinants of product innovation in small firms, suggesting product, firm, market and innovation process factors are its key drivers of success. Variations across industries relating to the determinants of product innovation are often expected, but due to a lack of data this is still under-researched. This article explores if composite effects due to broad samples indeed blur one's view. Drawing upon a database of 1250 small firms across 7 industries, we investigate if any differences are found in the presence and impact of various firm-level determinants. Controlling for size and age differences, the analysis

		reveals some major differences to the extent small firms use innovative practices, and their connection with new product introductions.
Hung, Humphry	Formation and Survival of New Ventures: A Path from Interpersonal to Interorganizational Networks, <i>International Small Business Journal</i> , 2006, vol. 24, no. 4, pp. 359-378.	This article proposes a staged model of how relevant interpersonal and interorganizational networks can affect the formation and survival of new entrepreneurial ventures. Focusing on two critical points in new entrepreneurial venture formation, the article posits that the formation process requires not only the supply of appropriate resources, but also specific patterns of resource exchanges between the entrepreneur, the potential new venture and their respective networks. The model advances the existing literature on new entrepreneurial venture formation by highlighting the importance of maintaining appropriate patterns of resource exchanges between the entrepreneur's new venture and the relevant networks in which the venture embeds.
Bryan, Jane	Training and Performance in Small Firms, <i>International Small Business Journal</i> , 2006, vol. 24, no. 6, pp. 635-660.	This article explores the relationship between training and growth in small manufacturing businesses. Research on training undertaken at the macro-level highlights a series of earnings and productivity returns. However, firm-level research has generally yielded more ambiguous results. A review of small firms research indicates that the relationship between training and growth has rarely been considered within the wider context of other factors that may influence growth. Training literature also appears to be more concerned, perversely, with its impacts on firm inputs (employment growth) rather than output (sales) growth. Other considerations also complicate understanding of the relationship between training and performance, since training may be provoked by employment growth (but not theoretically by sales growth), and has a tendency to be associated with larger firms. These considerations are examined with respect to two types of training (in-house training and ex-house management training) using information from a sample of 114 small manufacturing firms in Wales.
Clercq, Dirk De Arenius, Pia	The Role of Knowledge in Business Start-up Activity, <i>International Small Business Journal</i> , 2006, vol. 24, no. 4, pp. 339-358.	Drawing on the literature on knowledge and self-efficacy, we examine the effects of individuals' possession of and exposure to knowledge on the likelihood to engage in business start-up activity. Our analyses are based on data collected for the 2002 Global Entrepreneurship Monitor. More specifically, we analysed data from individuals located in Belgium and Finland in terms of their education and skills, and their contacts with the entrepreneurial community. Our findings suggest that knowledge-based factors indeed have a strong impact on the decision to engage in business start-up activity. We also found cross-country differences for these knowledge-based effects, in particular as regards the growth-orientation of business start-up activity. We discuss our findings and provide directions for future research.
Lockett, Nigel Brown, David H.	Aggregation and the Role of Trusted Third Parties in SME E-Business Engagement: A Regional Policy Issue, <i>International Small Business Journal</i> , 2006,	It is against the background of low engagement by SMEs in e-business that this article seeks to highlight the potential importance of aggregation and of the role of trusted third parties in facilitating higher levels of involvement. The article is based on an ongoing SME e-business research programme and reports on some recent research on SMEs that were using high complexity e-

	vol. 24, no. 4, pp. 379-404,	business applications; it explores the extent to which the research findings could address the core concern of low engagement. This qualitative case study based research includes analysis of data collected from 13 community intermediaries, acting as trusted third parties. It concludes that the role of community intermediaries appears to be central to the adoption of critical e-aggregation applications provided by service providers. For policymakers, this important role of critical e-aggregation applications in facilitating e-business engagement by SMEs has emerged as part of this research but there is limited evidence of policy initiatives that reflect this.
Spicer, David P. Sadler-Smith, Eugene	Organizational Learning in Smaller Manufacturing Firms, International Small Business Journal, 2006, vol. 24, no. 2, pp. 133-158.	This article describes the development and validation of a measure of a firm's organizational learning orientation and considers the relationships between this and firm performance. The measure assesses owner-managers' perceptions of their organizations' orientation to learning in terms of higherorder (active) and lower-order (passive) levels of learning. Its development is a response to the criticisms that organizational learning research is beset by a paucity of valid and reliable measures to assess the ways in which organizations engage in learning at the collective level (Tsang, 1997). Data are presented from a number of samples of small- and medium-sized enterprises in the UK that indicate that the organizational learning orientation measure exhibits acceptable reliability and validity. Furthermore, a number of relationships between organizational learning and financial and non-financial performance were observed. The implications of the findings for research, policy and the management of learning within organizations are discussed.
Shaw, Eleanor	Small Firm Networking: An Insight into Contents and Motivating Factors, International Small Business Journal, 2006, vol. 24, no. 1, pp. 5-29.	Despite significant research interest in small firm networks, gaps continue to exist in knowledge and understanding about the concept of a network and its relationship with small firms. This article seeks to build upon extant research by discussing some of the findings to emerge from a qualitative study of small firm networks. The findings presented concentrate on the contents found to exist across the social networks in which six small service firms are embedded. Discussion of these reveal the multiplexity of network relationships and emphasize the informal nature of small firm networking processes. In particular, discussion provides some insight into what motivates small firms to engage in networking and identifies areas for future research.
Chell, Elizabeth Tracey, Paul	Relationship building in small firms: The development of a model, Human Relations, 2005, vol. 58, no. 5, pp. 577-616.	This article investigates relationships between Owner Managers and First Line Managers (supervisors) in small firms. A model comprising four components - competency, role, style and vision - was developed to consider the operating reality of this dyad, and its robustness considered using an embedded case study design (n= 15). The analysis relied upon 'pattern matching' in which a set of a priori propositions were examined, and (a) the predicted outcome (based on the model) compared with (b) the observed outcome (based on respondents' assessment of the relationship). Two types of factor were identified: style and vision were found to be contingent, varying according to the dynamic of the relationship and expectations of those involved, while competency and role were deemed to be core elements without which effective interrelating is unlikely. Finally, the model was revised to include a fifth

		dimension - an emotional bond comprising trust/mutual respect - which appeared to be a crucial feature of effective relationships.
Bell, Jim Crick, Dave Young, Stephen	Small Firm Internationalization and Business Strategy: An Exploratory Study of 'Knowledge-Intensive' and 'Traditional' Manufacturing, International Small Business Journal, 2004, vol. 22, no. 1, pp. 23-56.	The objective of this study was to explore the linkages between the overall business strategies of small firms and their patterns, processes and pace of internationalization. A qualitative approach was adopted, involving 30 in-depth interviews with key decision makers of internationalizing small firms based in 3 UK regions (15 'knowledge-intensive' and 15 'traditional' firms). The findings suggest that business policies, including those linked to ownership and/or management changes, had an important influence upon the international orientation of many firms. There were close relationships between product policies and market focus, with product or process innovation often providing an important stimulus to international expansion. However, differences existed in the patterns, processes and pace of internationalization between small 'knowledge-intensive' and 'traditional' manufacturing firms. The implications of these results on firm strategy, public policy and theory development are discussed and a series of research questions are postulated for future investigation.
Jones, Janice	Training and Development, and Business Growth: A Study of Australian Manufacturing Small-Medium Sized Enterprises, Asia Pacific Journal Of Human Resources, 2004, vol. 42, no. 1, pp. 96-121.	The principal objectives in this paper are to compare and contrast training and development initiatives for a longitudinal sample of 871 small and medium-sized enterprises in the Australian manufacturing sector that have embarked upon different growth development pathways; and to examine possible connections between small and medium-sized enterprise growth, and training and development. Statistical analysis reveals highly significant differences in management training and qualifications, training changes, as well as training methods, providers and fields, across the low-, moderate and high-growth small and medium-sized enterprise development pathways. Furthermore, training is a relatively consistent concomitant with small and medium-sized enterprise growth.
Sawyer, Olukemi Mcgee, Jeffrey Peterson, Mark	Perceived Uncertainty and Firm Performance in SMEs: The Role of Personal Networking Activities, International Small Business Journal, 2003, vol. 21, no. 3, pp. 269-290.	In this article we propose and test a model of the effects of perceived environmental uncertainty on personal networking activities and firm performance, utilizing a sample of owner-managers from 153 small firms in the high technology sector. We predicted that as the level of uncertainty perceived in the environment by decision makers increased, they would engage in increased external and internal networking activities. This increased networking in response to perceived uncertainty would then result in improved financial performance for their firms. The data provide support for the effects of perceived uncertainty on internal networking and firm performance. We found that as the level of perceived uncertainty in the environment increased, so did the frequency of internal networking. Increased internal networking in response to increased perceived uncertainty resulted in better firm performance. The data, however, do not provide support for our predictions related to external networking and firm performance.
Suárez-ortega, Sonia	Export Barriers: Insights from Small and Medium-Sized Firms, International Small	What are the factors that impede firms' international expansion? Does a firm with marginal export activity perceive the same export barriers as a company wholly devoted to the export market? This article addresses these

	Business Journal, 2003, vol. 21, no. 4, pp. 403-419.	and other questions through data collected from a total of 286 exporting and non-exporting small and medium-sized firms in the Spanish wine industry. The results show that decision makers' perceptions of export barriers - regardless of the type of barrier considered - decrease as the firm moves further in the export development process, even when pre-export stages are taken into account. The main implications of this research work, together with its limitations, are presented in the 'Discussion and Conclusions' section of the article.
Starke, Frederick Dyck, Bruno Mauws, Michael	Coping with the Sudden Loss of an Indispensable Employee: An Exploratory Case Study, The Journal Of Applied Behavioral Science, 2003, vol. 39, no. 2, pp. 208-228.	Using real-time longitudinal survey and interview data, the authors assessed explicit and tacit knowledge flows within a small manufacturing firm for an indispensable employee (IE). They then compared those flows to the flows for a replacement employee (RE) who took over after the IE became ill. As expected, they found that (a) explicit and tacit knowledge outflows to coworkers were greater for the IE than for the RE, and (b) tacit knowledge inflows from coworkers were slightly greater for the RE than for the IE. Explicit knowledge inflows from coworkers were not consistently greater for the RE than for the IE. Surprisingly, the loss of the IE did not have a negative impact on the firm's productivity.
Tsui-auch, Lai Si	Learning Strategies of Small and Medium-Sized Chinese Family Firms: A Comparative Study of Two Suppliers in Singapore, Management Learning, 2003, vol. 34, no. 2, pp. 201-220.	This article is based on a comparative study of the learning strategies of two Singapore Chinese family firms that are incorporated into the same supplier network. As shown in this study, the firms, which work as suppliers in networks that are organized by global technology leading corporations and face state-driven institutional isomorphism on technological upgrading and quality control, have engaged in the learning of technology and management control procedures regardless of firm size, financial capability or industrial position. However, only the larger firm, with greater financial capability and a higher industrial position, has adopted a professional management system. The study provides the author with a base on which to develop propositions and a political-economic explanation that incorporates the roles of the state and foreign capital, the industrial characteristics of small and medium-sized enterprises and the institutional characteristics of Chinese family firms to explicate the learning strategies of these firms.
Bartram, Timothy	Small firms, big ideas: The adoption of human resource management in Australian small firms, Asia Pacific Journal Of Human Resources, 2005, vol. 43, no. 1, pp. 137-154.	Relatively little research has been conducted on human resource management (HRM) in Australian small firms. This study, using AWIRS 1995 data, investigates the adoption and character of HRM in small firms. The dominant findings indicate that, relative to medium and large firms, small firms in Australia are generally less likely to adopt 'formal' HRM practices, including recruitment and selection procedures, written OH&S guidelines, and performance evaluation practices. In contrast, small firms were just as likely as medium and large firms to utilise workplace innovations such as TQM. Regardless of establishment size, management have similar views regarding the devotion of resources to HRM and the development of a corporate ethic. Management in small firms, however, were less likely to receive training in employee relations and less likely to develop a formal organisational strategy. Industry differences are also apparent within the adoption of HRM by small firms. This study provides a greater understanding of where small firms are in the adoption of HRM in Australia relative to medium and large firms, as

		well as some of the critical issues that small firms may face. The paper concludes with a call for greater research regarding the adoption of HRM in small firms.
Schulze, Anja Hoegl, Martin	Knowledge Creation in New Product Development Projects, Journal Of Management, 2006, vol. 32, no. 2, pp. 210-236.	In this article, the authors develop and test hypotheses relating the four knowledge creation modes of socialization, externalization, combination, and internalization as performed during the concept and the development phases of new product development projects to new product success. Using data from 94 new product development projects, they find that socialization during the concept phase and combination during the development phase are positively related to new product success but that externalization during the concept phase as well as socialization and internalization during the development phase are negatively related to new product success. Implications for theory and practice are discussed.
Way, Sean A.	High Performance Work Systems and Intermediate Indicators of Firm Performance Within the US Small Business Sector. Journal Of Management, vol. 28, no. 6, pp. 765-785, 2002	Within this manuscript I present conceptual and empirical evidence that indicates that within the US small business sector high performance work systems (HPWS) are associated with outcomes that are key to the success of small US firms. I also present empirical evidence that indicates that within this sector of the US economy HPWS do not necessarily produce outcomes that exceed the labor costs associated with the use of these systems.
Prefontaine, Lise Bourgault, Mario	Strategic Analysis and Export Behaviour of SMEs: A Comparison between the United States and Canada. International Small Business Journal, vol. 20, no. 2, pp. 123-138, 2002	An empirical study was conducted in the aerospace sector in order to analyse the relationship between strategic analysis and export behaviour of SMEs. CEOs' perceptions of the environment were measured using the four traditional SWOT model dimensions: strengths, weaknesses, opportunities and threats. Results from 132 Canadian and 141 American SMEs show interesting differences between the two countries. It appears that Canadian managers are more prone to react to external opportunities whereas their American counterparts adopt a more defensive behaviour and primarily adjust their export behavior in view of perceived weaknesses and threats. Globally, strategic analysis has a greater impact on export behaviour in Canada than in the USA.
Freel, Mark S.	Barriers to Product Innovation in Small Manufacturing Firms, International Small Business Journal, vol. 18, no. 2, pp. 60-80, 2000.	This paper seeks to understand the nature and extent of barriers to innovation within a sample of small manufacturing firms. After identifying from the literature four broad categories of constraint (finance, management and marketing, skilled labour, and information) it is found, while the sample provides no evidence that innovators are more likely to apply for external finance (as a proxy for greater need), the data does suggest that, of those firms who had applied for external funds, innovators were less likely to have been successful than their less innovative peers. This latter finding is tempered by generally low levels of applications and application failures. However, perhaps of more concern, there remains a heavy reliance on short-term debt funding for innovation. Improving in-house technical and marketing competencies are identified by the firms as key to improving their innovative activity rather than accessing external skills and increasing the number of internal 'experts' and in preference to management, finance and exporting skills. The study also signals the employment of graduates as important to innovation, although the nature of cause and effect is unclear. Finally, the study suggests that the level of firm interaction with external

		agencies is disappointingly low and that the principal barriers to collaboration are "lack of trust" and "inability to find suitable partner", Public policy may find such intangible 'barriers' somewhat intractable.
Gadenne, David	Critical Success Factors for Small Business: An Inter-industry Comparison, International Small Business Journal, vol. 17, no. 1, pp. 36-56, 1998.	The main purposes of this paper are to determine whether there were any common (or different) management practices across different industries that contribute to the successful financial performance of small businesses; to determine whether any antecedent factors, in the form of owners' personal characteristics and enterprise objectives, significantly influence successful management practices for small business; and to document the practical implications of the current research for small business practice. While much previous research focused on the underlying 'causes' or reasons for the success of small business enterprises, very little research has been undertaken in relation to the different factors that are used to measure success across different industries. Moreover, the lack of a comprehensive theoretical framework between various factors and small business success has limited the usefulness of previous research. Accordingly, this study contributes to the existing literature by using a causal model framework involving the relationship between management practices and small firm performance for three different industry types, while considering the antecedent factors of small business owners' personal characteristics and small business enterprise objectives on management practices. The results show that there is different management practices associated with small firm success between industry groups and significant effects of enterprise objectives on management practices for only one type of industry.
Atkins, M. H. Lowe, J. F	Sizing up the Small Firm: UK and Australian Experience, International Small Business Journal, vol. 15, no. 3, pp. 42-55, 1997.	This paper reexamines the definition of a small firm. In the past both input and output criteria have been used in different industrial sectors, often without any formal justification except convenience. Other definitions have concentrated on structures or roles but instead a new model based on management processes related to the planning function is advocated. This new model is widely applicable and empirical results have been obtained from large-scale samples of firms in the United Kingdom and Australia. Logistic regression is used to identify the structural differences between firms in manufacturing and services.
De Koning, Aad Snijders, Jacqueline	Policy on Small-and Medium-Sized Enterprises in Countries of the European Community, International Small Business Journal, vol. 10, no. 3, pp. 25-39, 1992.	This paper gives figures concerning the position of small and medium enterprises in the European Community; in addition to an overview of the target groups the organisation and objectives of SME policy in the different EC member states, a comparison is made between the supportive measures in ten areas -- fiscal policies, regional policies, education and training, business licensing, financing, information and counselling, technology and research and developing, supply and contracting, export policies and employment. At the same time the differences in SME policy are analysed on the basis of characteristics of countries, such as prosperity level and export volume.
Romano, Claudio A.	Research Strategies for Small Business: A Case Study Approach, International Small Business Journal, vol. 7,	This large small business research project which is considering the role of formal planning and control systems in the growth of 50 small manufacturing firms. A mixed qualitative/quantitative methodological approach is used. In conducting small business research,



	no. 4, pp. 35-43, 1989.	researchers should be prepared to consider a much wider range of research processes. Current small business research favours the scientific mode of research, an approach which has disadvantaged researchers in obtaining intimate small business knowledge. The methodological structure stresses the need to adopt a mixed methodological approach in understanding small business. Although the suggestions presented are not conclusive, they tend to imply an alternative approach which is lacking in the literature. A case study approach is advanced as an alternative.
Joyce, Paul Woods, Adrian McNulty, Tony Corrigan, Paul	Barriers to Change in Small Businesses: Some Cases from an Inner City Area, International Small Business Journal, vol. 8, no. 4, pp. 49-58, 1990.	This paper examines the perceptions of business people on the barriers to making desired changes in various aspects of their businesses. The evidence is based on interviews conducted in a number of relatively small manufacturing and retail enterprises in the London borough of Hackney. It was found that the market was seen by these business people as an important barrier to making changes. This was so in a number of areas but was especially critical in respect of the firms' flexibility in changing their products or services and, for the manufacturing firms, in making changes to their orders. The analysis develops the argument that the market is a particular type of economic co-ordinating mechanism, one which is a source of opportunities for small firms and simultaneously a constraint on their actions. The opportunities create the potential for change; the constraint makes the actual change potentially difficult. It is the cause, on occasion, of the need to make changes. The market is, therefore, as a co-ordinating mechanism, full of difficult actual and potential changes for small businesses.
Gibb, Allan Manu, George	The Design of Extension and Support Services for Small-Scale Enterprise Development, International Small Business Journal, vol. 8, no. 3, pp. 10-26., 1990.	This paper looks at the design of extension and related support services and institutions for small-scale enterprise development in developing countries. It is based on a world-wide study carried out for the International Labour Organisation, Geneva, Switzerland, and on more detailed work in Ghana during which a model was developed and tested. The paper first outlines some of the key issues of concern in the design of extension services and presents a conceptual model for the design of SSE extension and related support services. Sound practices are prescribed in the light of the model leading to specific guidelines for designing and operating SSE support services. Finally, practical implications of the model 'on the ground' are suggested.
Smalibone, David	Success and Failure in New Business Start-Ups, International Small Business Journal, vol. 8, no. 2, pp. 34-47, 1990.	This paper aims to contribute to knowledge of the characteristics and problems of new firms through a longitudinal study of a group of new business helped to start by a local enterprise agency, a unique British organisation which provides free or low-cost advice and support to young firms and which are themselves funded by large local business and local authorities. The characteristics of surviving and failed businesses are described, together with the problems faced in the initial trading period. The role of external agencies in providing continued support after start up is also discussed briefly. Apart from contributing to a more informed assessment of the recent growth in the number of new business and self-employed, the paper outlines the implications of the findings for improving the quality of new business starts.
Miesenbock, Kurt J.	Small Businesses and	The present literature on international business falls into

	Exporting: A Literature Review, International Small Business Journal, vol. 6, no. 2, pp. 42-61, 1988.	two main categories: the first covers multinational corporations, their development, organisational and marketing problems, and strategies; the second comprises the internationalisation of small and medium-sized businesses. Early publications on this issue appeared in the early 1960s and since then the issue has gained more and more importance. However, the extensive literature based on empirical studies is full of inconsistencies and a conclusive theory of small business internationalisation is far from available. In addition to this the relevant literature is widely scattered and difficult to obtain with the result that few analysts appear to be aware of more than a proportion of what has been written. The aim of this paper is to compile, systematise and compare all those empirical studies on the export behaviour of small and medium-sized firms to provide a useful basis for further research.
Owualah, Sunday	Providing the Necessary Economic Infrastructures for Small Businesses: Whose Responsibility? International Small Business Journal, vol. 6, no. 1, pp. 10-30, 1987.	This paper asks what contemporary economies; what constitutes economic infrastructures for small firms; and whose responsibility it is to provide them and to what extent they have been or are being provided in many countries. It finds that government has a responsibility to provide relevant economic infrastructure but suggests there is doubt whether actual implementation should also be their direct responsibility. It suggests that less developed countries may have lost sight of their own comparative advantage in harnessing the potential of the small business sector and conclude that these countries can achieve no meaningful or balanced industrial and economic development without due consideration for their small business sector.
Hankinson, Alan	Small Firms' Investment: A Search For the Motivations, International Small Business Journal, vol. 2, no. 2, pp. 11-24, 1984.	This paper reports on the results of a study which examined the motivations and weaknesses behind investment decision making by 52 small engineering firms in the South Wessex region of the United Kingdom. The results showed that in the main small firms actually chose to ignore and even avoid certain opportunities to reach the highest attainable return on investment, indicating endemic investment weaknesses within the small engineering firm.
Perry, Chad	Growth Strategies for Small Firms: Principles and Case Studies, International Small Business Journal, vol. 5, no. 2, pp. 17-25, 1986.	This paper considers growth strategies for small firms after they have become established after start-up. Terms describing growth strategies are presented and principles for choosing between the strategies are developed. It is established that growth strategies should be niche strategies and hypothesized that the most appropriate strategies are market development and product development strategies, in that order. Case studies of small Australian growth firms are examined to verify those principles. The cases demonstrate the soundness of the hypotheses developed and also that a consolidation phase is required after each growth surge. They also suggest that the first growth surge often results from a disturbance event and requires credible examples of mentors.
Perry, Chad Macarthur, Ross Meredith, Geoffrey Cunnington, Bert	Need for Achievement and Locus of Control of Australian Small Business Owner-Managers and Super-Entrepreneurs,	The paper describes research into need for achievement and locus of control among highly successful "super-enterprise", or other small business owner-manager and the general population. Ranking for need for achievement, internal locus of control and chance of control are expected, but result for powerful other locus of

	International Small Business Journal, vol. 4, no. 4, pp. 55-64, 1986.	control are unexpected. The relationship between need for achievement and locus of control is discussed.
Meredith, Geoffrey	Small Enterprise Policy and Program Development: The Australian Case, International Small Business Journal, vol. 3, no. 2, pp. 46-55, 1985.	The paper describes the political, economic and geographical environment which has influenced directly or indirectly, the development of small enterprise policy and programs in Australia. Given the autonomy of each State, policies and programs have been developed and implemented with minimal co-ordination at the national level. Competition between States and political parties has played a significant role in accelerating the development of small enterprise policies and programs. The paper outlines current policies and programs and forecasts expected changes within the next decade.

## **CHAPTER 5 IMPLICATIONS AND APPLICATIONS**

### **5.1 Introduction**

This chapter discusses the implications and application of the research. The chapter covers the activities that were undertaken as part of the intervention to answer the research questions set out in this study.

The findings of the research is somewhat perplexed in that in order to improve the innovation practices of micro-manufacturers, there is a need to encourage a more systematic and disciplined approach, and hence, policies and grant programs have been designed to encourage this. However, in saying this, the best drivers for change in the innovation practice of micro-manufacturers are the owners and managers of the business operations. It can be argued that without the “ownership” and appropriate support from the owners of the micro-manufacturers, the impact and outcomes of policies will be negligible.

This chapter explores and reflects on the innovation and technology transfer experience within a micro-manufacturer, obtained through embedment of the researcher in a micro-manufacturer’s business as a case-officer from a regional university. The research initially focused on the manufacturing factors such as increasing productivity through work study and work-flow analysis, and introducing semi-automation and flexible manufacturing methodology. As the project progressed, however, several non-manufacturing factors were identified as major influences in the innovation process within the targeted micro-manufacturer. The ability for firms to progress in improving the manufacturing factors is often dependent on these factors, which are categorized as personal and business related. The underlying project on which the work described is based on involved: (1) a SWOT analysis on the business, (2) learning and discovering the obstacles and barriers for innovation, (3) seeking and proposing ways to reduce it, (4) and modeling the overall I&TT process within micro-manufacturers in regional areas, and termed regional knowledge diffusion (RKD) model.

### **5.2 Study of a Micro-Manufacturer**

This chapter is an exploration and reflection of the innovation experience of a regional micro-manufacturer through embedment of the researcher in a particular micro-manufacturing firm as a case-officer from a regional university, in an analogue to an anthropological type (ethnographic) study. The case study involved learning and discovering the obstacles and

barriers for innovation, seeking and proposing ways to reduce them, and improving the overall innovation process within micro-manufacturers in regional areas.

During the experience, the researcher embedded within the firm provided advice and analysis, and at times, physical labor on the process transformation for the micro-manufacturing firm via process improvements, semi-automation, and systemization of the business operation, and in the process initiated preliminary study into the innovation process in regional micro-manufacturing sector. The intention in this chapter is to focus on the innovation experiences to gain an understanding of the influencing factors that affect it.

The approach to the overall case study is separated into three different components:

- Study of the business & working owner
- Study of the manufacturing processes
- Study of the innovation process

### **5.3 Background of the micro-manufacturing firm**

The background of the firm is restricted by the ethic clearance and research participants' conditions to remain anonymous. The firm was founded and owned by an individual based at the regional township located within a 50km radius from Toowoomba in Queensland, Australia. The operation started off as a commercial flower growing business focusing on organic and medicinal herbs. However it revolved, now it specializes in and manufactures a range of high-quality organic/pure "chemical-free" soap, shampoo and skin care products. The business has been in operation for about 15 years. Along with a good domestic distribution, it also exports to New Zealand, the United Kingdom and Asia. The products that it manufactures are varied and include:

- Soap-based products (over 200)
- Hair care products
- Skin care products
- Natural "Bush" products
- Medicinal based products
- Miscellaneous products (e.g. Hemp).

### 5.3.1 Study of the Business and Working Owner

A SWOT (strengths, weaknesses, opportunities, threats) analysis as illustrated in Table 17 and Table 18 was performed on the business. This information was collected from interviews and observation on the business and the working owner. It was observed that there is a comparative advantage and **strength** in the firm's niche high-quality product specializations, and its willingness to innovate and perceived intellectual properties (owner's knowledge on soap making). Though the broad range of products was seen as a strength (to the customers), without systems, manufacturing a wide range of products can be a difficult logistic exercise. This was observed during operations. It may also present a case for market confusion for the consumer with the wide choices. The SWOT analysis also provided some evidence to show that the attributes of the owner is the most important factor that influence innovation in the micro-manufacturer.

It was observed the **weaknesses** are many, and presented a challenge for the process transformation task. Interestingly, many of the perceived weaknesses are related to the owner's personal attributes and an intrinsic tie to the business and the manufacturing processes. This can be solved by leveraging the working owner from the operation (to work on the business not in the business), and instilling systems and good practices within the operations. However, time and money (the lack of it) are the major source of weaknesses. This finding is consistent with other research into barriers to innovation, as discussed previously in this chapter. Addressing this lack of money needs external sources of support such as government agencies (subsidies and innovation grants) or larger enterprises (that form a vertical supply chain).

It was observed that a number of **opportunities** could be taken without incurring large capital cost or expenses. Most of the recommendations for the process transformation derived from this observation. One aspect is to focus on decreasing manufacturing cost, both in overheads and unit costs; the other aspect is to specifically target major distribution channels, and consolidate product range to address this wholesale market.

It was observed that the perceived **threats** were related to macro-environmental factors such as raw material price increases, increased global competition, increased labor costs etc, and this is well supported by the literature. However, one interesting view is tied to the owner's personal attributes, as discussed previously.

The SWOT analysis provided an initial understanding of the business to progress to the process transformation stages. Specific areas from the findings; such as the decreasing

manufacturing costs, product consolidation, installing systems and procedure and less reliance on the working owner for day-to-day operations; were addressed. However, the findings also indicated that one of the biggest hurdles for the business is the lack of time and capital, and presented a challenge to the transformation tasks and achieving innovation objectives.

**Table 17: SWOT Analysis – Strength and Weaknesses**

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>-patented recipes and processes</li> <li>-knowledge of soaps</li> <li>-great ideas generation</li> <li>-innovative products and processes</li> <li>-willingness to try new things</li> <li>-soaps with “healing” properties</li> <li>-choice and range – customers buy more / impressive</li> <li>-quality of product is high and well regarded</li> <li>-affordable prices mean volume is growing</li> </ul>	<ul style="list-style-type: none"> <li>-too much control over distribution (IP &amp; territory protection)</li> <li>-too many ideas</li> <li>-try too many things</li> <li>-without strategic plan/focus</li> <li>-ad hoc action / putting out bushfires</li> <li>-knowledge of current industry processes / benchmarking</li> <li>-lack of systems</li> <li>-staff training</li> <li>-staff recruitment / retentions</li> <li>-non-standard orders / batches / sizes</li> <li>-cost structure – high labor + freight + distance + volume sourcing of material</li> <li>-money / time</li> <li>-pricing calculation for orders</li> <li>-creativity / personality</li> <li>-selling wholesale prices</li> <li>-luxury bar affordable prices</li> <li>-quality of product – no compromise - cost is high</li> <li>-aesthetic of soaps and labeling</li> <li>-prevented from growing as the result of thin margins</li> <li>-under priced / locked in from the beginning</li> <li>-health care product higher margin / not visible e.g. labeling</li> <li>-order quantities are small</li> <li>-growing business through personal referral / markets / shows</li> <li>- regional area</li> </ul>

**Table 18: SWOT Analysis – Opportunities and Threats**

<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>-cost saving through system implementation + process improvement</li> <li>- increase margin by decreasing manufacturing cost</li> <li>-more focus to business strategy i.e. manufacturing + outsource marketing/promotion</li> </ul>	<ul style="list-style-type: none"> <li>-copy cats + highly competitive environment</li> <li>-pricing from similar products</li> <li>-intellectual properties infringement</li> <li>-must grow quickly else left behind</li> <li>-price increases – wages, material cost,</li> </ul>

<ul style="list-style-type: none"> <li>-export opportunities / overseas plant</li> <li>-potential to market as healing properties, buy for that purpose</li> <li>-create new product range – create additional volume</li> <li>-consolidate existing product range</li> <li>-potential export market to Dubai, China, Japan, Mexico, US</li> </ul>	<ul style="list-style-type: none"> <li>fuel/freight, electricity, insurances</li> <li>-personality – control freak, delegate well, share recipe</li> <li>-pricing is fixed</li> <li>-low margins, fixed to wholesale prices</li> <li>-affordable prices mean volume is growing</li> </ul>
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### 5.3.2 Study of the Manufacturing Processes

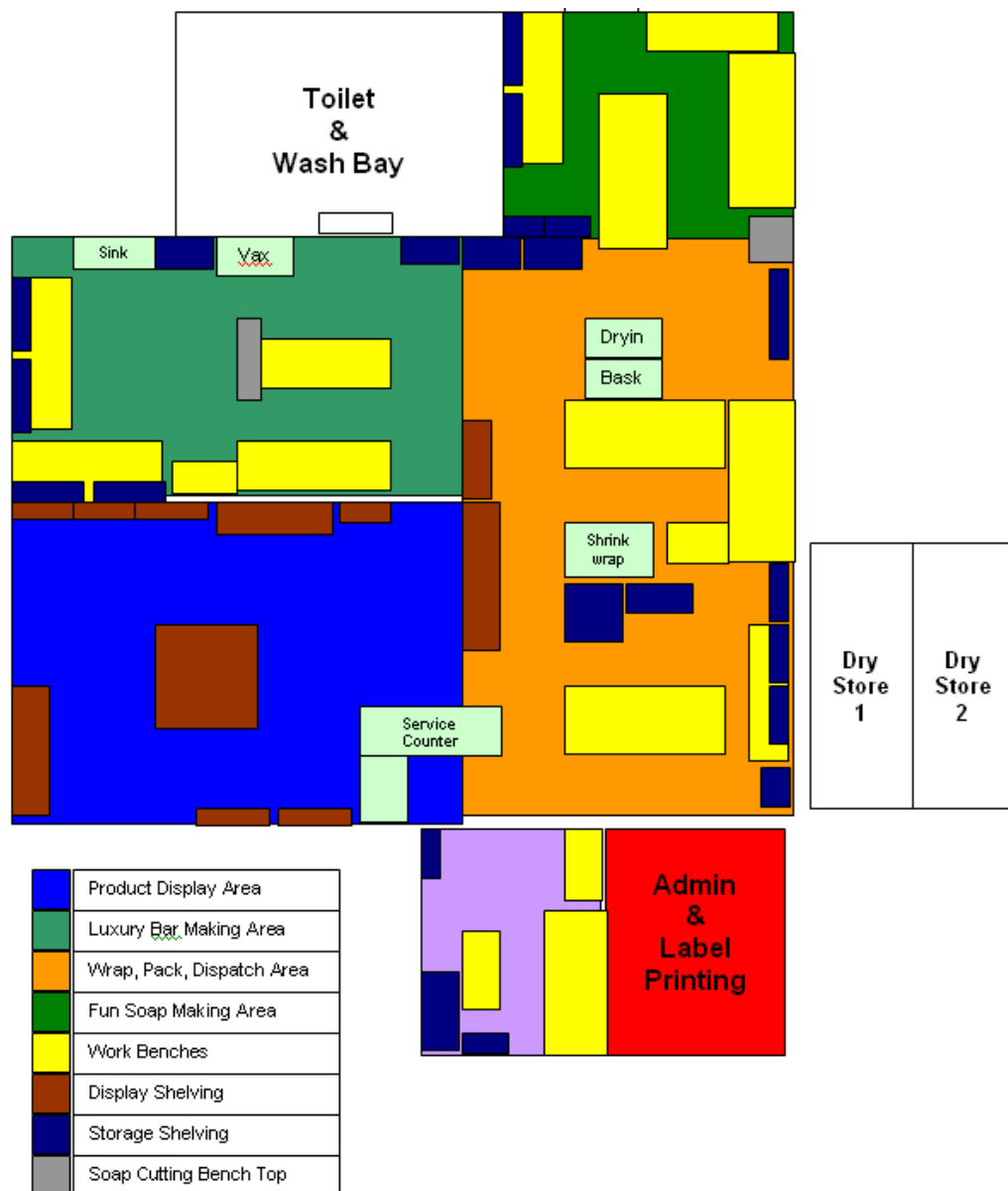
The study of the manufacturing processes encompassed an initial familiarization of the basic soap making processes, categorization of the firm’s soap manufacturing line, and then engagement in the process transformation, resulting in key findings and recommendations.

The basic soap making processes are Cold process, Melt & Pour, Hot process, and Rebatching. The most common type of soap making is known as the “Cold Process”. This process has been adopted by the firm as the process used in the manufacturing of its main line of soaps. It is made by combining fatty acids and sodium hydroxide (lye) together. Fatty acids can be almost any oil – from beef tallow to olive oil to hemp oil. In simple terms, this process combines a proportion of lye (sodium hydroxide) and water with fatty acids, resulting in a chemical reaction called “saponification”. During saponification the oils and lye mix and becomes soap.

One competitive advantage the firm has over other commercial soap manufacturers are in its superior ingredients. They contain organic herb, oil, distilled water, real fruits, vegetable, rice/nut oils, jojoba & macadamia wax, vegetable glycerin. The firm does not use any sodium laurel sulphate, propylene glycol, parabens, or peanut oil; as is common in ingredients in commercial soaps. The soap manufacturing line is composed of an “L” shape configuration, encompassing the following processes and illustrated in Figure 3 as the layout of the manufacturing facility:

- Mixing of lye and fatty acids
- Luxury Bars Making
- Fun Soaps Making
- Soap Cutting / Slicing
- Saponication/Drying
- Packaging
- Storage





**Figure 3: Existing layout of the manufacturing facility**

### 5.3.3 Example of Process Transformation Interventions

The approach to the process transformation was mainly through analyzing the processes with data collected, mostly video recordings of the individual manufacturing elements, and applying work study principles to evaluate and seek increased productivity and improvements in output quality and quantity. This approach is described below:

#### Background Studies

- Understand the business and manufacturing processes including soap making techniques;

- Understand the soap/skincare industry on a macro and micro basis;
- Observe the manufacturing processes;
- Plan intervention project schedule; and
- Determine research methodologies to be used.

### **Preliminary Analysis**

- Interview the Owner and employees regarding the business and manufacturing processes;
- Perform SWOT analysis based on the information gathered from interviews; and
- Outline process transformation required from SWOT.

### **Data Collection & Further Analysis**

- Record videos of the manufacturing processes to be improved by work-study analysis;
- Re-arrange layout of manufacturing plant to be re-arranged for flow optimization;
- Identify key manufacturing process for semi-automation; and
- Identify suitable technology transfer for the manufacturing processes.

### **Recommendations & Comprehensive Report**

- Draft comprehensive report including full recommendations.

These manufacturing elements were analyzed with data collected (through work study) with the view to improve the manufacturing operation to decrease manufacturing costs and increase production output. Process transformation was mainly achieved through analyzing the processes with data collected through video recording of the individual manufacturing elements, and applying work study principles to evaluate and seek increased productivity and improvements in output quality and quantity.

### **Key Process Transformation Findings**

It was determined that the manufacturing costs and units cost are comparatively high as the result of high labor utilization. The solution desired was to decrease the direct manufacturing cost by optimizing factory layout and introduce semi-automation into some processes (illustrated in Figure 4). The project initially targeted to increase the production rate of Luxury bars from 800 to 3000 bars in an eight hour day with minimal investment needed.

The findings from the process transformation were to:

- Improve workstations layouts
- Decrease manual handling in the manufacturing
- Semi-automate manufacturing processes
- Decrease transfer between workstations
- Reposition and increase storage space.

It was also determined during the discussion and analysis with the owner that there were inadequate distribution channels and poor marketing strategies, mainly attributed to the time limitation from the demand of being a full-time working owner who have to frequently travel to country and city shows to exhibit and sell their products. The solution desired was to identify and successfully recruit two major and two minor distribution channels to establish sales consistency and volume. As part of the process, it was also envisaged that there would be consolidation of selected products into a “high-volume” product range to assist in forming a suitable “high-volume” wholesale marketing strategy.

In general terms, it was observed that there are three critical deficiencies within the firm which commonly are endemic within the SME sector in Australia, and all of which impact on innovative capacity of the firm. These were:

- Lack of planning and organization
- Lack of systems and procedures (or lack the training of personnel)
- Lack of expert input into structures and technologies.

There were two separate complementary recommendations, one aimed at the process transformation and the other into improving the distribution channel.

### **Recommendations for the Process Transformation**

There were two separate complementary recommendations, one aimed at the process transformation and the other into improving the distribution channel. These are categorized into 6 stages (listed below) and were executed:

- Manufacturing Improvements [1] via layout design improvements for flow optimization and storage.
- Manufacturing Improvements [2] via semi-automation for processes include soap cutting, labeling and packaging, soap preparation and mixing.

Stage 1: Layout optimization

Stage 2: Soap Cutting productivity

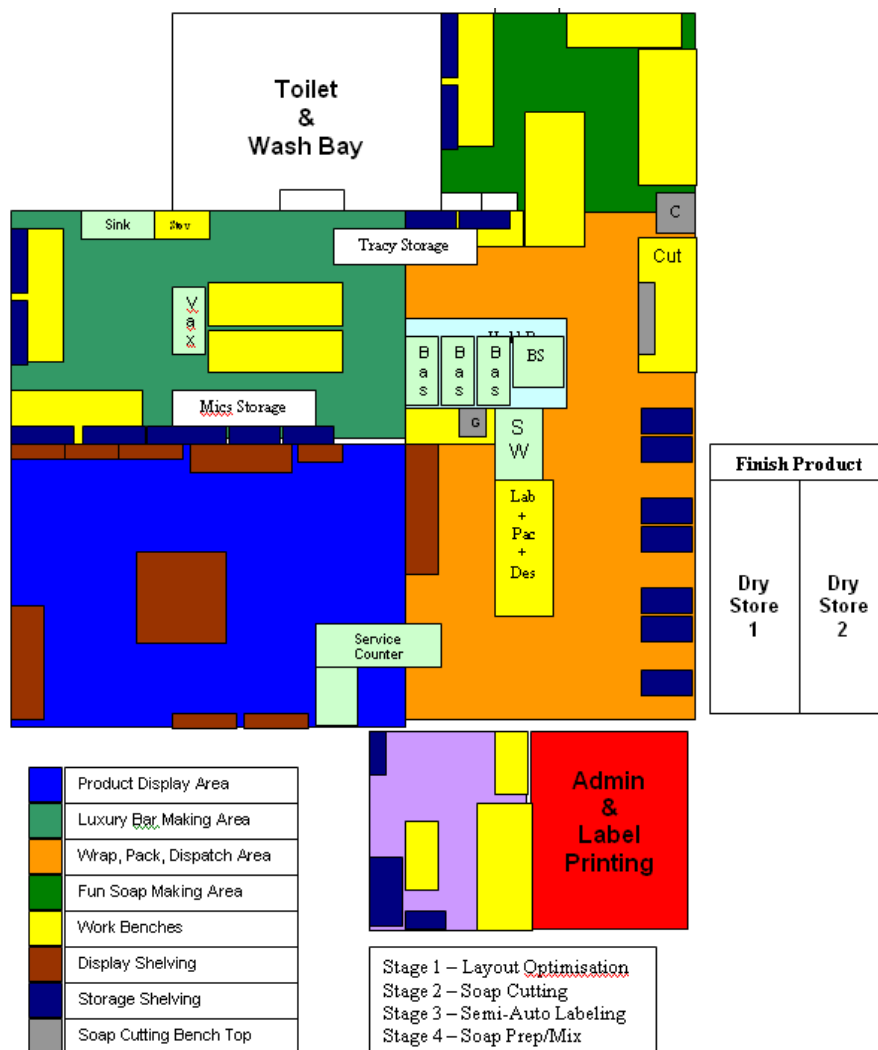
Stage 3: Semi-automate Labeling & Packaging

Stage 4: Soap preparation/mixing.

- Distribution Improvements [1] via consolidation of product range to target the “high-volume” wholesale market.

Stage 5: Standardize and streamline products and procedures

Stage 6: Establish two major and two minor distribution channels.



**Figure 4: Reconfigured layout of the manufacturing facility incorporating the recommended process enhancements**

Figure 4 shows how part of Stage 1 has been implemented to optimize the layout of the manufacturing plant to decrease the associated problems with manual handling and storage.

The technical aspects and outcomes of this case study are not the focus for this case study, and therefore are not expounded further in this chapter.

### **Implications for Regional Universities**

From the experience in the active intervention, this is perhaps an area where academic-industry collaboration can take place, whereby university resources can be provided for a government-subsidized fee to enhance SMEs in their planning, establish systems, and provide I&TT advice. In some ways, there is adequate anecdotal evidence to suggest that the **business coaching industry** that has been established to fill this gap has gained popular demand from the SME sector.

### **5.3.4 Study of the Innovation Process**

The study of the innovation process in this particular firm involved the identification of factors influencing the innovation process. These are listed below, where they are categorized as internal and external factors:

#### **Internal Factors**

- Lack of time and money;
- Inadequate external support;
- Lack of systematic Approach;
- Lack of planning & monitoring;
- Adhoc approach.

#### **External Factors**

- External support is crucial and provides an avenue for innovation;
- Government agencies have the grants/funds for innovation but lack suitable delivery for regional enterprises: need to restructure for regional SME
- There is opportunity for universities to exploit: provide education, advice and structured innovation (similar to business coaching services);
- Customers and Suppliers can be a good source of innovation;
- Employees and Owners need innovation training;
- Larger enterprises can act as a conduit for vertical supply chain innovation (act as innovation host and pseudo-financier).

It can be argued that the major hurdle for the successful innovation hinges on the specific owner's attributes and ability to systematically plan, implement and monitor the business environment and its operations. It is also acknowledged (as previously discussed) that the major hurdle is the lack of capital and time to reinvest into innovation, even though SMEs are perceived as the organizations most responsive and agile to innovation opportunities. This then points to the abilities of government agencies to support such SMEs through targeted financial and facilitation support, collectively with universities who may have the knowledge base and resources to advise business and transfer knowledge. An addition to this is the ability of larger enterprises to form vertical supply chain clusters involving the hosting of SMEs' innovation activities.

There is opportunity in this area for academic-industry collaboration, whereby university resources can be provided for a government-subsidized fee to enhance SMEs in their planning, establish systems, and provide innovation advice. In some ways, there is adequate anecdotal evidence to suggest that the business coaching industry that has been established to fill this gap has gained popular demand from the SME sector.

#### **5.4 Research Implications and Applications**

As a comparison, one of the important results from the research into residential builders was that although it is contended by a number of researchers that larger firms have more capacity to innovate than smaller ones (Arias-Aranda *et al.*, 2001; Gopalakrishnan & Santoro, 2001), there was considerable innovation in the firms studied. The research described in this study also indicates that the small size of the firms studied is likely to enhance their ability to develop, test and implement innovations. This is consistent with the findings of Sexton & Barrett (2003) and Rogers (2003).

The desire to meet changes in the business environment with a high level of rapidity also indicates that smaller firms may be prepared to take risks in the expectation of receiving gain in the long term, in spite of the financial issues involved. The research also indicates how information about innovation flows to firms. The participating firms in Rogers (2003) and the manufacturing firm in this study advised that sources of knowledge for innovations not personally developed by the firm, included journals and magazines, advertisements, industry association events, sales representatives, and other professionals. As was previously observed, SME firms seldom directly receive information from university researchers (Roger 2003).

The sources of information are valuable to the firms, who tend to form a loosely-coupled group of organizations (Dubois & Gadde, 2002), linked to other firms and their knowledge sources. This loose network allows them to exchange information, or obtain information from industry associations, professionals, material and equipment suppliers, their operating environment, clients, subcontractors, and other firms. At the same time, direct communication with researchers and development of trust between the industry and researchers would be highly desirable. This study into the micro-manufacturer indicated that there were roles for government agencies, universities and other education providers in assisting the SME sector. Thus, for government agencies and relevant policy development, implications included the following:

- The desirability of developing a “One-Stop-Shop” for SME support.
- Improvement of accessibility of field officers to regional areas.
- Provision of financial support for advisory and coaching services.
- Provision of financial support for education and training.
- Facilitation of establishment of vertical supply chain clusters.
- Provision of financial incentives for larger enterprises to host innovation activities with SMEs in the form of innovation clusters.

Universities and education providers could:

- Exploit opportunities in the “business coaching” market.
- Develop targeted educational/training products for SME in the form of short customized courses.
- Established technical advisory, process auditing and mentoring consultancies in collaboration with government agencies.
- Be hosts for SMEs’ innovation activities supported by relevant government funding to form clustered applied research and SME “nurturing” centers.

### **Regional Knowledge Diffusion Model**

This study has indicated that there are some common elements, with respect to the innovation process, in the micro-manufacturer researched. While such firms can be quite innovative in their own right, and in fact their small size can in fact be an advantage with respect to being able to quickly adopt innovations, it is clear that little use is being directly made of the government support and knowledge and skills of universities and researchers to assist the innovation.

A suggested model of this process for smaller regional firms has therefore been developed to demonstrate the dependency of the business to the owner, and the need to rely on systematic planning and organization. Such a process will require changes in the owner's behavior and sufficient education/training, along with relevant advisory and financial support needed to improve the probability of a successful innovation experience. The model is termed a "Regional Knowledge Diffusion" (RKD) model, and is illustrated in Figure 5.

This model takes into account the need to invest in the individual as well as the business systems. The policies and program designed around the individuals (owners) must be flexible and agile to be applied across different types of businesses, personal motivations, different levels and quality of learning and knowledge, different personal and financial circumstances. The assumption for this model is that the SME attribute does consist a willingness to innovate and invest in I&TT, and ideally have the agility and responsive to introduction and acceptance of new technologies into the business operations.

In addition, the model suggests that there is a need for respective governments (across regional, state and federal), regional universities and industry leaders to collaborate more extensively to improve industry-wide transformation. Educational and advisory, hosting, and financial supports are viewed as critical to the successful innovation and knowledge transfer in SMEs. The role of governments can be as a facilitator (agent) and financial support, regional universities as educational, technical, hosting support, and industry leaders can be as hosting and pseudo financial support (as a major customer).

Government Support may take the form of:

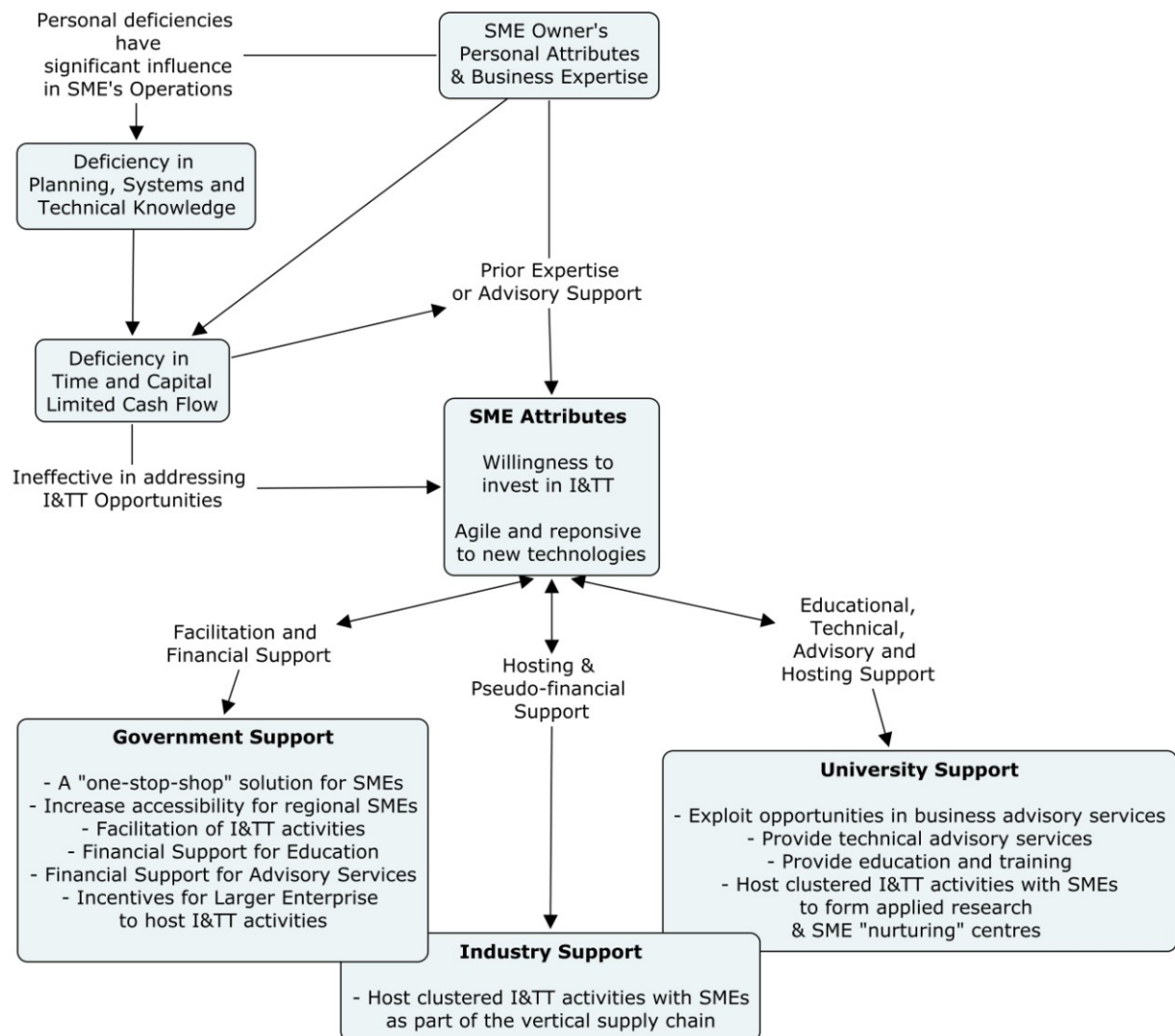
- A one-stop-shop solution for SMEs;
- Increase accessibility for regional SMEs;
- Facilitation and coordination of I&TT activities;
- Financial support for education;
- Financial support for advisory services;
- Incentives for large enterprise to form value chain clusters and host I&TT activities.

Industry Support may take the form of hosting I&TT activities with SMEs within a value or vertical supply chain cluster. This may include pseudo financing using preferential purchasing policy for firms within the cluster.



University Support may take the form of:

- Exploiting opportunities in business advisory services;
- Provide technical advisory services including research consulting;
- Provide education and training services;
- Host clustered I&TT activities with SMEs to form applied research centers and incubation centres.



**Figure 5: Model for Innovation Experience in Small Regional firms: Regional Knowledge Diffusion (RKD)**

## 5.5 Implications and Applications Summary

SMEs are an important sector of the Australian economy. While not all have good success rates in innovation, especially within regional areas, they are generally receptive to

opportunities to innovate and adopt new technologies to lift business growth. The innovation processes in SMEs are not easily understood and not well researched within the literature. Existing support for these processes is also not particularly suited to SMEs. The lack of time, capital and new technology knowledge may be seen as hurdle in innovation, particularly for regional SMEs. In addition, the strategy and organization that is the result of working owners being highly focused on their businesses also need to be addressed.

At the same time, it has been shown that small firms can be quite innovative in their own right, particularly with respect to the development and adoption of new or improved products and processes. Such innovation is driven by improved productivity and efficiency within the firm, as is meeting perceived client requirements. Personal goals and values (e.g., those of the firm's management, often the firm's owners) were also important drivers of the innovations reported. The innovations developed and pursued ultimately benefited the firm and, in particular, resulted in a positive perception of the firm by both clients and competing firms. At the same time, there was an ill-defined benefit with respect to profitability, although the firms generally indicated that they would continue to use their key innovations.

One of the important aspects in the innovation process is the transfer of research knowledge within the industry. It would appear that research knowledge is largely not directly disseminated to small firms. As is considered beneficial for the results of research to be more directly accessible to the firms, and for the firms to receive direct input from universities and other research organizations, it is recommended that university researchers develop closer links with the industry representatives who undertake the intermediary's role, and that universities should take a stronger role in collaborating with the firms. To this end, the Regional Knowledge Diffusion model has been developed as a result of this research.

## CHAPTER 6 CONCLUSION

### 6.1 Research Findings

SMEs play a critical part and are an important contribution to the economy in Australia, and the imperative to innovate has been greater than ever in a globalized economic setting. This research explored a number of questions surrounding SMEs, their innovation practices and the policy that influence them. This research builds on prior studies and addressed a significant gap within the literature in a descriptive and explanatory way. The significance of the research is two-folds; firstly in the use of qualitative methodologies, and secondly providing a deeper understanding of the actual innovation that takes place within SMEs and the drivers that motivates or inhibits them. This is evidenced by the peer-reviewed publications as listed:

- **Goh, S. & Thorpe, D. (2008)** *A Reflection in the Innovation and Technology Transfer Experience in a Regional Micro-Manufacturer: A Case Study*, 9th Global Congress on Manufacturing & Management, 12-14 Nov 2008, Gold Coast.
- **Goh, S. & Thorpe, D. (2008)** *An Investigation into the Innovation and Technology Transfer Process in SME Sector within a University-Industry Collaboration Context*, Asian International Journal of Science and Technology, Vol. 1, No. 2, pp1-10, ISSN # 1906-151X.
- **Thorpe, D. & Goh, S. (2010)** *Study of SME innovation in two Queensland industries*, in Al-hakim, L. & Jin, C. (eds) *Innovation in Business and Enterprise: Technologies and Frameworks*, Business Science Reference: IGI Global, Hershey PA, pp240-259. ISBN 1615206434; 9781615206438.

The literature review in this dissertation explored the definition, imperative, types of innovation and how it relates to SMEs. It also discussed the local macro-economic context within Australia and the comparative positioning around the world, and the influencing factors that drives innovation. The chapter also covered the prior research associated with industry-university related SME innovation; specifically, MacPherson (1998) and Freel (2000). The research questions were developed and these are presented in the form of propositions:

- **Proposition 1:** Failure and Novelty is mutually inclusive and is the governing principle behind innovation policy (ie. systematically grasping opportunities in the midst of change while minimising failures)?

- **Proposition 2:** SMEs are not effective and efficient beneficiaries of innovation policies and their outputs (such as research, education and business support)?
- **Proposition 3:** To what extent do influencing macro-environmental factors affect the decisions of firm's manager to innovate?
- **Proposition 4:** Regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster?

This research was based on a description case study within an action-based participatory research framework grounded in explanative principle. In this study, the author is involved as an active observer and participant, namely, a technology and business advisor from the local university visiting on site about two days a week during a 12 month period from 2006 to 2007 in supporting and enhancing the innovation process with the participants and their manufacturing business. This study uses 'impromptu' interview methods; open, unstructured and informal. This study uses Bernard (2002)'s model to match the collected data (observation, interviews, photographs and videos) to variables (Internal states, External states, Behaviour, Artifacts, Environment) in answering the research questions.

**Proposition 1 findings:** This research in examining the artifacts of the available innovation related programs has indicated a growing weight of evidence to suggest that failure and novelty is mutually inclusive and is the governing principle behind innovation policy, in that it presumed by the policy makers that it is a process that systematically grasps opportunities in the midst of change while minimizing failures. The research observed that SMEs have the natural tendency to innovate, and a willingness to approach innovation in a "trial-and-error" in comparison to large businesses where significant large R&D budgets are involved (and reduced risks of failure). The notion of failure is fundamentally embedded within the culture of SMEs in a positive sense that you have to "give-it-a-go" to innovate, however often than not, failure could mean the end of the business venture. Some would suggest that the SME's owners wear these "failures" as a "badge of honour". Though the principles behind the policies are aligned with visible SME requirements, there is a fundamental difference in the approach taken; ie. process vs people centricity. Many of the programs and literature resources (engineering and business) that were developed to cater for SMEs have this belief that SMEs do have core fundamental expertise and resources, strategic and operational systems, and in general, good business principles and application. However, this research suggests that many SMEs and specifically in our case study, micro-manufacturers in regional settings do lack many of the standardized and theoretical models of a SME, in that the business is the owner, and that every owner is different in their profile, traits, personality, and skill sets. That is, the business can only grow and prosper with the owner in isolation of the

policy-based support that are seemingly accessible at face value but often rendered useless. Process-centric policies will not suit people-centric needs. Process-centric policies would not have much traction dealing with essentially people-oriented problems and issues.

**Proposition 2 findings:** Our study has shown that SMEs especially micro-manufacturing in regional setting are not effective and efficient beneficiaries of innovation policies and their outputs, such as research, education and business support. In addition to the process-centric programs that are not conducive to business owners as day-to-day decision makers, there is a limitation of the availability of time and money to gain support and then innovate accordingly in a planned and systematic fashion. Often than not, innovation came through as an adhoc and experimental approach lacking in assurance of success but lacerated with zeal and passion for the new products and improved processes one envisioned in one's sleep. Often than not, the source of finance for the experimentation and innovation is the "credit card", in the hope that the new product line will sell. Time constraint is a significant barrier to SMEs innovating. Literature suggests that the most innovative firms do not rely on just the owners to innovate but one that creates a culture of innovation across the organization. Very difficult to achieve when the organization is only three people as in our study, and the ownership of innovation derived from the owner. Time to do research and consult on the potential grants and innovation programs that are available were not prioritized. This is perhaps not just a time or prioritization issue, but one that is buried within the entrepreneurial spirit "I-did-it-my-way" and "See, I-made-it-worked". The self-reliant belief is very visible especially in our regional setting, where isolation has been part and parcel of the Australia outback way of life. Investing in support for SMEs mean investing in the owners. This could be in the form of business coaching, educational support and skill development.

**Proposition 3 findings:** The study examines the question on what extent do macro-environmental factors influence the decisions of business owners to innovate. It has concluded that macro-environmental influence will affect business strategy, performance and competitiveness one way or another, at different level of impact, of which owners must consider and address in their management of SMEs. In many cases, managers can only absorb the impact by repositioning or restructuring their businesses. This variable is very much a determinant of how well business owners deal with time constraints. Often than not, owners are approaching multiple fronts; strategic, operational, and frontline activities. You have the customers, the banks, the taxman, the suppliers, the forwarding services, even a simple utility bill can cause "hernias" in any given day. The old saying in SMEs, "work on the business not in the business" still hold true, but the difficulty still reside on values and behavioural barriers to remove oneself from the frontline. Monitoring the operational

progress and “working on the business” defeats the purpose of why owners started the business in the first instances. The core value of a “need” or “passion” in SMEs is in itself providing the basis for starting the venture but holding back the owners in the toil of day-to-day activities. However, in saying this, the most successful SMEs are the ones that are able to change this paradigm in their thinking, and invest in themselves and allow others to “work in the business”. The proliferation of business coaching for SMEs is an exemplary illustration of such a change in discourse.

**Proposition 4 findings:** From the basis of this participatory study, one could suggest that regional universities can play an instrumental part in delivering support mechanisms for innovation within a networked cluster. Though the active participatory researcher (and author) made preparations and skilling in the engineering, business, and management expertises, it was unprepared for the interpersonal and counseling nature of the interactions. One would spend an afternoon listening to the owner sharing the “struggles” and “battles” of the week, and this is somewhat missing in all innovation program and policies; the psychological difficulties and barriers associated with regional SMEs who generally operate in isolation and remoteness. Though enriching an experience, it was difficult to apply the technical expertise into business and technological solutions without dealing with the psychological barriers to innovation. As a result, many of the envisaged solutions were not tested or implemented. However, the impact of the “first-priority” innovation implemented saw immediate increase in production efficiencies, and hence, a reinforcement for the owner of the need to change the SME discourse into “working on the business”. Even that the location was still within a 2hr driving distance, it was still evidenced that the lack of focal point, in terms of a networked “cluster”, diffuses any incentive to engage or interact with the university in its region. It is also quite evidenced that there is a lack of understanding by the SME community of the role of tertiary institutions in their research and teaching for economic and community development. Governments in this instant have an important role to play as the creator and facilitator of collaborative environments. Universities cannot do it alone nor will it as the incentives are not compelling in relation to the third prong of its existence: “Service”. There is also a major disconnect in the other two prongs in that Australian universities in recent times have the tendency to focus only in teaching and research but in a mutually exclusive way. Perhaps, one can suggest that all three prongs should be advancing in harmony, teaching, research, and service, and be funded appropriately to do so. This study suggests a model where a team of case managers would facilitate collaborative research between networked clusters consisting of manufacturers in the region, teaching of entrepreneurial skills and educational development for the managers and owners,

and providing a service to the community in a coordinated effort between industry and institution to encourage innovation and economic prosperity in the region.

## **6.2 Research Applicability**

Research was conducted as a descriptive case study that explored and reflected on the innovation and technology transfer (I&TT) experience of a regional micro-manufacturer of soaps, through embedment of the researcher in the business as a university-placed consultant or case manager. The case study involved learning and discovering the discourse, values, obstacles and barriers for I&TT, seeking and proposing ways to reduce it, and improving the overall I&TT process within micro-manufacturers in regional areas, using a regional knowledge diffusion approach. This study found that there were both strengths and weaknesses in the firm. Particular strengths included its willingness to innovate and its intellectual property. Perceived weaknesses were related to the owner's close embedment in the business operations, thus reducing the ability to think strategically, time and lack of funding. At the same time, there were found to be a number of opportunities, particularly in process transformation. Most threats were related to macro-environmental reasons. The research also indicates that the small size of the firms studied is likely to enhance their ability to develop, test and implement innovations. The desire to meet changes in the business environment with a high level of rapidity also indicates that SMEs may be prepared to take risks in the expectation of receiving gain in the long term, in spite of the financial issues involved.

This study into micro-manufacturer indicated that there were roles for government agencies, universities and other education providers in assisting the SME sector. Thus, for government agencies and relevant policy development, implications included the following:

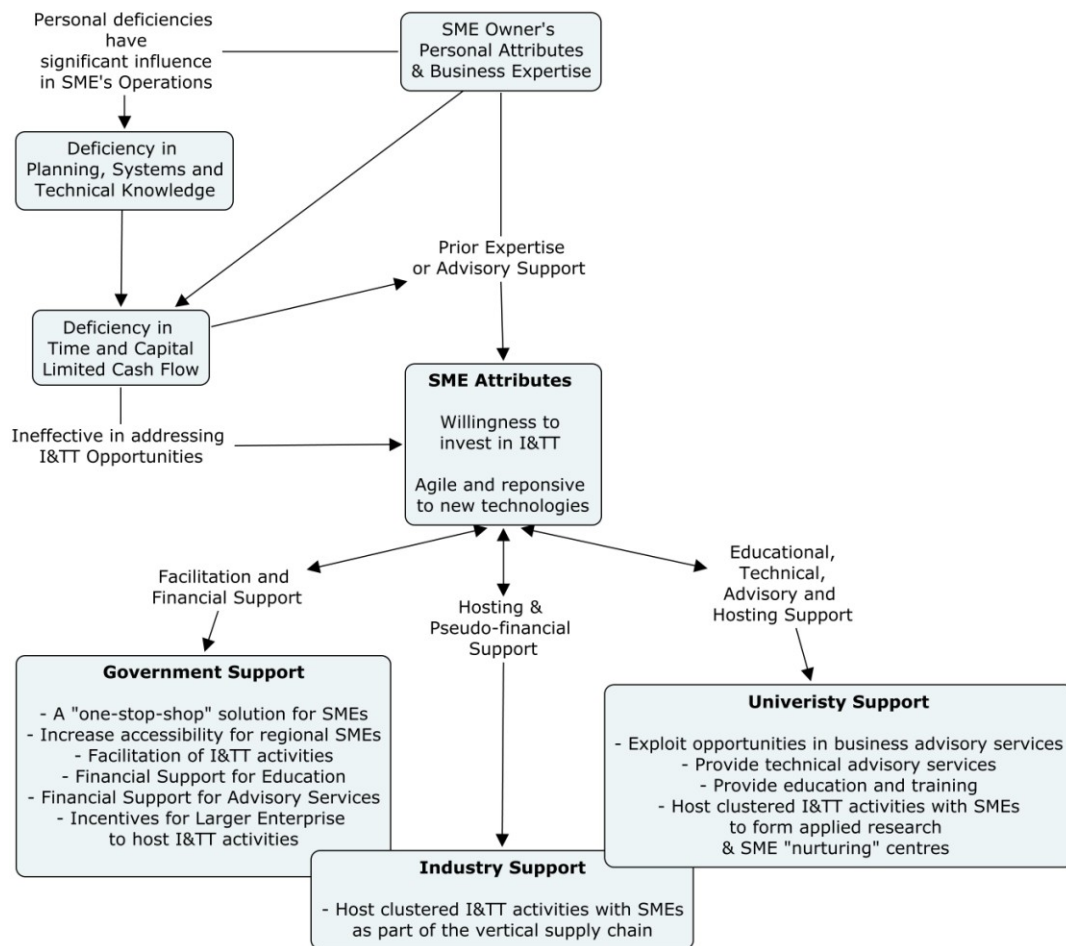
- The desirability of developing a “One-Stop-Shop” for SME support.
- Improvement of accessibility of field officers to regional areas.
- Provision of financial support for advisory/coaching services.
- Provision of financial support for education and training.
- Facilitation of establishment of vertical supply chain clusters.
- Provision of financial incentives for larger enterprises to host innovation activities with SMEs in the form of innovation clusters.

Universities and education providers could:

- Exploit opportunities in the “business coaching” market.
- Develop targeted educational/training products for SME in the form of short customized courses.
- Established technical advisory, process auditing and mentoring consultancies in collaboration with government agencies.
- Facilitate and host SMEs’ innovation activities supported by relevant government funding to form clustered applied research and SME “nurturing” centers.

This study indicates that there are some common elements, with respect to the innovation process, in the SMEs studied in prior literature. While such firms can be quite innovative in their own right, and in fact their small size can in fact be an advantage with respect to being able to quickly adopt innovations, it is clear that little use is being directly made of the knowledge and skills of universities and researchers to assist the innovation. A suggested model of this process for smaller regional firms has therefore been developed to demonstrate the dependency of the business to the owner, and the need to rely on systematic planning and organization. Such a process will require changes in the owner’s behavior and sufficient education and training, along with relevant advisory and financial support needed to improve the probability of a successful innovation experience. The model proposed here is termed “Regional Knowledge Diffusion” (RKD) model, and is illustrated in Figure 6.





**Figure 6: Regional Knowledge Diffusion (RKD) - Suggested Model for Innovation Experience in Small Regional firms**

SMEs are an important sector of the Australian economy. While not all have good success rates in innovation, especially within regional areas, they are generally receptive to opportunities to innovate and adopt new technologies to lift business growth. The innovation discourse and processes in SMEs are not easily understood and not well researched within the literature. Existing support for these processes is also not particularly suited to SMEs. The lack of time, capital and new technology knowledge may be seen as hurdle in innovation, particularly for regional SMEs. In addition, the strategy and organization that is the result of working owners being highly focused on their businesses also need to be addressed.

Innovation is driven by new products, improved productivity and efficiency within the firm, as is meeting perceived client and customer requirements. Personal goals and values (e.g., those of the firm's management, often the firm's owners) were also important drivers of the innovations reported. The innovations developed and pursued ultimately benefited the firm and, in particular, resulted in a positive perception of the firm by customers, clients and competing firms. At the same time, there was an ill-defined benefit with respect to

profitability, although the firms generally indicated that they would continue to use their key innovations. One of the important aspects in the innovation process is the transfer of research knowledge within the industry. It would appear that research knowledge is largely being received indirectly by firms through indirect sources such as industry associations and design professionals. As is considered beneficial for the results of research to be more directly accessible to the firms, and for the firms to receive direct input from universities and other research organizations, it is recommended that researchers develop closer links with the industry representatives who undertake the intermediary's role, and that universities should take a stronger role in collaborating with the firms. To this end, the "Regional Knowledge Diffusion" model has been developed as a result of this research.

### **6.3 Further work**

Future research should aim at extending this qualitative research to a more diverse group of SMEs and importantly gaining a better understanding of the value systems, across a range of industries in a range of geographical locations in Australia and elsewhere, in order to evaluate the extent of and commitment of this sector to innovation at a wider level, and to better understand how this industry sector might benefit from closer links with universities and researchers. It would also be desirable for further research to be undertaken to test the proposed RKD model to evaluate the effectiveness and the impact on the I&TT process within the Australian SME sector in regional settings.

### **6.4 Concluding remarks**

This dissertation is a cumulative journey of nearly 7 years in the making. It has been an enriching experience to say the least, learning new and foreign research methodologies, but the best rewards came when some of the recommendations put forward from this research received high praises from government representatives (at manufacturing and innovation conferences), and influenced in some form or another, the current innovation support programs (more so at the state level). The motivation and core driver of this research, that seemingly a problem too great to solve, must start with a deeper understanding of the dynamics. The persistence and patience is found wanting at time throughout this journey, but the outcomes is the betterment of the SME innovation policy development in Australia. Here's a "cheer" for the Australian manufacturing "battler". Keep innovating, never give up, and build your dreams.



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# APPENDIX 1

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12-14 November 2008, Holiday Inn, Surfers Paradise, Australia

## A Reflection in the Innovation and Technology Transfer Experience in a Regional Micro-Manufacturer: A Case Study

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### ABSTRACT

This paper provides an investigation into the innovation and technology transfer (I&TT) process in the Small-to-Medium (SME) sector within a University-Industry collaboration context. This paper provides an initial insight into the main influencing factors that affect innovation and technology transfer (I&TT) in regional micro-manufacturers. This paper explores and reflects on the innovation and technology transfer experience by embedding oneself within a micro-manufacturer. The experience initially focused on the manufacturing factors such as increasing productivity through work study and work-flow analysis, and introducing semi-automation, and flexible manufacturing methodology. However, as the project progressed, several non-manufacturing factors were identified as major influences in the I&TT process within the targeted micro-manufacturer. The ability to progress in improving the manufacturing factors is often dependent on these factors, and is categorized as personal and business related. The underlying project on which the paper is based involved a SWOT analysis on the business, learning and discovering the obstacles and barriers for I&TT, seeking and proposing ways to reduce it, and modeling the overall I&TT process within micro-manufacturers in regional areas, and termed regional knowledge diffusion (RKD) model.

**KEY WORDS:** Innovation, Technology Transfer, SME, Regional Manufacturing, Micro-Manufacturing, Regional Knowledge Diffusion.

### 1 INTRODUCTION

Most of the academic research undertaken on innovation and technology transfer (I&TT) is based on large organizations. Some of the factors that influence the performance of the I&TT process include organizational culture, government policies and support mechanism, structural framework, investment communities, IP protection, financial stability, research-industry relationships, the organization's financial profile and stability, economic and corporate environment. However, there is increasing evidence to show that the most innovative and fast growth enterprises are from the Small-to-Medium Enterprise (SME) sector, and these include small manufacturers who are operating with flexibility and innovation in niche markets within a very competitive global market place.

There is increasingly improved structural support for these small enterprises from governments at all levels. However, such programs are often unable to flow down to the micro-manufacturers (less than yearly \$2Million turnover), and access to relevant field officers for assistance are often very difficult especially within regional areas.

This poses an interesting scenario where it is often very difficult for these SME to access the available financial and non-financial assistance for their innovation and technology transfer activities.

The statistics for SME are also an interesting observation, in that business failure is a comparatively rare phenomenon. Only around 2 per cent of businesses cease operations each year because the owners, while solvent, are unable to secure a sufficient return. And less than 0.5 per cent of businesses cease operations each year due to insolvency - down significantly from the rate applying in the early 1990s. Common misperceptions about the level of business failure and the chances of survival may lead some entrepreneurs to overestimate the risk of failure, reducing their willingness to innovate [1]. Nearly half the small businesses in operation in Australia today started in the past six years and in the past decade they have provided four out of five of all the new jobs created. Small businesses employ around 40% of the workforce, and are responsible for generating around a quarter of our GDP [2]. One may argue that good ideas that have generated from SME have a low probability of developing into commercial successes though there may be more opportunities for I&TT. This is an important challenge for this nation if it was to be successful in developing a comparative advantage globally as the "clever country".

Universities have always had an interest in I&TT to industry, however, there is limited literature in demonstrating this motivation to the SME sector. Therefore, this particular case study attempts to investigate the I&TT process in the SME sector within a university-industry collaboration context.

## 2 LITERATURE REVIEW

The theoretical framework for the effects of macro environmental influences and business forces that drive enterprises are categorized into technological, economical, corporate social responsibility, political, legal and globalisation factors [3].

The literature review highlighted several theories proposing that firms need to continuously innovate, adapt and improve on existing technologies, in order to it to exist, compete and grow. And organisations that are best leveraged to evolutionary nature of technology, the better its performance will be. This is supported by Moncrief & Cravens [4] where technology is changing markets and buyer's preference, and organizations that are market driven and leverage technologies can provide for better market growth and performance. Agnihotri, Sivasubramaniam & Simmons [5] further supported this theory in that organization can achieve superior customer service by focusing on creating new service strategies that leverage the value of information technology.

There is also a need to develop a systematic approach to review an organization's ability not just to innovate but create value through innovation. It is important not to view innovation in isolation but as an integral part of any business strategy. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and its structure. Also, the effective benefits, market and profit performance that technology innovation delivers tend to be hard to measure and are often underestimated, and therefore create a disincentive to invest in innovation.

Technological change is one of the significant influences on business enterprises, in which companies die and emerge from every evolutionary technological innovation. Hill & Rothaermel [6] provided a theoretical platform in that technology discontinuity does affect the performance of the incumbent firm, but that some firms some adapt and improve their performance, and some get ahead of the change and exploit the new technology and experience sustained performance. Macher & Richman [7] have complemented this theory that firms tend to restructure and develop new strategies in pursuing a new technology in response to "discontinued" technologies. They have also found that certain organizational strategies are more appropriate for particular stages of the innovation life cycle. There is a common theme emerging that firms need to continuously innovate, adapt and improve on existing technologies, in order to it to exist, compete and grow.

Dillon, Lee & Matheson [8] proposed that technology and R&D are insufficient to create value and wealth when used in isolation, and that current business practices fail to support the activities crucial to value innovation. There is a need to develop a systematic approach to review an organization's ability not just to innovate but create value through innovation. Orr & Sohal [9] complemented this key theory by using a German example of successfully managed technology transfer from home country to overseas productions, which delivered superior quality and competitive advantage, and indirectly provided an entry and presence in the respective market. They also demonstrated that managing innovation process is not only about creating new ideas and gadgets, but forms part of a holistic business strategy to enable it to ensure its sustainability as a business enterprise. It is important not to view innovation in isolation but as an integral part of any business strategy, which may take into account other factors proposed in Zhuang [10] where the composition of an organization in terms of

gender, age, industry type, and management level can influence its ability to devise and implement business strategies that focus on innovation. This theme is further supported by Roberts & Amit [11] in proposing the view that innovative activity that are differentiated from industry norms tends to deliver superior performance, where the successful firm has focused on a point of differentiation as their competitive advantage.

There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and its structure. This theory is highlighted Zhuang [10], and also Gyampoh-Vidogah & Moreton [12], where the construction industry has always been a collaborative business environment; however, the corporate or collaborative information technology framework is lacking as the result of the culture that dictates each individual function maintains total independence in all respects including information. Also, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and often underestimated, and therefore create a disincentive to invest in innovation. Also, Zhu [13] has demonstrated that where the impact of IT as a tool for e-commerce, profit performance and its value is underestimated, there may not be enough financial justification to invest in IT, which in turn may not reap the full benefit of e-commerce.

University-industry collaboration has always been a mechanism for I&TT. MacPherson [14] examined the academic-industry linkages and small firm innovation in the scientific instruments sector, and found data from a sample of 204 SME in the New York State region that suggest that university can play a helpful role in SME innovation. Knowledge spillovers from the academic sector are shown to be geographically localized. A key finding is that the intensity of academic-SME interaction varies inversely with the time-distance that separates firms from major campuses; and innovation rates are higher among SMEs that enjoy close proximity to academic resources.

Freel [15] expanded linkage collaboration further by examining external linkages and product innovation in small manufacturing firms. Based on a sample of 228 small West Midlands' manufacturers in the UK, this study found that innovators are making greater use of external linkages, of a certain types and in a particular direction (predominately in vertical value chain linkages). It is observed that the data suggested the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration.

It is with this view that a regional university such as USQ can be a channel for I&TT for SME within its geographical proximity. This case study provide an initial investigation to further examine this concept.

## 3 METHODOLOGY

This case study aims to explore and reflect on the I&TT experience of a regional micro-manufacturer through embedding oneself within the firm, in an analogy to an anthropological study. The case study involved learning and discovering the obstacles and barriers for I&TT, seeking and proposing ways to reduce them, and improving the overall I&TT process within micro-manufacturers in regional areas, and termed regional knowledge diffusion (RKD) model.

During the experience, the academic embedded within the firm provided advice and analysis, and at times, physical labor on the

process transformation for the micro-manufacturing firm via process improvements, semi-automation, and systemization of the business operation, and in the process initiated preliminary study into the I&TT process in regional micro-manufacturing sector.

### 3.1 System Approach

The approach to the overall case study is separated into the different components:

- Study of the Business & Working Owner
- Study of the Manufacturing Processes
- Study of the I&TT Process

Though the authors acknowledge the importance of the technical aspects and outcomes of this case study (such as the work study analysis), it is not the intention of the paper to address these, but rather to focus on the I&TT experiences to gain an understanding of the influencing factors that affects it.

### 3.2 Background of the firm

The firm was founded and owned by an individual based in around the regional township of Pittsworth (located 50 km south-west from Toowoomba). The operation started off as a commercial flower growing business focusing on organic and medicinal herbs. Now, it specializes in and manufactures a range of high-quality organic/pure “chemical-free” soap & shampoo and skin care products. The business has been in operation for about 10 years. Along with a good domestic distribution, it also exports to NZ, UK and Asia. The products that it manufactures are varied and are shown in Figure 1:

- Soap-based products (over 200)
- Hair care products
- Skin care products
- Natural “Bush” products
- Medicinal based products
- Miscellaneous products (e.g. Hemp)

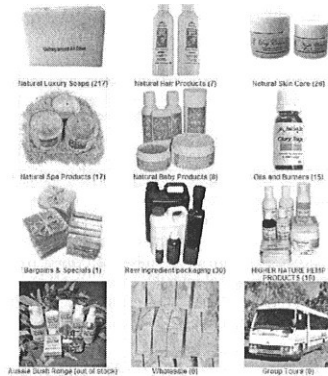


Figure 1. Variety of products manufactured including factory tour

## 4 FINDINGS & DISCUSSIONS

The findings from the overall study are categorized into 3 segments:

- Study of the business & working owner

- Study of the manufacturing processes
- Study of the I&TT process

### 4.1 Study of the Business & Working Owner

A SWOT Analysis was performed on the perceived strengths (Table 1), weaknesses (Table 2), opportunities (Table 3) and threats (Table 4) of the business. This information was collected from interviews and observation on the business and the working owner.

Table 1: SWOT Analysis - Strength

Strengths	
-	patented recipes and processes
-	knowledge of soaps
-	great ideas generation
-	innovative products and processes
-	willingness to try new things
-	soaps with “healing” properties
-	choice and range – customer buy more / impressive
-	quality of product is high and well regarded
-	affordable prices mean volume is growing

It was observed that there is a comparative advantage in its niche high-quality product specializations and its willingness to innovate and its perceived intellectual properties (owner’s knowledge on soap making). Though the broad range of products was seen as a strength (to the customers), without systems, manufacturing a wide range of products can be a difficult logistic exercise, and this was observed during operations. It may also present a case for market confusion for the consumer with the wide choices.

It was observed the weaknesses are many, and presented a challenge for the process transformation task. Interestingly, many of the perceived weaknesses are related to the owner’s personal attributes and an intrinsic tie to the business and the manufacturing processes. This can be solved by leveraging the working owner from the operation (to work on the business not in the business), and instilling systems and good practices within the operations. However, time and money (the lack of it) are the major source of weaknesses, and addressing this needs external sources of support such as government agencies (subsidies and innovation grants) or larger enterprises (that form a vertical supply chain).

Table 2: SWOT Analysis - Weakness

Weaknesses	
-	too much control over distribution (IP & territory protection)
-	too many ideas
-	try too many things
-	without strategic plan/focus
-	ad hoc action / putting out bushfires
-	knowledge of current industry processes / benchmarking
-	lack of systems
-	staff training
-	staff recruitment / retentions
-	non-std orders / batches / sizes
-	cost structure – high labor + freight + distance + volume sourcing of material
-	money / time
-	pricing calculation for orders
-	creativity / personality
-	selling wholesale prices
-	luxury bar affordable prices
-	Quality of product – no compromise cost is high
-	Aesthetic of soaps and labeling

- Prevent from growing as the result of thin margin
- Under priced / locked in from the beginning
- Health care product higher margin / not visible e.g. labeling
- Order quantities are small
- Growing business through personal referral / markets / shows
- regional area

It is observed that there were a number of opportunities can be taken without incurring large capital cost or expenses. Most of the recommendations for the process transformation derived from this observation. One aspect is to focus on decreasing manufacturing cost, both in overheads and unit costs; the other aspect is to specifically target major distribution channels, and consolidate product range to address this wholesale market.

Table 3: SWOT Analysis - Opportunities

Opportunities	- cost saving through system implementation + process improvement
	- increase margin by decreasing manufacturing cost
	- more focus business strategy i.e. manufacturing + outsource marketing/promotion
	- export opportunities / overseas plant
	- potential to market as healing properties, buy for that purpose
	- create new product range – create additional volume
	- consolidate existing product range
	- potential export market to Dubai, China, Japan, Mexico, US

It was observed that the perceived threats were related to macro-environmental factors such as raw material price increases, increase global competition, increased labor costs etc, and this is well supported by literature. However, one interesting view is tied to the owner's personal attributes, as discussed previously.

Table 4: SWOT Analysis - Threats

Threats	- Copy cats + highly competitive environment
	- Pricing from similar products
	- Intellectual properties infringement
	- Must grow quickly else left behind
	- Price increases – wages, material cost, fuel/freight, electricity, insurances
	- Personality – control freak, delegate well, share recipe
	- Pricing are fixed and low margin, fixed to wholesale prices
	- affordable prices mean volume is growing

The SWOT analysis provided an initial understanding of the business to progress to the process transformation stages. Specific areas from the findings are addressed, such as the decreasing manufacturing costs, product consolidation, instilling systems and procedure and less reliant on the working owner for day-to-day operations. However, the findings also indicated that one of the biggest hurdles for the business is the lack of **time** and **capital**, and presented a challenge to the transformation tasks and achieving I&TT objectives.

#### 4.2 Study of the Manufacturing Processes

The study of the manufacturing processes encompassed an initial

familiarization of the basic soap making processes, categorized the firm's soap manufacturing line, and then engaged in the process transformation resulting in key findings and recommendations.

##### 4.2.1 Basic Soap Making Processes

The basic soap making processes are:

- Cold process
- Melt & Pour
- Hot process
- Rebatching

The most common type is the "Cold Process" soap which the firm has adopted as the process used in the manufacturing of its main line of soaps. It is made by combining fatty acids and sodium hydroxide (lye) together. Fatty acids can be almost any oil – from beef tallow to olive oil to hemp oil. In simple terms, this process combines a proportion of lye (sodium hydroxide) and water with fatty acids, resulting in a chemical reaction called "saponification." During saponification, the oils and lye mix and becomes soap.

One competitive advantage the firm has over other commercial soap manufacturers are in its superior ingredients. It contains organic herb, oil, distilled water, real fruits, vegetable, rice/nut oils, jojoba & macadamia wax, vegetable glycerin. It does not use any sodium laurel sulphate, propylene glycol, parabens, peanut oil as common in ingredients in commercial soaps.

##### 4.2.2 The Firm's Soap Manufacturing Line

The soap manufacturing line is composed of an "L" shape configuration as described in Figure 2 encompassing the following processes:

- Mixing of lye and fatty acids
- Luxury Bars Making
- Fun Soaps Making
- Soap Cutting / Slicing
- Saponication/Drying
- Packaging
- Storage

These manufacturing elements are analyzed with data collected (through work study) with the view to improve the manufacturing operation to decrease manufacturing costs and increase production output.

##### 4.2.3 Approach to the Process Transformation

The approach to the process transformation are mainly through analyzing the processes with data collected (video recording of the individual manufacturing elements), and applying work study principles to evaluate and seek increase productivity and improvements in output quality and quantity. This approach is described below:

###### 1) Background Studies

- Understand the business and manufacturing processes including soap making techniques.
- Understand the soap/skincare industry on a macro and micro basis.
- Observe the manufacturing processes
- Plan project schedule

- Determine research methodologies to be used

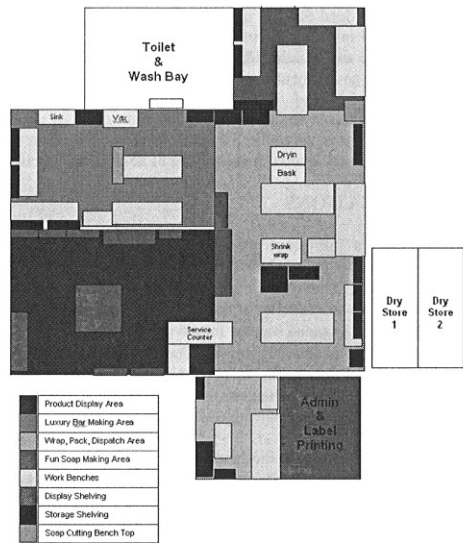


Figure 2. Existing layout of the manufacturing facility

#### 2) Preliminary Analysis

- Interview the Owner and employees regarding the business and manufacturing processes
- Perform SWOT analysis based on the information gathered from interviews
- Outline process transformation required from SWOT

#### 3) Data Collection & Analysis

- Record videos of the manufacturing processes to be improved by work-study analysis.
- Re-arrange layout of manufacturing plant to be re-arranged for flow optimization.
- Identify key manufacturing process for semi-automation.
- Identify suitable technology transfer for the manufacturing processes

#### 4) Recommendations & Comprehensive Report

- Draft comprehensive report including full recommendations.

#### 4.2.4 Key Process Transformation Findings

It was determined that the manufacturing costs and unit cost are comparatively high as the result of high labor utilization. The solution desired was to decrease the direct manufacturing cost by optimizing factory layout and introduce semi-automation into some processes. The project initially targeted to increase the production rate of Luxury bars from 800 to 3000 bars in an eight hour day with minimal investment needed.

In detail, the findings from the process transformation are to:

- Improve workstations layouts
- Decrease manual handling in the manufacturing
- Semi-automate manufacturing processes
- Decrease transfer between workstation
- Reposition and increase storage space

It was also determined during the discussion and analysis that there were inadequate distribution channels and poor marketing strategies, mainly attributed to the time limitation from the demand of being a full-time working owner. The solution desired was to identify and successfully recruit two major and two minor distribution channels to establish sales consistency and volume. As part of the process, it was also envisaged that there would be consolidation of selected products into a "high-volume" product range to assist in forming a suitable "high-volume" wholesale marketing strategy.

In general terms, it was observed that there are three critical deficiencies within the firm which commonly are endemic within the SME sector in Australia. These are:

- Lack of planning and organization
- Lack of systems and procedures (or lack the training of personnel)
- Lack of expert input into structures and technologies

This is perhaps an area where academic-industry collaboration can take place, where university resources can be provided for a government-subsidized fee to enhance SMEs in their planning, establish systems, and provide I&TT advice. In some ways, there is adequate anecdotal evidence to suggest that the **business coaching industry** that has been established to fill this gap has gained popular demand from the SME sector.

#### 4.2.4 Recommendations for the Process Transformation

There were two separate complementary recommendations, one aimed at the process transformation and the other into improving the distribution channel, these are categorized into 6 stages and are listed below:

##### Manufacturing Improvements

- Layout design improvements (Flow Optimization & Storage)
- Manufacturing process improvements via semi-automation (Soap Cutting, Labeling & Packaging, Soap Preparation/Mixing)

Stage 1: Layout optimization

Stage 2: Soap Cutting productivity

Stage 3: Semi-automate Labeling & Packaging

Stage 4: Soap preparation/mixing

##### Distribution Improvements

- Consolidation of product range to target the "high-volume" wholesale market.

Stage 5: Standardize and streamline products and procedures

Stage 6: Establish 2 major and 2 minor distribution channels

#### 4.2.5 Implementation Example - Stage 1

Figure 3 shows how part of Stage 1 has been implemented to optimize the layout of the manufacturing plant to decrease the

associated problems with manual handling and storage. The technical aspects and outcomes of this case study are not the focus for this case study therefore is not expounded further in this paper.

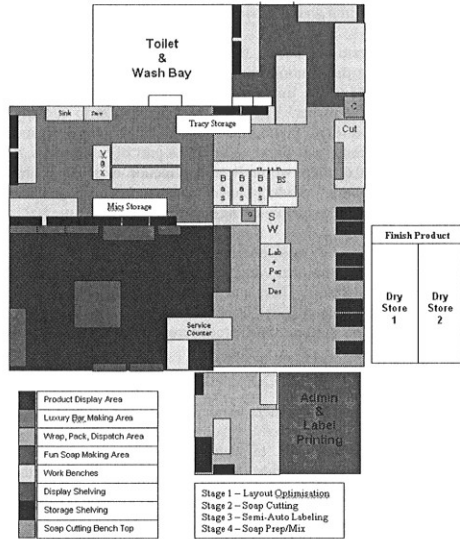


Figure 3. Reconfigured layout of the manufacturing facility incorporating the recommended process enhancements

#### 4.3 Study of the I&TT Process

The study of the I&TT process involved the identification of factors influencing the I&TT process, and these are listed below, categorized as internal and external factors:

##### Internal Factors

- Lack time & money
- Inadequate external support
- Lack systematic Approach
- Lack planning & monitoring
- Adhoc approach

##### External Factors

- External support is crucial and provide an avenue for I&TT
- Government agencies have the grants/funds for I&TT but lack suitable delivery for regional enterprises; need to restructure for regional SME
- There is opportunity for universities to exploit; provide education, advice and structured I&TT (similar to business coaching services)
- Customers and Suppliers can be a good source of I&TT
- Employees and Owners need I&TT training
- Larger enterprises can act as a conduit for vertical supply chain I&TT (act as innovation host and pseudo-financier)

It can be argued that the major hurdle for the successful I&TT hinge on the specific owner's attributes and ability to systematically plan, implement and monitor the business environment and its operations. It is also acknowledged that the major hurdle is the lack of capital and time to reinvest into I&TT, even though SMEs are perceived as the most responsive and agile to I&TT opportunities. This then points to the abilities of government agencies to support such SMEs through targeted financial and facilitation support, collectively with universities (who have the knowledge base and resources to advice). An addition to this is the ability of larger enterprises to form vertical supply chain clusters involving the hosting of SMEs' I&TT activities.

#### 5 IMPLICATIONS

The implication for government agencies and relevant policy development for the regional SME sector are to:

- Develop "One-Stop-Shop" for SME support.
- Improve accessibility of field officers in regional areas.
- Provide financial support for advisory/coaching services.
- Provide financial support for education and training.
- Facilitate the establishment of vertical supply chain clusters
- Provide financial incentives for larger enterprises to host I&TT activities with SMEs.

The implications for universities and education providers are to:

- Exploit opportunities in the "business coaching" market.
- Develop targeted educational/training products for SME in the form of short customized courses.
- Established technical advisory, process auditing and mentoring consultancies in collaboration with government agencies.
- Be one of the hosts for SMEs' I&TT activities supported by relevant government funding to form clustered applied research and SME "nurturing" centers.

From the implications above, a suggested model of the I&TT experience in regional micro-manufacturers is established to demonstrate the intrinsic dependency of the business to the owner, and the need to rely on systematic planning and organization. This required change in owner's behavior and sufficient education/training along with relevant advisory and financial support are needed to improve the probability of successful I&TT experience. The overall I&TT process within micro-manufacturers in regional areas is modeled, and termed "regional knowledge diffusion" (RKD) model, and is illustrated in Figure 4 below.



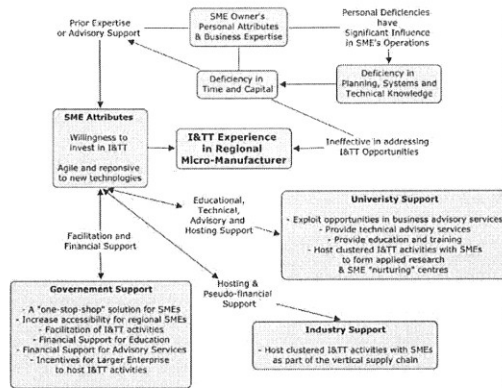


Figure 4. Suggested Model for I&TT Experience in Regional Micro-Manufacturing SMEs; Regional Knowledge Diffusion (RKD)

## 6 CONCLUSIONS

SMEs are an important sector of the Australian economy. They have relatively low success rates in innovation, especially within regional areas. However, They are generally receptive to opportunities to innovate and adopt new technologies to lift business growth. SME's I&TT processes are not easily understood and not well researched within the literature. Existing I&TT support is not particularly suited to SMEs. The lack of time, capital and new technology knowledge are seen as hurdles for regional SMEs. And the lack of strategy and organization mostly attributed to the working owner's personal attributes are also needs to be addressed. It can be argued that having better capitalization and planning can "buy" more time to investigate new technologies, and thus heighten the probability of successful I&TT activities. There is some evidence to show that seasoned executives starting their own SME have a better success rate because of their ability to plan and implement systems with adequate capitalization of the business. However, most individual SMEs would need some form of external advisory and mentoring support, and industry support and government agencies have an important role to play in the I&TT process to be an accessibility conduit, facilitators and pseudo-financiers. Overall, this I&TT experience has been personally rewarding. It has been a joy to mentor a regional micro-manufacturer.

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# APPENDIX 2

Goh, S. & Thorpe, D. (2008) *An Investigation into the Innovation and Technology Transfer Process in SME Sector within a University-Industry Collaboration Context*, Asian International Journal of Science and Technology, Vol. 1, No. 2, pp1-10, ISSN # 1906-151X.

Asian International Journal of Science and Technology in Production and Manufacturing (2008) Vol. 1, No. 2 , pp. 1-10

## An Investigation into the Innovation and Technology Transfer Process in the SME sector within a University-Industry Collaboration Context

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### Abstract

*This paper provides an initial insight into the main influencing factors that affect innovation and technology transfer (I&TT) in regional micro-manufacturers, and describes an investigation into the I&TT process in the Small-to-Medium Enterprise (SME) sector within a University-Industry collaboration context. In doing so, it explores and reflects on the innovation and technology transfer experience within a micro-manufacturer, obtained through embedment of one of the authors in an SME firm. The research initially focused on the manufacturing factors such as increasing productivity through work study and work-flow analysis, and introducing semi-automation and flexible manufacturing methodology. As the project progressed, however, several non-manufacturing factors were identified as major influences in the I&TT process within the targeted micro-manufacturer. The ability for firms to progress in improving the manufacturing factors is often dependent on these factors, which are categorized as personal and business related. The underlying project on which the work described is based involved a SWOT analysis on the business, learning and discovering the obstacles and barriers for I&TT, seeking and proposing ways to reduce it, and modeling the overall I&TT process within micro-manufacturers in regional areas, and termed regional knowledge diffusion (RKD) model.*

### Key Words:

*Innovation, Technology Transfer, SME, Regional Manufacturing, Micro-Manufacturing, Regional Knowledge Diffusion.*

## 1 INTRODUCTION

Most of the academic research undertaken on innovation and technology transfer (I&TT) is based on large organizations. Some of the factors that influence the performance of the I&TT process include organizational culture, government policies and support mechanism, structural framework, investment communities, IP protection, financial stability, research-industry relationships, the organization's financial profile and stability, economic and corporate environment. However, there is increasing evidence to show that the most innovative and fast growth enterprises are from the Small-to-Medium Enterprise (SME) sector, and these include small manufacturers who are operating with flexibility and innovation in niche markets within a very competitive global market place.

There is increasingly improved structural support for these small enterprises from governments at all levels. However, such programs are often unable to flow down to the micro-manufacturers (less than yearly \$2Million turnover), and access to relevant field officers for assistance are often very difficult especially within regional areas.

This poses an interesting scenario where it is often very difficult for these SMEs to access the available financial and non-financial assistance for their innovation and technology transfer activities. Because they are dependent on cash flow from existing operations as their innovation funding source [1], the incentives for SMEs to invest in innovation are diminished.

The statistics for SMEs are also interesting, in that business failure is a comparatively rare phenomenon. Only around 2 per cent of SME businesses cease operations each year because the owners, while

solvent, are unable to secure a sufficient return. And less than 0.5 per cent of businesses cease operations each year due to insolvency - down significantly from the rate applying in the early 1990s. Common misperceptions about the level of business failure and the chances of survival may lead some entrepreneurs to overestimate the risk of failure, and thus reducing their willingness to innovate [2].

Nearly half the small businesses in operation in Australia today started in the past six years and in the past decade they have provided four out of five of all the new jobs created. Small businesses employ around 40% of the workforce, and are responsible for generating around a quarter of our gross domestic product (GDP) [3]. One may argue that good ideas that have been generated by SMEs have a low probability of developing into commercial successes although there may be more opportunities for I&TT. This is an important challenge for this nation if it was to be successful in developing a comparative advantage globally as the "clever country". Dr Michael Schaper, a deputy chairman at the Australian Competition and Consumer Commission noted that even a small increase in innovation intensity in SMEs would have significant flow-on effect given the sector provides a significant employment and economic activity [1].

Innovation in SMEs is often poorly understood, in that it is often a messy, unpredictable process that is hard for SMEs to manage effectively. Innovation effort can also see attention diverted from the core business and operations. Relative risks are higher because there are fewer margins for errors in SME. The "portfolio of experiment" approach has great merit in larger companies with surplus cash flow, stronger balance sheets and excess staff, but it is not suited for SMEs. The core problem in Australia at the moment is there is too much talk about innovation and not enough action [1]. SMEs want more

practical, cost effective ways to maintain or increase their innovation intensity.

There is evidence to date that governments are acting to enhance the innovation intensity in SMEs. For example, government agencies at the state and federal levels have always been trying to improve the innovation outcomes from industry, and in recent cases, in the SME sector. The establishment of the \$251 million "Enterprise Connect" federal program is designed to provide small and medium enterprises with access to practical advice and mentoring. According to Senator Kim Carr [4], the 10 Enterprise Connect centers to be opened around Australia will provide businesses with confidential mentoring and support, to gain access to a range of government and non-government services including business planning, prototype development, grant applications and advice regarding human resources. It is based on similar programs which have proved successful in Ireland and the UK.

Universities have always had an interest in I&TT to industry. However, there is limited literature available to demonstrate this motivation to the SME sector. Therefore, this particular case study attempts to investigate the I&TT process in the SME sector within a university-industry collaboration context.

## 2 LITERATURE REVIEW

The theoretical framework for the effects of macro environmental influences and business forces that drive enterprises are categorized into technological, economical, corporate social responsibility, political, legal and globalization factors [5].

The literature review highlighted several theories proposing that firms need to continuously innovate, adapt and improve on existing technologies, in order to exist, compete and grow. The better organizations are leveraged to the evolutionary nature of technology, the better their performance will be. This is supported by Moncrief & Cravens [6] where technology is changing markets and buyer's preference, and organizations that are market driven and leverage technologies, can provide better market growth and performance. Agnihothri, Sivasubramaniam & Simmons [7] further supported this theory, in that organizations can achieve superior customer service by focusing on creating new service strategies that leverage the value of information technology.

There is also a need to develop a systematic approach to review an organization's ability not just to innovate but to create value through innovation. It is important not to view innovation in isolation but as an integral part of any business strategy. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and its structure. Also, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and are often underestimated, and therefore create a disincentive to invest in innovation.

Technological change is one of the significant influences on business enterprises, and companies die and emerge from every evolutionary technological innovation. Hill & Rothaermel [8] provided a theoretical platform in that technology discontinuity does affect the performance of the incumbent firm, but that some firms some adapt and improve their performance, and some get ahead of the change and exploit the new technology and experience sustained performance. Macher & Richman [9] have complemented this theory that firms tend to restructure and develop new strategies in pursuing a new technology in response to "discontinued" technologies. They have also found that

certain organizational strategies are more appropriate for particular stages of the innovation life cycle. There is a common theme emerging that firms need to continuously innovate, adapt and improve on existing technologies, in order to it to exist, compete and grow.

Dillon, Lee & Matheson [10] proposed that technology and R&D are insufficient to create value and wealth when used in isolation, and that current business practices fail to support the activities crucial to value innovation. There is a need to develop a systematic approach to review an organization's ability not just to innovate but to create value through innovation. Orr & Sohal [11] complemented this key theory by using a German example of successfully managed technology transfer from home country to overseas productions, which delivered superior quality and competitive advantage, and indirectly provided an entry and presence in the respective market. They also demonstrated that managing the innovation process is not only about creating new ideas and gadgets, but also that it forms part of a holistic business strategy to enable the firm to ensure its sustainability as a business enterprise. It is important not to view innovation in isolation but as an integral part of any business strategy, which may take into account other factors proposed in Zhuang [12]; where the composition of an organization in terms of gender, age, industry type, and management level can influence its ability to devise and implement business strategies that focus on innovation. This theme is further supported by Roberts & Amit [13] in proposing the view that innovative activity that is differentiated from industry norms tends to deliver superior performance, in which the successful firm has focused on a point of differentiation as its competitive advantage.

There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and firm structure. This theory is highlighted by Zhuang [12], and also Gyampoh-Vidogah & Moreton [14], where the construction industry has always been a collaborative business environment; however, the corporate or collaborative information technology framework is lacking as the result of the culture that dictates each individual function maintains total independence in all respects including information. Also, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and often underestimated, and therefore create a disincentive to invest in innovation. Also, Zhu [15] has demonstrated that where the impact of IT as a tool for e-commerce, profit performance and its value is underestimated, there may not be enough financial justification to invest in IT, which in turn may not reap the full benefit of e-commerce.

University-industry collaboration has always been a mechanism for I&TT. MacPherson [16] examined the academic-industry linkages and small firm innovation in the scientific instruments sector, and found data from a sample of 204 SME in the New York State region that suggest that the university can play a helpful role in SME innovation. Knowledge spillovers from the academic sector are shown to be geographically localized. A key finding is that the intensity of academic-SME interaction varies inversely with the time-distance that separates firms from major campuses; and innovation rates are higher among SMEs that enjoy close proximity to academic resources.

Freel [17] expanded linkage collaboration further by examining external linkages and product innovation in small manufacturing firms. Based on a sample of 228 small West Midlands manufacturers in the UK, this study found that innovators are making greater use of external linkages, of a certain type and in a particular direction (predominately in vertical value chain linkages). It is observed that the

data suggested the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration.

Undertaking innovation is not always about taking significant risks and launching new products. Other strategies such as incremental process innovation (doing things more efficiently), and customer service innovation can be very important. In their book "Winning Through Innovation", Michael Tushman and Charles O'Reilly illustrate the innovation process as "ambidextrous" organizations juggling several balls at once: incremental innovation, architectural (reconfiguration of existing products for different markets), and discontinuous innovation (the big leap that reshapes industries and create new ones) [18].

It is with this view that a regional university such as USQ can be considered a channel for I&TT for SME within its geographical proximity. This case study provides an initial investigation to further examine this concept.

### 3 METHODOLOGY

The case study described in this paper aims to explore and reflect on the I&TT experience of a regional micro-manufacturer through embedment of one of the authors in a particular firm, in an analogy to an anthropological study. The case study involved learning and discovering the obstacles and barriers for I&TT, seeking and proposing ways to reduce them, and improving the overall I&TT process within micro-manufacturers in regional areas, through a process which is termed the Regional Knowledge Diffusion (RKD) model.

During the experience, the researcher embedded within the firm provided advice and analysis, and at times, physical labor on the process transformation for the micro-manufacturing firm via process improvements, semi-automation, and systemization of the business operation, and in the process initiated preliminary study into the I&TT process in regional micro-manufacturing sector.

#### 3.1 System Approach

The approach to the overall case study is separated into the different components:

- Study of the Business & Working Owner
- Study of the Manufacturing Processes
- Study of the I&TT Process

Though the authors acknowledge the importance of the technical aspects and outcomes of this case study (such as the work study analysis), it is not the intention in this paper to address these, but rather to focus on the I&TT experiences to gain an understanding of the influencing factors that affects it.

#### 3.2 Background of the firm

The firm was founded and owned by an individual based at the regional township of Pittsworth (located 50 km south-west from Toowoomba in Queensland, Australia). The operation started off as a commercial flower growing business focusing on organic and medicinal herbs. Now, it specializes in and manufactures a range of high-quality organic/pure "chemical-free" soap & shampoo and skin care products. The business has been in operation for about 10 years. Along with a good domestic distribution, it also exports to New Zealand, the United Kingdom and Asia. The products that it

manufactures are varied and are shown in Figure 1:

- Soap-based products (over 200)
- Hair care products
- Skin care products
- Natural "Bush" products
- Medicinal based products
- Miscellaneous products (e.g. Hemp).



Figure 1. Variety of products manufactured including factory tour

### 4 FINDINGS & DISCUSSIONS

The findings from the overall study are categorized into 3 segments:

- Study of the business & working owner
- Study of the manufacturing processes
- Study of the I&TT process

#### 4.1 Study of the Business & Working Owner

A SWOT Analysis was performed on the perceived strengths (Table 1), weaknesses (Table 2), opportunities (Table 3) and threats (Table 4) of the business. This information was collected from interviews and observation on the business and the working owner.

Table 1: SWOT Analysis - Strength

Strengths	
	- patented recipes and processes
	- knowledge of soaps
	- great ideas generation
	- innovative products and processes
	- willingness to try new things
	- soaps with "healing" properties
	- choice and range – customers buy more / impressive
	- quality of product is high and well regarded
	- affordable prices mean volume is growing

It was observed that there is a comparative advantage in the firm's niche high-quality product specializations, and its willingness to innovate and its perceived intellectual properties (owner's knowledge on soap making). Though the broad range of products was seen as a strength (to the customers), without systems, manufacturing a wide range of products can be a difficult logistic exercise, and this was observed during operations. It may also present a case for market confusion for the consumer with the wide choices.

It was observed the weaknesses are many, and presented a challenge for the process transformation task. Interestingly, many of the perceived weaknesses are related to the owner's personal attributes and an intrinsic tie to the business and the manufacturing processes. This can be solved by leveraging the working owner from the operation (to work on the business not in the business), and instilling systems and good practices within the operations. However, time and money (the lack of it) are the major source of weaknesses, and addressing this lack of money needs external sources of support such as government agencies (subsidies and innovation grants) or larger enterprises (that form a vertical supply chain).

Table 2: SWOT Analysis - Weakness

Weaknesses	- too much control over distribution (IP & territory protection)
	- too many ideas
	- try too many things
	- without strategic plan/focus
	- adhoc action / putting out bushfires
	- knowledge of current industry processes / benchmarking
	- lack of systems
	- staff training
	- staff recruitment / retentions
	- non-standard orders / batches / sizes
	- cost structure – high labor + freight + distance + volume sourcing of material
	- money / time
	- pricing calculation for orders
	- creativity / personality
	- selling wholesale prices
	- luxury bar affordable prices
	- quality of product – no compromise - cost is high
	- aesthetic of soaps and labeling
	- prevented from growing as the result of thin margins
	- under priced / locked in from the beginning
	- health care product higher margin / not visible e.g. labeling
	- order quantities are small
	- growing business through personal referral / markets / shows
	- regional area

It was observed that a number of opportunities could be taken without incurring large capital cost or expenses. Most of the recommendations for the process transformation derived from this observation. One aspect is to focus on decreasing manufacturing cost, both in overheads and unit costs; the other aspect is to specifically target major distribution channels, and consolidate product range to address this wholesale market.

Table 3: SWOT Analysis - Opportunities

Opportunities	- cost saving through system implementation + process improvement
	- increase margin by decreasing manufacturing cost
	- more focus to business strategy i.e. manufacturing + outsource marketing/promotion
	- export opportunities / overseas plant
	- potential to market as healing properties, buy for that purpose
	- create new product range – create additional volume
	- consolidate existing product range
	- potential export market to Dubai, China, Japan, Mexico, US

It was observed that the perceived threats were related to macro-environmental factors such as raw material price increases, increased global competition, increased labor costs etc, and this is well supported by the literature. However, one interesting view is tied to the owner's personal attributes, as discussed previously.

Table 4: SWOT Analysis - Threats

Threats	- copy cats + highly competitive environment
	- pricing from similar products
	- intellectual properties infringement
	- must grow quickly else left behind
	- price increases – wages, material cost, fuel/freight, electricity, insurances
	- personality – control freak, delegate well, share recipe
	- pricing is fixed
	- low margins, fixed to wholesale prices
	- affordable prices mean volume is growing

The SWOT analysis provided an initial understanding of the business to progress to the process transformation stages. Specific areas from the findings; such as the decreasing manufacturing costs, product consolidation, installing systems and procedure and less reliance on the working owner for day-to-day operations; were addressed. However, the findings also indicated that one of the biggest hurdles for the business is the lack of **time** and **capital**, and presented a challenge to the transformation tasks and achieving I&TT objectives.

#### 4.2 Study of the Manufacturing Processes

The study of the manufacturing processes encompassed an initial familiarization of the basic soap making processes, categorization of the firm's soap manufacturing line, and then engagement in the process transformation, resulting in key findings and recommendations.

##### 4.2.1 Basic Soap Making Processes

The basic soap making processes are:

- Cold process
- Melt & Pour
- Hot process
- Rebatching

The most common type is the "Cold Process" soap which the firm has adopted as the process used in the manufacturing of its main line of soaps. It is made by combining fatty acids and sodium hydroxide (lye) together. Fatty acids can be almost any oil – from beef tallow to olive oil to hemp oil. In simple terms, this process combines a proportion of lye (sodium hydroxide) and water with fatty acids, resulting in a chemical reaction called "saponification." During saponification, the oils and lye mix and becomes soap.

One competitive advantage the firm has over other commercial soap manufacturers are in its superior ingredients. They contain organic herb, oil, distilled water, real fruits, vegetable, rice/nut oils, jojoba & macadamia wax, vegetable glycerin. The firm does not use any sodium laurel sulphate, propylene glycol, parabens, or peanut oil; as is common in ingredients in commercial soaps.

##### 4.2.2 The Firm's Soap Manufacturing Line

The soap manufacturing line is composed of an “L” shape configuration as illustrated in Figure 2, encompassing the following processes:

- Mixing of lye and fatty acids
- Luxury Bars Making
- Fun Soaps Making
- Soap Cutting / Slicing
- Saponication/Drying
- Packaging
- Storage

These manufacturing elements were analyzed with data collected (through work study) with the view to improve the manufacturing operation to decrease manufacturing costs and increase production output.

#### 4.2.3 Approach to the Process Transformation

The approach to the process transformation was mainly through analyzing the processes with data collected (video recording of the individual manufacturing elements), and applying work study principles to evaluate and seek increased productivity and improvements in output quality and quantity. This approach is described below:

##### 1) Background Studies

- Understand the business and manufacturing processes including soap making techniques.
- Understand the soap/skincare industry on a macro and micro basis.
- Observe the manufacturing processes
- Plan project schedule
- Determine research methodologies to be used.

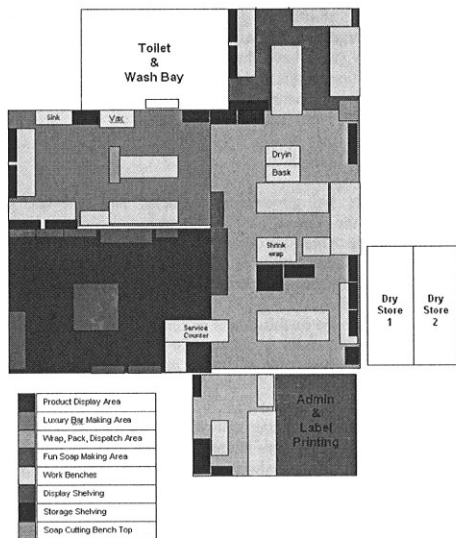


Figure 2. Existing layout of the manufacturing facility

##### 2) Preliminary Analysis

- Interview the Owner and employees regarding the business and manufacturing processes
- Perform SWOT analysis based on the information gathered from interviews
- Outline process transformation required from SWOT.

##### 3) Data Collection & Analysis

- Record videos of the manufacturing processes to be improved by work-study analysis.
- Re-arrange layout of manufacturing plant to be re-arranged for flow optimization.
- Identify key manufacturing process for semi-automation.
- Identify suitable technology transfer for the manufacturing processes.

##### 4) Recommendations & Comprehensive Report

- Draft comprehensive report including full recommendations.

#### 4.2.4 Key Process Transformation Findings

It was determined that the manufacturing costs and units cost are comparatively high as the result of high labor utilization. The solution desired was to decrease the direct manufacturing cost by optimizing factory layout and introduce semi-automation into some processes. The project initially targeted to increase the production rate of Luxury bars from 800 to 3000 bars in an eight hour day with minimal investment needed.

In detail, the findings from the process transformation are to:

- Improve workstations layouts
- Decrease manual handling in the manufacturing
- Semi-automate manufacturing processes
- Decrease transfer between workstations
- Reposition and increase storage space.

It was also determined during the discussion and analysis that there were inadequate distribution channels and poor marketing strategies, mainly attributed to the time limitation from the demand of being a full-time working owner. The solution desired was to identify and successfully recruit two major and two minor distribution channels to establish sales consistency and volume. As part of the process, it was also envisaged that there would be consolidation of selected products into a “high-volume” product range to assist in forming a suitable “high-volume” wholesale marketing strategy.

In general terms, it was observed that there are three critical deficiencies within the firm which commonly are endemic within the SME sector in Australia. These are:

- Lack of planning and organization
- Lack of systems and procedures (or lack the training of personnel)
- Lack of expert input into structures and technologies.

This is perhaps an area where academic-industry collaboration can take place, whereby university resources can be provided for a government-subsidized fee to enhance SMEs in their planning, establish systems, and provide I&TT advice. In some ways, there is adequate anecdotal evidence to suggest that the **business coaching industry** that has been established to fill this gap has gained popular demand from the SME sector.



relevant government funding to form clustered applied research and SME "nurturing" centers.

From the implications above, a suggested model of the I&TT experience in regional micro-manufacturers has been established to demonstrate the intrinsic dependency of the business to the owner, and the need to rely on systematic planning and organization. This has required changes in the owner's behavior and sufficient education/training, along with relevant advisory and financial support needed to improve the probability of a successful I&TT experience. The overall I&TT process within micro-manufacturers in regional areas is modeled is termed "Regional Knowledge Diffusion" (RKD) model, and is illustrated in Figure 4 below.

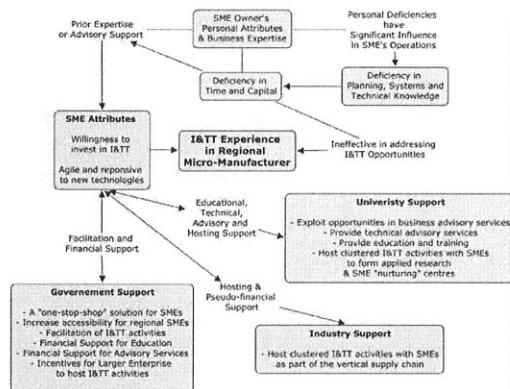


Figure 4. Suggested Model for I&TT Experience in Regional Micro-Manufacturing SMEs; Regional Knowledge Diffusion (RKD)

## 6 CONCLUSIONS

SMEs are an important sector of the Australian economy. They have relatively low success rates in innovation, especially within regional areas. However, they are generally receptive to opportunities to innovate and adopt new technologies to lift business growth. The I&TT processes in SMEs are not easily understood and not well researched within the literature. Existing I&TT support is not particularly suited to SMEs. The lack of time, capital and new technology knowledge are seen as hurdles for regional SMEs. And the lack of strategy and organization mostly attributed to the working owner's personal attributes also need to be addressed. It can be argued that having better capitalization and planning can "buy" more time to investigate new technologies, and thus heighten the probability of successful I&TT activities. There is some evidence to show that seasoned executives starting their own SME have a better success rate because of their ability to plan and implement systems with adequate capitalization of the business. However, most individual SMEs would need some form of external advisory and mentoring support, and industry support and government agencies have an important role to play in the I&TT process to be accessibility conduits, facilitators and pseudo-financiers. Universities can provide some of this support, though it is acknowledged that it may not be the best candidate to provide it without being given a government-based mandate to do so. Overall, this I&TT experience has been personally rewarding. It has

been a joy to mentor a regional micro-manufacturer.

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## APPENDIX 3

Thorpe, D. & Goh, S. (2010) *Study of SME innovation in two Queensland industries*, in Al-hakim, L. & Jin, C. (eds) *Innovation in Business and Enterprise: Technologies and Frameworks*, Business Science Reference: IGI Global, Hershey PA, pp240-259. ISBN 1615206434; 9781615206438.

### STUDY OF SME INNOVATION IN TWO QUEENSLAND INDUSTRIES

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## Study of SME Innovation in two Queensland Industries

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### ABSTRACT

*This chapter describes research in innovation in smaller SME firms in Southern Queensland, Australia. The industries selected for this study were micro manufacturing in the Darling Downs Region and domestic building constructions in South East Queensland. Results of this research and its implications for innovation in the SME industry sector are discussed. While the firms studied, and the research methodology used, were quite different in each case, it was found that there were common factors that aided and inhibited innovation in each industry. These factors have implications for SME firms in other industries. Suggestions are made in the chapter with respect to the ongoing facilitation of innovation in such firms.*

**KEY WORDS:** Construction, Innovation, Building, SME, Regional Manufacturing, Micro-Manufacturing, Knowledge Diffusion.

### BACKGROUND

Australian businesses have increasingly investing in innovation in the last few years. According to the Australian Bureau of Statistics (2006), just over a third (34%) of Australian businesses undertook some type of innovation during the two years to December 2005. This was up four percentage points from the two years ended December 2003. By type of innovation, 'implementing new or significantly improved organizational/managerial processes' (25%) had the highest result. Approximately 22% of businesses reported 'implementing new or significantly improved operational processes' and 19% of businesses reported 'introducing new or significantly improved goods or services'. Over 7% of innovating business reported introducing new-to-the-world goods or services.

From the 2005 figures, the proportion of innovating businesses increased with business size. This is most noticeable in the difference between innovating businesses that employ 5-19 persons (28.4%) and the results for businesses that employ 20-99 persons and 100 or more persons (46.6% and 51.5% respectively). This pattern is followed for each type of innovation with the exception of businesses that employ 20-99 persons which recorded the highest proportion of businesses that introduced new goods or services. More than 58% of innovating businesses reported cost as a barrier to innovation. Lack of skilled staff was reported as a barrier to undertaking innovation by 27% of innovating businesses. Profit-related drivers were reported as a key reason for all types of innovation by 94% of innovating businesses.

During 2006/07, over one-third (37%) of Australian businesses reported undertaking some form of innovation. Across the three statuses of innovation, larger businesses were more likely to have undertaken innovative activity than smaller businesses. This scenario is consistent with that observed in the 2005 survey. The proportion of businesses that were innovation-active was greater for each successive employment size range, from 31% for businesses with 0-4 persons employed to more than double this proportion for businesses with 200 or more persons employed (66%). (In considering these results, populations for each of the employment size groups should be taken into account. For example, for businesses with 200 or more persons employed, an innovation-active rate of 66% represents

approximately 2,000 businesses, whereas an innovation-active rate of 31% for businesses with 0-4 employees represents approximately 136,000 businesses.) Over 25% of businesses claimed that a lack of skilled staff significantly hampered their ability to innovate. More than three-quarters (76%) of innovative-active businesses claimed that the most common driver of innovation was profit-related (Australian Bureau of Statistics, 2008).

These statistics above provides a background to which this chapter examines the innovation process in Small and Medium Enterprises (SME) within two Queensland industries. All except two of the firms discussed in this chapter employed less than 20 employees, typically placing them in the smaller group of SME firms.

## INTRODUCTION

Much of the academic research undertaken on innovation is based on large organizations. Some of the factors that influence the performance of this process include organizational culture, government policies and support mechanism, structural framework, investment communities, intellectual property protection, financial stability, research-industry relationships, the organization's financial profile and stability, economic and corporate environment. However, there is increasing evidence to show that the most innovative and fast growth enterprises are from the Small-to-Medium Enterprise (SME) sector, such as small manufacturers who are operating with flexibility and innovation in niche markets within a very competitive global market place.

There is also increasingly improved structural support for these small enterprises from governments at all levels. However, such programs are often unable to flow down to the micro-manufacturers (less than yearly AUD 2 Million turnover per year), and access to relevant field officers for assistance are often very difficult especially within regional areas.

This poses an interesting scenario where it is often very difficult for these SMEs to access the available financial and non-financial assistance for their innovation activities. Because they are dependent on cash flow from existing operations as their innovation funding source (Featherstone, 2008), the incentives for SMEs to invest in innovation are diminished.

It is noted that business failure in SMEs is a comparatively rare phenomenon. Only around 2 per cent of SME businesses cease operations each year because the owners, while solvent, are unable to secure a sufficient return. And less than 0.5 per cent of businesses cease operations each year due to insolvency - down significantly from the rate applying in the early 1990s. Unfortunately, common misperceptions about the level of business failure and the chances of survival may lead some entrepreneurs to overestimate the risk of failure, thus reducing their willingness to innovate (Commonwealth of Australia, 2000).

The construction industry, which is one of the two industries discussed in this chapter, is not considered highly innovative with respect to other industries, including comparable sectors such as manufacturing and transport. For example, the OECD, in its 1998 *Science, Technology and Industry (STI) Outlook*, observed that the global construction industry has failed to achieve productivity improvement rates comparable to those of more mature manufacturing industries (such as textiles, steel and automobile manufacture). In Australia, the Australian Bureau of Statistics (ABS) has found that over the period 2001-2003 the construction industry, at 30.7 per cent, had one of the lowest proportions of innovating businesses (Australian Bureau of Statistics, 2005a). This result was comparable to the mining

industry, yet well behind many other industries such as manufacturing, electricity, gas and water supply, and communications (45 per cent or more of firms innovating). The 2006-7 survey by the ABS found that the proportion of innovative-active construction firms had subsequently decreased to 27 per cent (Australian Bureau of Statistics, 2008)

It has been reported that many of the small businesses (almost half) in Australia today started in the past six years and in the past decade they have provided four out of five of all the new jobs created. Small businesses employ around 40% of the workforce, and are responsible for generating around a quarter of our gross domestic product (GDP) (ABC Radio, 2008). It may be argued that good ideas that have been generated by SMEs have a low probability of developing into commercial successes although there may be more opportunities for innovation. Given the propensity of SMEs to create jobs, this is an important challenge for Australia if it was to be successful in developing a comparative advantage globally as the “clever country”. Thus, it has been noted that even a small increase in innovation intensity in SMEs would have significant flow-on effect given the sector provides a significant employment and economic activity (Featherstone, 2008). This conclusion applies to both the manufacturing and construction sectors, which is noted as contributing, across the various OECD countries, 6.0 per cent to gross value added (a measure of the contribution made to GDP) in 1995, and 5.4 per cent to gross value added in 1999 (OECD, 2004)

Innovation in SMEs is often poorly understood, in that it is often a disordered, unpredictable process that is hard for SMEs to manage effectively. Innovation effort can also see attention diverted from the core business and operations. Relative risks are higher because there are fewer margins for errors in SME. The ability to experiment with different options has great merit in larger companies with surplus cash flow, stronger balance sheets and excess staff, but it is not suited for SMEs. A further reported issue in innovation in the SME sector is that there is too much discussion about innovation and not enough action (Featherstone, 2008). SMEs want more practical, cost effective ways to maintain or increase their innovation intensity.

There is evidence to date that governments are acting to enhance the innovation intensity in SMEs. For example, government agencies in Australia at the state and federal levels have always been trying to improve the innovation outcomes from industry, and in recent cases, in the SME sector. The establishment of the “Enterprise Connect” federal program in Australia, for example, is designed to provide small and medium enterprises with access to practical advice and mentoring. It has been reported that, according to Senator Kim Carr (Douglas, 2008), 10 Enterprise Connect centers to be opened around Australia will provide businesses with confidential mentoring and support, to gain access to a range of government and non-government services including business planning, prototype development, grant applications and advice regarding human resources. This program is based on similar programs which have proved successful in Ireland and the United Kingdom.

This chapter describes research projects in two significant smaller components of the SME sector – micro-manufacturing and smaller domestic building construction firms. While each project used a different methodology, both projects investigated the innovation process within representative firms of their particular sector. They also considered the mechanism for transfer of knowledge from researchers (such as universities) to the SME sector. The micro-manufacturing research project, in particular, investigated the innovation process in the SME sector within a university-industry collaboration (working jointly or cooperatively) context.

## OVERVIEW OF THE INNOVATION PROCESS

### Innovation Adoption and Development

An innovation may be described as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). Rogers outlines the innovation development process as consisting of the steps of recognition of a problem or need, research, development, commercialization, diffusion and adoption, and consequences, i.e., changes that occur in an individual or social system as a result of adoption or rejection of an innovation. He also divides adopters of innovations into five ideal types, each of which is defined by specific characteristics such as the subject’s ability to take risks, the subject’s resources, and the subject’s position within the overarching social system. The five types are innovators, early adopters, the early majority, the late majority, and laggards.

Knowledge and its organization and dissemination within the firm are significant factors with regard to innovation (Egbu, 2004). Such knowledge may be created within the firm rather than externally to it. Thus, the knowledge creation process can be considered as a continuous process through which one overcomes the individual boundaries and constraints imposed by information and past learning by acquiring a new context, a new view of the world, and new knowledge (Nonaka *et al.*, 2006).

Firms need to continuously innovate, adapt and improve on existing technologies, in order to exist, compete and grow. The better organizations are leveraged to the evolutionary nature of technology, the better their performance will be. This is supported by Moncrief & Cravens (1999) where technology is changing markets and buyer’s preference, and organizations that are market driven and leverage technologies, can provide better market growth and performance.

There is also a need to develop a systematic approach to review an organization’s ability not just to innovate but to create value through innovation. It is important not to view innovation in isolation but as an integral part of any business strategy. There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and its structure. In addition, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and are often underestimated, and therefore create a disincentive to invest in innovation.

Technological change is one of the significant influences on business enterprises, which companies both dying and emerging from every evolutionary technological innovation. Hill and Rothaermel (2003) provide a theoretical platform in that technology discontinuity does affect the performance of the incumbent firm, but that some firms some adapt and improve their performance, and some get ahead of the change and exploit the new technology and experience sustained performance. Macher & Richman (2004) have complemented this theory that firms tend to restructure and develop new strategies in pursuing a new technology in response to “discontinued” technologies. They have also found that certain organizational strategies are more appropriate for particular stages of the innovation life cycle. There is a common theme emerging that firms need to continuously innovate, adapt and improve on existing technologies, in order to it to exist, compete and grow.

Dillon, Lee & Matheson (2005) propose that technology and research and development (R&D) are insufficient to create value and wealth when used in isolation, and that current

business practices fail to support the activities crucial to value innovation. There is a need to develop a systematic approach to review an organization's ability not just to innovate but to create value through innovation. Orr & Sohal (1999) have complemented this theory by using a German example of innovation by successfully managed technology transfer from home country to overseas productions, which delivered superior quality and competitive advantage, and indirectly provided an entry and presence in the respective market. They also demonstrated that managing the innovation process is not only about creating new ideas and gadgets, but also that it forms part of a holistic business strategy to enable the firm to ensure its sustainability as a business enterprise.

Finally, it is important not to view innovation in isolation but as an integral part of any business strategy, which may take into account other factors proposed in Zhuang (1995); where the composition of an organization in terms of gender, age, industry type, and management level can influence its ability to devise and implement business strategies that focus on innovation. This theme is further supported by Roberts & Amit (2003) in proposing the view that innovative activity that is differentiated from industry norms tends to deliver superior performance, in which the successful firm has focused on a point of differentiation as its competitive advantage.

### **Innovation development and adoption in the construction industry**

The residential construction sector is recognized as a particularly important component of the construction industry (Miller *et al.*, 2004). In Australia, for example, the residential building sector, over the financial years 1997-98 to 2002-03, accounted for, on average, 43.3 per cent of the value of work undertaken, i.e., a total of AUD28.1 billion per year (Australian Bureau of Statistics, 2005b). In view of this, a one per cent gain in productivity in this sector has the potential to add about AUD280 million to the economy on an annual basis.

Given the importance of the residential building sector, and its potential to contribute significant improvements to national economies through innovation, it is important, as highlighted above, to develop an improved understanding of the innovation process. To achieve this goal, research was undertaken, with the aid of sponsorship from Australia's Cooperative Research Centre (CRC) for Construction Innovation<sup>1</sup>, into assessing innovation development and adoption in a sample of 20 firms in the residential construction industry of South-East Queensland, Australia. The research was undertaken by means of a semi-structured interview process.

### **BARRIERS AND ENABLERS OF INNOVATION**

While organizational knowledge and its use are important in the innovation process, and factors like those related to profit can be important drivers for firms to innovate, there are also a number of barriers and enablers (both within and external to the firm) that have the potential to impede or aid the innovation process in construction firms. A number of these barriers and enablers are discussed below.

### **Barriers to Innovation**

There are inherent hindrances to the adoption of technological innovation such as corporate culture, organizational composition, and firm structure (Zhuang, 1995).

In the construction industry, Gyampoh-Vidogah & Moreton (2002) note that the industry has always been a collaborative business environment. However, the corporate or collaborative information technology framework is lacking as the result of the culture that dictates each individual function maintains total independence in all respects including information. In addition, the effective benefits, market and profit performance that technological innovation delivers tend to be hard to measure and often underestimated, and therefore create a disincentive to invest in innovation. This view is supported for that particular industry through the identification by Hampson & Brandon (2004) of a number of barriers preventing the Australian construction industry from taking more responsibility for leading and investing in research and innovation. Such barriers include the cyclical nature of the industry, a lack of client and industry leadership, a limited history of business deliverables from researchers, the self-interest of many participants, an inability of the industry to foresee the tide of competition, insufficient trust between industry and researchers with respect to sharing vital information, and lack of a long-term funding basis for a national R&D centre.

Similar barriers were observed by Koivu & Mantalya (2000) in the European construction sector, which they stated had not been very successful in adopting new technology and processes. Some of the issues in that sector included fragmentation, low potential for added value because of a price and project-based focus, fluctuation of demand with time, slow process or project improvement cycles, a relative inability to manage the innovation process, lack of educated personnel, limitations to risk taking, a conservative culture, and a relatively significant level of government oversight and control.

The culture of the firms themselves can be the source of additional barriers to innovation. Acar *et al.* (2005) found, for example, that organizational culture was a factor in implementing information and communications technology (ICT) in construction firms. The importance of these barriers to innovation is also noted by Egbu (2004), who observed that, if the construction industry is to benefit from innovation, it should change from an adversarial and blame culture to a sharing one. Further, a study by Manley *et al.* (2005) of 383 Australian construction firms found that key obstacles to innovation included high costs of developing innovations and insufficient time.

Finally, Zhu (2004) has demonstrated that where the impact of ICT as a tool for e-commerce, profit performance and its value is underestimated, there may not be enough financial justification to invest in ICT, which in turn may not reap the full benefit of e-commerce.

### **Enablers of Innovation**

The study of the Australian construction industry by Manley *et al.* (2005) found that the determinants of innovation outcomes in that particular industry included business strategies, innovation drivers and obstacles, and the number of sources of ideas. In addition, the same researchers found that key drivers of innovation were efficiency, productivity improvements and customer needs, and that stand-out innovators a) developed innovations with higher degrees of novelty, b) adopted a higher number of advanced practices, and c) invested in



research and development. Approximately one-third of the respondents maintained a culture that supported innovation.

Dulaimi *et al.* (2003) found that an innovative proposal can be successfully implemented if effort is put into carrying the innovation through, if favorable results can be expected and there is high managerial commitment. Ling (2003) similarly concluded that the extent to which an innovation would prove beneficial is closely correlated to the level of interest of project team members, the working environment, the formation of task groups, and the capabilities of the people involved.

Successful innovation requires support from senior management. Egbu (2004), for example, found that any meaningful innovation strategy must have unequivocal support from the top, be communicated to and accepted by the organization's rank and file, and sit naturally within the organization's overall strategy. Similarly, Sexton & Barrett (2003) found that owners of small firms have the power to ensure rapid decision-making while the type of innovation and the different organizational factors brought into play largely depend on the firm's operating environment.

It is concluded that the barriers to innovation are related to industry culture (of both the industry and the firm), cost, client factors, and the issues in adopting new technology, while enablers of innovation include commitment to innovation, firm characteristics, commitment of firm management, and organizational strategy.

#### **University and Industry Collaboration in Innovation**

University-industry collaboration has always been a mechanism for innovation. MacPherson (1998) examined the academic-industry linkages and small firm innovation in the scientific instruments sector, and found data from a sample of 204 SMEs in the New York State region that suggest that the university can play a helpful role in SME innovation. Knowledge spillovers from the academic sector were shown to be geographically localized. A key finding is that the intensity of academic-SME interaction varies inversely with the time-distance that separates firms from major campuses; and innovation rates are higher among SMEs that enjoy close proximity to academic resources.

Freel (2000) expanded linkage collaboration further by examining external linkages and product innovation in small manufacturing firms. Based on a sample of 228 small West Midlands manufacturers in the UK, this study found that innovators are making greater use of external linkages, of a certain type and in a particular direction (predominately in vertical value chain linkages). It is observed that the data suggested the importance of inter-personal dynamics, attitude and expectations in facilitating successful collaboration.

In the construction industry, Hampson & Brandon (2004) have noted that commitment to collaborative research and innovation is required, with genuine mutual consultation with industry being essential for research and development to make a difference. They have also commented that it is important for researchers to engage with SMEs (94 per cent of firms in the Australian construction industry employ fewer than five people).

These studies indicate that, on the whole, successful innovation can be considerably aided by the involvement of universities, other research institutions, and business coaching approaches.

## **STUDY OF A MICRO MANUFACTURER**

### **Overview**

The first study discussed in this chapter is the exploration and reflection of the innovation experience of a regional micro-manufacturer through embedment of one of the authors in a particular firm, in an analogy to an anthropological study. The case study involved learning and discovering the obstacles and barriers for innovation, seeking and proposing ways to reduce them, and improving the overall innovation process within micro-manufacturers in regional areas.

During the experience, the researcher embedded within the firm provided advice and analysis, and at times, physical labor on the process transformation for the micro-manufacturing firm via process improvements, semi-automation, and systemization of the business operation, and in the process initiated preliminary study into the innovation process in regional micro-manufacturing sector.

The approach to the overall case study is separated into three different components:

- Study of the Business & Working Owner
- Study of the Manufacturing Processes
- Study of the innovation Process

The intention in this chapter is to focus on the innovation experiences to gain an understanding of the influencing factors that affect it.

### **Background of the firm**

The firm was founded and owned by an individual based at the regional township of Pittsworth (located 50 km south-west from Toowoomba in Queensland, Australia). The operation started off as a commercial flower growing business focusing on organic and medicinal herbs. Now, it specializes in and manufactures a range of high-quality organic/pure “chemical-free” soap & shampoo and skin care products. The business has been in operation for about 10 years. Along with a good domestic distribution, it also exports to New Zealand, the United Kingdom and Asia. The products that it manufactures are varied and include:

- Soap-based products (over 200)
- Hair care products
- Skin care products
- Natural “Bush” products
- Medicinal based products
- Miscellaneous products (e.g. Hemp).

### **Research Findings**

The findings from the overall study were categorized into 3 segments:

- Study of the business and working owner
- Study of the manufacturing processes

- Study of the innovation process.

### **Business and Working Owner**

Following a SWOT (strengths, weaknesses, opportunities, threats) analysis, it was observed that there is a comparative advantage in the firm's niche high-quality product specializations, and its willingness to innovate and its perceived intellectual properties (owner's knowledge on soap making). Though the broad range of products was seen as a strength (to the customers), without systems, manufacturing a wide range of products can be a difficult logistic exercise. This was observed during operations. It may also present a case for market confusion for the consumer with the wide choices. The SWOT analysis also provided some evidence to show that the attributes of the owner is the most important factor that influence innovation in the micro-manufacturer.

It was observed the weaknesses are many, and presented a challenge for the process transformation task. Interestingly, many of the perceived weaknesses are related to the owner's personal attributes and an intrinsic tie to the business and the manufacturing processes. This can be solved by leveraging the working owner from the operation (to work on the business not in the business), and instilling systems and good practices within the operations. However, time and money (the lack of it) are the major source of weaknesses. This finding is consistent with other research into barriers to innovation, as discussed previously in this chapter. Addressing this lack of money needs external sources of support such as government agencies (subsidies and innovation grants) or larger enterprises (that form a vertical supply chain).

It was observed that a number of opportunities could be taken without incurring large capital cost or expenses. Most of the recommendations for the process transformation derived from this observation. One aspect is to focus on decreasing manufacturing cost, both in overheads and unit costs; the other aspect is to specifically target major distribution channels, and consolidate product range to address this wholesale market.

It was observed that the perceived threats were related to macro-environmental factors such as raw material price increases, increased global competition, increased labor costs etc, and this is well supported by the literature. However, one interesting view is tied to the owner's personal attributes, as discussed previously.

The SWOT analysis provided an initial understanding of the business to progress to the process transformation stages. Specific areas from the findings; such as the decreasing manufacturing costs, product consolidation, installing systems and procedure and less reliance on the working owner for day-to-day operations; were addressed. However, the findings also indicated that one of the biggest hurdles for the business is the lack of time and capital, and presented a challenge to the transformation tasks and achieving innovation objectives.

### **The Manufacturing Processes**

The study of the manufacturing processes encompassed an initial familiarization of the basic soap making processes, categorization of the firm's soap manufacturing line, and then engagement in the process transformation, resulting in key findings and recommendations.

The most common type of soap making is known as the “Cold Process.” This process has been adopted by the firm as the process used in the manufacturing of its main line of soaps. It is made by combining fatty acids and sodium hydroxide (lye) together. Fatty acids can be almost any oil – from beef tallow to olive oil to hemp oil. In simple terms, this process combines a proportion of lye (sodium hydroxide) and water with fatty acids, resulting in a chemical reaction called “saponification.” During saponification, the oils and lye mix and becomes soap.

One competitive advantage the firm has over other commercial soap manufacturers are in its superior ingredients. They contain organic herb, oil, distilled water, real fruits, vegetable, rice/nut oils, jojoba & macadamia wax, vegetable glycerin. The firm does not use any sodium laurel sulphate, propylene glycol, parabens, or peanut oil; as is common in ingredients in commercial soaps.

The soap manufacturing line is composed of an “L” shape configuration, encompassing the following processes:

- Mixing of lye and fatty acids
- Luxury Bars Making
- Fun Soaps Making
- Soap Cutting / Slicing
- Saponification/Drying
- Packaging
- Storage

These manufacturing elements were analyzed with data collected (through work study) with the view to improve the manufacturing operation to decrease manufacturing costs and increase production output.

Process transformation was mainly achieved through analyzing the processes with data collected through video recording of the individual manufacturing elements, and applying work study principles to evaluate and seek increased productivity and improvements in output quality and quantity.

It was determined that the manufacturing costs and units cost are comparatively high as the result of high labor utilization. The solution desired was to decrease the direct manufacturing cost by optimizing factory layout and introduce semi-automation into some processes. The project initially targeted to increase the production rate of Luxury bars from 800 to 3000 bars in an eight hour day with minimal investment needed.

The findings from the process transformation were to to:

- Improve workstations layouts
- Decrease manual handling in the manufacturing
- Semi-automate manufacturing processes
- Decrease transfer between workstations
- Reposition and increase storage space.

It was also determined during the discussion and analysis that there were inadequate distribution channels and poor marketing strategies, mainly attributed to the time limitation from the demand of being a full-time working owner. The solution desired was to identify

and successfully recruit two major and two minor distribution channels to establish sales consistency and volume. As part of the process, it was also envisaged that there would be consolidation of selected products into a “high-volume” product range to assist in forming a suitable “high-volume” wholesale marketing strategy.

In general terms, it was observed that there are three critical deficiencies within the firm which commonly are endemic within the SME sector in Australia, and all of which impact on innovative capacity of the firm. These were:

- Lack of planning and organization
- Lack of systems and procedures (or lack the training of personnel)
- Lack of expert input into structures and technologies.

There were two separate complementary recommendations, one aimed at the process transformation and the other into improving the distribution channel. As at the time of writing this paper, part of the first stage, layout optimization, had been implemented, with consequent work flow improvements.

### **The Innovation Process in the Firm**

The study of the innovation process in this particular firm involved the identification of factors influencing the innovation process. These are listed below, where they are categorized as internal and external factors:

#### **Internal Factors**

- Lack of time and money
- Inadequate external support
- Lack of systematic Approach
- Lack of planning & monitoring
- Adhoc approach.

#### **External Factors**

- External support is crucial and provides an avenue for innovation
- Government agencies have the grants/funds for innovation but lack suitable delivery for regional enterprises: need to restructure for regional SME
- There is opportunity for universities to exploit: provide education, advice and structured innovation (similar to business coaching services)
- Customers and Suppliers can be a good source of innovation
- Employees and Owners need innovation training
- Larger enterprises can act as a conduit for vertical supply chain innovation (act as innovation host and pseudo-financier).

It can be argued that the major hurdle for the successful innovation hinges on the specific owner’s attributes and ability to systematically plan, implement and monitor the business environment and its operations. It is also acknowledged (as previously discussed) that the major hurdle is the lack of capital and time to reinvest into innovation, even though SMEs are perceived as the organizations most responsive and agile to innovation opportunities. This then points to the abilities of government agencies to support such SMEs through targeted financial and facilitation support, collectively with universities (who have the knowledge

base and resources to advice). An addition to this is the ability of larger enterprises to form vertical supply chain clusters involving the hosting of SMEs' innovation activities.

There is opportunity in this area for academic-industry collaboration, whereby university resources can be provided for a government-subsidized fee to enhance SMEs in their planning, establish systems, and provide innovation advice. In some ways, there is adequate anecdotal evidence to suggest that the business coaching industry that has been established to fill this gap has gained popular demand from the SME sector.

## **STUDY OF SMALL RESIDENTIAL BUILDERS**

### **Method**

The study of innovation in the domestic building sector was undertaken through contacting 100 small residential builders operating in the South-East of the Australian state of Queensland. This sample of builders was obtained through selecting fifth firm, in alphabetical order, in publicly available lists of selected residential property builders in this region. In order that the study considered smaller builders, the study sample was limited to builders constructing houses up to AUD 750,000 in value. This value was considered a reasonable upper limit for the type of small builders interviewed for this particular study.

In order to obtain reasonably detailed information about the behavior of the firms in the study, a qualitative methodology incorporating a semi-structured interview process was adopted. The objective of the interview questions was to explore the extent of innovation in the firms selected; provide an understanding of how they developed or adopted innovations; qualitatively assess the value of innovations to the firm; and assess their readiness to adapt to changes in their working environment.

Since there was considerable activity in the residential building industry in the study area during the time of data collection, representatives of only 20 of the 100 contacted firms were able to be interviewed. It was therefore decided to use these 20 firms as the study sample. A semi-structured questionnaire that aimed to obtain useful information, but which also had to meet the tight timeframes of the interviewees, was developed as the research instrument. The interviews, which took about 45 minutes each, took place in September and October 2006.

The firms in the study constituted small independent domestic building firms, seven of which had four or fewer permanent staff, and only two over nineteen permanent staff. All firms were principal contractors with little or no interaction with the other firms in the sample. Of the firms, eighteen undertook new construction, and two were primarily engaged in maintenance or renovation. Eleven of the firms undertook design as well as construction.

All firms worked with private clients undertaking private sector residential work in which small projects, such as private dwellings, predominated. In addition to working for private clients, four of the firms also worked for government clients. About three of the firms also undertook larger projects such as construction of apartment blocks and commercial buildings.

### **Innovation in the Sample Firms**

The research found 50 examples of innovations, or "something new" (Rogers, 2003), in the 20 firms surveyed, ranging from one to five innovations per firm. This was a good result

given the relatively poor reputation of the industry for innovation. Examples of such innovations, which illustrate the variety of innovations used, include the following:

- Use of new engineered products (e.g. LVL - laminated veneer lumber - I-beams).
- Polyethylene pipe for internal water supplies (as opposed to copper).
- Use of new structural products (primarily in insulation).
- Use of polystyrene blocks as substitutes for other materials such as fiber cement boards. These blocks were insulating and did not emit dust (an important issue in occupational health and safety) when cut.
- Adoption of new building materials that improve (energy) efficiency
- A “Greensmart” design and construction process.
- Use of a web-based system that enabled customers to track building plans and follow construction.
- The use of electronic estimating packages.
- A custom-designed mobile toolbox for use in a mental health maintenance environment.

The innovations could mainly be classed as either product or process innovations (21 in each category), as defined by the third edition of the Oslo Manual (OECD, 2005). The remainder of the innovations could be classed as were organizational (three), product and process (two), product and marketing (one) and process and marketing (two).

Very few of the innovations were completely new to the construction industry. However, all were new to each particular firm.

Participants in the study were asked to nominate one particular innovation for further discussion, giving the reason for developing or adopting the innovation, the process of developing or adopting the innovation, implementation issues, and the results achieved from using the innovation.

With respect to the reason for developing or adopting the innovation, the predominant answer was improvement of productivity in the firm (selected by 9 firms), followed by the need to meet requirements of the client and improvement efficiency of the firm (each elected by 7 firms). One firm advised that the innovation had been developed in response to legislative requirements. Other reasons for developing the innovation included a commitment to leadership in the industry, customer service, sustainability, safety, or desire to achieve good practice.

### **Results of using Innovations**

With respect to the result of using the innovation selected for further study, all firms in the survey reported that they had gained increased knowledge to their advantage. There was also a positive response by clients and firms with which the builders dealt with respect to the innovation. Twelve of the firms reported a positive effect on profitability as a result of using this innovation, with none reporting a decrease in profitability. In addition, 11 of the firms reported reduced risk as a result of using it. Examples of such risk reduction included improved safety, improved time and cost estimates, less fatigue in tradesmen, less theft, reduction in long-term maintenance needs and reduced stress levels in management and staff. Factors assisting this risk reduction included improved safety through lighter and safer materials, improved handling practices and improved systems and documentation.

All firms interviewed reported that they gained increased knowledge to their advantage as a result of using the innovation. However, only 10 of the 20 firms interviewed reported that the innovation provided them with a competitive advantage. This outcome is likely to be related to the difficulty of measuring any competitive advantage, and to perceptions by builders about what constituted a competitive advantage rather than to whether such an advantage was actually achieved. Other firms reported improved productivity and positive client responses.

Seven of the firms reported that they were required to make changes to their business as a result of adopting or using the selected innovation. The main change identified was in human resources management, such as staff training and development, changes in employment arrangements, and employing different staff. Marketing was also considered an area that required change. This minimal impact on business operations, combined with the view of all firms that they would use the innovation again, indicates that the firms tended to view their innovations positively.

One of the results from the study of the domestic building firms was that participating firms tended to develop their innovations through a) identifying a need or business objective; b) developing or obtain knowledge of an innovation to meet the need or objective; c) deciding whether to use the innovation; d) trialing and testing it; and e) undertaking a pilot implementation of it. Once the pilot implementation proved satisfactory, the firm would move to full implementation of it and further refine and improve it. This process is similar to Rogers's (2003) innovation development process, i.e., recognition of a problem or need, research, development, commercialization, diffusion, adoption, and consequences; which indicates that the process followed by the builders interviewed in this study was consistent with the results of previous studies in the field of innovation development and adoption.

The firms in the study also listed at least one factor that aided the innovation process. The main categories into which these factors could be grouped were ease of use, commitment, personal desire for the innovation's success, and customer acceptance. Other factors that aided the innovation process included the importance to the firm of the innovation, improving the firm's reputation, ease of implementation, and staff acceptance of the innovation.

Of the selected innovations (one per builder) nominated by each builder for further discussion, those in 16 firms (80 per cent of the sample) originated within the firm. An external information source contributed to the development and adaptation of innovations in 12 of the 20 firms in the research. The main such source of external information in these cases was trade literature. Other sources of information included industry training seminars, supplier representatives, design professionals, adaptation from another industry, and sub-contractors. Only one of the firms directly used a researcher to assist with the innovation process.

These results possibly reflect the difficulty in disseminating innovation in a loosely coupled industry (Dubois & Gadde, 2002). They are supported by the findings of Manley et al. (2005), who noted that in-house staff members were the primary source of innovation ideas and that research institutions ranked in twelfth place as a source of such ideas. They would also tend to support the research discussed in the section on barriers and enablers of innovation, and in the micro-manufacturer cases study, that in small firms the owner is an important driver and facilitator of innovation.



### **Implementation of innovations**

Only eight of the 20 firms reported that they had experienced difficulties in implementing the nominated innovation. This good result might be attributable to the fact that many of the innovations were developed within firms, and thus were driven by the owner or senior management.

Where difficulties were experienced in the implementation process, the most common issues were human resource related, such as unwillingness to depart from entrenched ways of doing things, and technical problems such as the failure of the first attempt at innovation. Other implementation issues included time and cost, a need to meet customer requirements, and legislative impediments.

## **DISCUSSION**

### **Results from the Research**

One of the important results from the research into residential builders was that although it is contended by a number of researchers that larger firms have more capacity to innovate than smaller ones (Arias-Aranda *et al.*, 2001; Gopalakrishnan & Santoro, 2001), there was considerable innovation in the firms in the study. The research described in this chapter also indicates that the small size of the firms studied is likely to enhance their ability to develop, test and implement innovations. This is consistent with the findings of Sexton & Barrett (2003) previously discussed in this chapter.

Eighteen of the 20 firms interviewed identified themselves as either innovators or early adopters of innovations in the classification system developed by Rogers (2003). The desire to meet changes in the business environment with a high level of rapidity also indicates that smaller building firms may be prepared to take risks in the expectation of receiving gain in the long term, in spite of the financial issues involved.

The research into these builders also indicates how information about innovation flows to firms. The participating builders advised that sources of knowledge for innovations not personally developed by the firm included journals and magazines, advertisements, industry association events, sales representatives, and design professionals. As was previously observed, only one of these firms reported directly receiving information from a researcher.

The sources of information are valuable to the firms, who tend to form a loosely-coupled group of organizations (Dubois & Gadde, 2002), linked to other firms, sub-contractors and their knowledge sources. This loose network allows them to exchange information, or obtain information from industry associations, design professionals, material and equipment suppliers, their operating environment, clients, subcontractors, and other builders. At the same time, direct communication with researchers and development of trust between the industry and researchers would be highly desirable.

The study into the micro-manufacturer indicated that there were roles for government agencies, universities and other education providers in assisting the SME sector. Thus, for government agencies and relevant policy development, implications included the following:

- The desirability of developing a “One-Stop-Shop” for SME support.

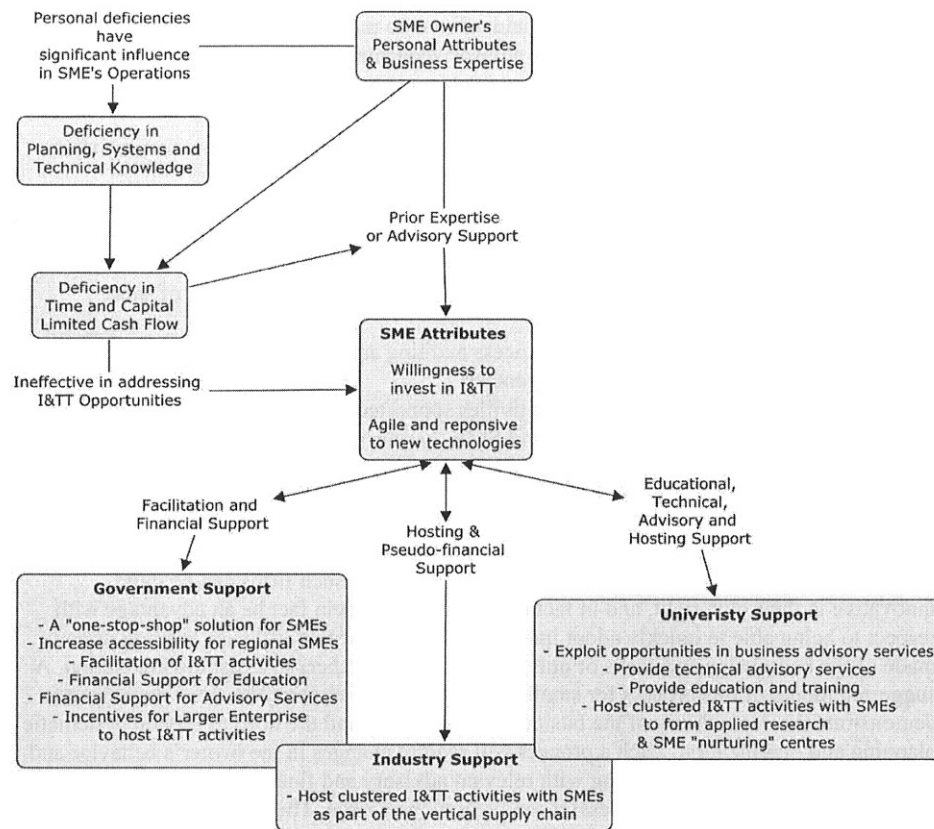
- Improvement of accessibility of field officers to regional areas.
- Provision of financial support for advisory/coaching services.
- Provision of financial support for education and training.
- Facilitation of establishment of vertical supply chain clusters.
- Provision of financial incentives for larger enterprises to host innovation activities with SMEs in the form of innovation clusters.

Universities and education providers could:

- Exploit opportunities in the “business coaching” market.
- Develop targeted educational/training products for SME in the form of short customized courses.
- Established technical advisory, process auditing and mentoring consultancies in collaboration with government agencies.
- Be hosts for SMEs’ innovation activities supported by relevant government funding to form clustered applied research and SME “nurturing” centers.

### **Regional Knowledge Diffusion Model**

Both studies indicate that there are some common elements, with respect to the innovation process, in the SME firms researched for this study. While such firms can be quite innovative in their own right, and in fact their small size can in fact be an advantage with respect to being able to quickly adopt innovations, it is clear that little use is being directly made of the knowledge and skills of universities and researchers to assist the innovation. A suggested model of this process for smaller regional firms has therefore been developed to demonstrate the dependency of the business to the owner, and the need to rely on systematic planning and organization. Such a process will require changes in the owner’s behavior and sufficient education/training, along with relevant advisory and financial support needed to improve the probability of a successful innovation experience. The model is termed a “Regional Knowledge Diffusion” (RKD) model, and is illustrated in Figure 1.



**Figure 1. Suggested Model for Innovation Experience in Small Regional firms: Regional Knowledge Diffusion (RKD)**

## CONCLUSIONS

SMEs are an important sector of the Australian economy. While not all have good success rates in innovation, especially within regional areas, they are generally receptive to opportunities to innovate and adopt new technologies to lift business growth. The innovation processes in SMEs are not easily understood and not well researched within the literature. Existing support for these processes is also not particularly suited to SMEs. The lack of time, capital and new technology knowledge may be seen as hurdle in innovation, particularly for regional SMEs. In addition, the strategy and organization that is the result of working owners being highly focused on their businesses also need to be addressed.

At the same time, the study of 20 domestic building firms has shown that small firms can be quite innovative in their own right, particularly with respect to the development and adoption of new or improved products and processes. Such innovation is driven by improved productivity and efficiency within the firm, as is meeting perceived client requirements. Personal goals and values (e.g., those of the firm's management, often the firm's owners) were also important drivers of the innovations reported. The innovations developed and

pursued ultimately benefited the firm and, in particular, resulted in a positive perception of the firm by both clients and competing firms. At the same time, there was an ill-defined benefit with respect to profitability, although the firms generally indicated that they would continue to use their key innovations.

One of the important aspects in the innovation process is the transfer of research knowledge within the industry. It would appear in both studies that research knowledge is largely being received indirectly by firms through indirect sources such as industry associations and design professionals. As is considered beneficial for the results of research to be more directly accessible to the firms, and for the firms to receive direct input from universities and other research organizations, it is recommended that researchers develop closer links with the industry representatives who undertake the intermediary's role, and that universities should take a stronger role in collaborating with the firms. To this end, the Regional Knowledge Diffusion model has been developed as a result of this research.

To conclude, future research should aim at extending this research to a larger group of SME organizations, across a range of industries in a range of geographical locations in Australia and elsewhere, in order to evaluate the extent of and commitment of this sector to innovation at a wider level, and to better understand how this industry sector might benefit from closer links with universities and researchers.

#### Notes

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## KEY TERMS

### Queensland

Queensland is a state of Australia which occupies the north-eastern section of the mainland continent. It is bordered by the Northern Territory to the west, South Australia to the south-west and New South Wales to the south. To the east, Queensland is bordered by the Coral Sea and Pacific Ocean. The state is Australia's second largest by area, following Western Australia, and the country's third most populous after New South Wales and Victoria.

### Jojoba

Jojoba (*Simmondsia chinensis*), is a shrub native to the Sonoran and Mojave deserts of Arizona, California, and Mexico. It is the sole species of the family Simmondsiaceae, placed in the core Caryophyllales. It is also known as goat nut, deer nut, pignut, wild hazel, quinine nut, coffee-berry, and gray box bush. Jojoba is grown commercially for its oil, a liquid wax ester, expressed from the seed.

### Macadamia

Macadamia is a genus of nine species of flowering plants in the family Proteaceae, with a disjunct distribution native to eastern Australia, New Caledonia and Sulawesi in Indonesia. They are small to large evergreen trees growing to 2–12 m tall. The fruit is a very hard woody globose follicle with a pointed apex, containing one or two seeds. The seeds are often consumed and used in confectionary, and its oil are often used in skin care products.

### Glycerin

Glycerin is a chemical compound also commonly called glycerol or glycerine. It is a colorless, odorless, viscous liquid that is widely used in pharmaceutical formulations. It is commonly derived in soap products. Glycerol is sweet-tasting and of low toxicity.

### Sodium laurel sulfate

Sodium laurel sulfate (SLS) or sodium dodecyl sulfate is an anionic surfactant used in many cleaning and hygiene products. The molecule has a tail of 12 carbon atoms, attached to a sulfate group, giving the molecule the amphiphilic properties required of a detergent. SLS is a highly effective surfactant used in any task requiring the removal of oily stains and residues. As such the compound is found in high concentrations in industrial products including engine degreasers, floor cleaners, and car wash soaps.

### Propylene glycol

Propylene glycol is an organic compound, usually a faintly sweet, and colorless clear viscous liquid that is hygroscopic and miscible with water, acetone, and chloroform. It is used as a solvent in many pharmaceuticals, including oral, injectable and topical formulations. It is also used as a moisturizer in medicines, cosmetics, food, toothpaste, mouth wash, and tobacco products

### Parabens

Parabens are a group of chemicals widely used as preservatives in the cosmetic and pharmaceutical industries. Parabens are effective preservatives in many types of formulas. These compounds, and their salts, are used primarily for their bactericidal and fungicidal properties. They can be found in shampoos, commercial moisturizers, shaving gels, personal lubricants, topical pharmaceuticals, spray tanning solution and toothpaste. They are also used as food additives.

### Hemp

Hemp is the common name for plants of the entire genus *Cannabis*, although the term is often used to refer only to *Cannabis* strains cultivated for industrial (non-drug) use. Industrial hemp has many uses, including paper, textiles, biodegradable plastics, construction, health food, and fuel, with modest commercial success. The commercial success of hemp food products has grown considerably.

### Lye (sodium hydroxide)

Lye or Sodium hydroxide (NaOH), also known as caustic soda, is a caustic metallic base. Sodium hydroxide forms a strong alkaline solution when dissolved in a solvent such as water. However, only the hydroxide ion is

basic. It is used in many industries, mostly as a strong chemical base in the manufacture of pulp and paper, textiles, drinking water, soaps and detergents and as a drain cleaner. Sodium hydroxide is a common base in chemical laboratories.

### **Saponification**

Saponification is the hydrolysis of an ester under basic conditions to form an alcohol and the salt of a carboxylic acid. Saponification is commonly used to refer to the reaction of a metallic alkali (base) with a fat or oil to form soap. Saponifiable substances are those that can be converted into soap

### **Laminated veneer lumber**

Laminated veneer lumber (LVL) is an engineered wood product that uses multiple layers of thin wood assembled with adhesives. It offers several advantages over typical milled lumber: it is stronger, straighter, and more uniform. It is much less likely than conventional lumber to warp, twist, bow, or shrink due to its composite nature. Made in a factory under controlled specifications, LVL products allow users to reduce the onsite labor. They are typically used for headers, beams, rimboard, and edge-forming material

### **Polyethylene**

Polyethylene or polythene is a thermoplastic commodity heavily used in consumer products (notably the plastic shopping bag). Over 60 million tons of the material is produced worldwide every year. Polyethylene is a polymer consisting of long chains of the monomer ethylene. Polyethylene is created through polymerization of ethene.

### **Polystyrene**

Polystyrene is a thermoplastic substance, which is in solid state at room temperature, but flows if heated above its glass transition temperature for manufacture, and becoming solid again when cooling off. Pure solid polystyrene is a colorless, hard plastic with limited flexibility. It can be cast into molds with fine detail. Polystyrene can be transparent or can be made to take on various colors. Solid polystyrene is used, for example, in disposable cutlery, plastic models, CD and DVD cases, and smoke detector housings. Products made from foamed polystyrene are nearly ubiquitous, for example packing materials, insulation, and foam drink cups.

### **Insulation**

Building insulation refers broadly to any object in a building used as insulation for any purpose. Whilst the majority of insulation in buildings is for thermal purposes, the term also applies to acoustic insulation, fire insulation, and impact insulation (eg. for vibrations caused by industrial applications). Often an insulation material will be chosen for its ability to perform several of these functions at once.

### **Fiber Cement Board**

Fiber cement board is a composite material made of sand, cement and cellulose fibers. In appearance fiber cement cladding most often consists of overlapping horizontal boards, imitating wooden cladding, clap-board and imitation shingles. Fiber cement siding is also manufactured in a sheet form and is used not only as cladding but is also commonly used as a soffit / eave lining and as a tile underlay on decks and in bathrooms. Fiber cement cladding is not only used as an exterior cladding, it can also be utilized as a substitute for timber fascias and barge boards in high fire areas.

### **“GreenSmart” Design and Construction Process**

*GreenSmart* is a voluntary practical approach to building that focuses on educating builders, designers, product manufacturers and consumers about the benefits of environmentally responsible housing. It is an industry-driven initiative that aims to encourage a mainstream application of its principles to today’s housing. As a voluntary initiative, it provides appropriate market recognition for environmental endeavors in the residential construction industry.

# APPENDIX 4

## Ethical Clearance Approval HO9REA036



### University of Southern Queensland

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Thursday, 25 June 2009

Steven Chingnam Goh  
Faculty of Engineering & Surveying  
USQ, Toowoomba Campus

**Re: Ethical Clearance – An investigation into the innovation and technology transfer process in a micro-manufacturer within regional south-east Queensland**

Dear Steven,

The Chair of the USQ Human Research Ethics Committee (HREC) recently reviewed your responses to the USQ HREC's conditions placed upon the ethical approval for the above project. Your project has been endorsed and full ethics approval was granted 23/06/2009. Your approval reference number is: **HO9REA036** and is valid until **23/06/2010**.

The Committee is required to monitor research projects that have received ethics clearance to ensure their conduct is not jeopardising the rights and interests of those who agreed to participate. Accordingly, you are asked to forward a **written report** to this office after twelve months from the date of this approval or upon completion of the project.

A questionnaire will be sent to you requesting details that will include: the status of the project; a statement from you as principal investigator, that the project is in compliance with any special conditions stated as a condition of ethical approval; and confirming the security of the data collected and the conditions governing access to the data. The questionnaire, available on the web, can be forwarded with your written report.

Please note that you are responsible for notifying the Committee immediately of any matter that might affect the continued ethical acceptability of the proposed procedure.

Yours sincerely

Ashley Steele  
Research Ethics Officer  
Office of Research and Higher Degrees