The Phenomenon Of The New Zealand Necessity Entrepreneur

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ABSTRACT

There is a direct correlation between Necessity Entrepreneurship and economic growth; high growth is achieved by raising the Necessity Entrepreneurship rate (GEM 2002). The Necessity Entrepreneur (NE) is someone who never considered owning a business until there was no other option (Kroll, 2003; Forbes 2003). This paper studies the demographic and attitudinal peculiarities of New Zealand Necessity Entrepreneurs; particularly related to reasons as to why these Entrepreneurs start their own businesses. The study explores comparisons between Total Entrepreneurial Activity (TEA), Opportunity Entrepreneurs (OE) and Necessity Entrepreneurs (NE) in New Zealand, together with NE comparisons between OECD and developed countries. The paper explores relationships between NE and unemployment, welfare systems, the labour-leisure trade off (Cowling, 2002), and pension provisions.

INTRODUCTION

The purpose of the study is to enhance our understanding of the New Zealand NE, with emphasis placed on issues of unemployment (Cowling & Bygrave, 2003); linked with immigration (Frederick, 2003; Rotherham 2003).

New Zealand’s high rate of NE is not indicative of low unemployment rates, notwithstanding adequate social benefits. Two propositions (p1 and p2) linking NE with unemployment and social benefits are explored. In declining p1 and p2, it is proposed that immigration could account for the majority of the 55000 NE, because attributes that caused them to leave their home country are similar to those needed for survival in business (Rotherham, 2003).

As a priori it is proposed that many of these entrepreneurs have unique psychological needs, such as lack of self-esteem and fear of family’s survival, due to never being prepared for entrepreneurship. Although NE immigrants have adequate skill levels, their local knowledge and networking capabilities lack distinctiveness.

GEM (2002) research identifies a direct correlation between NE and economic growth, indicating that high growth is achieved by raising the NE rate. Analysing the peculiarities of the New Zealand NE, may lead to intervention by Government programmes to address these inadequacies. Initiatives include socio-cultural programmes, training grants and business incubator subsidies.

The Necessity Entrepreneur (NE) is someone who never considered owning a business until there was no other option (Kroll, 2003; Forbes 2003). This paper studies the demographic and
attitudinal peculiarities of New Zealand Necessity Entrepreneurs; particularly related to reasons as to why these Entrepreneurs start their own businesses. The study explores comparisons between Total Entrepreneurial Activity (TEA), Opportunity Entrepreneurs (OE) and NE in New Zealand, together with NE comparisons between OECD and developed countries. The purpose of the study is to enhance our understanding of the New Zealand NE, with emphasis placed on issues of unemployment (Cowling & Bygrave, 2003); linked with immigration (Frederick, 2003; Rotherham 2003).

METHODOLOGY

The formal and descriptive study comprises data from a Digipoll survey of 2009 New Zealanders, undertaken in the GEM2003 process; measuring entrepreneurial behaviour and the attitudes of the adult population. The total New Zealand population is 3.95 million people, but the adult population of 2.36 million people (20 to 60 year olds) was used as the universe for the Digipoll survey. Data recorded from 27 nations in the GEM2003 poll, together with literature from leaders in the field of entrepreneurship are interpreted. Ex Post Facto primary and secondary data highlight the development of two theme propositions:

p1: When unemployment rates are high, necessity entrepreneurship will be high (Cowling and Bygrave, 2003)

p2: The more generous the welfare system the lower the rate of necessity entrepreneurship (Cowling and Bygrave, 2003).

THE NEW ZEALAND NECESSITY ENTREPRENEUR

Necessity Entrepreneurs are those individuals introduced to entrepreneurial activity because they have no better alternative for work. In contrast to Opportunity Entrepreneurs who take advantage of unique market opportunities; Necessity Entrepreneurs are those who start a business because it is the best option available (and most often, the only option). There is a direct correlation between unemployment and Necessity Entrepreneurship; when unemployment is high, NE will be high as outside alternatives in the labour market diminish (Cowling, 2002).

Demographical and Attitudinal Representation

There are approximately 66000 NE in New Zealand, who to set up their own businesses because of unemployment. This Represents 1.67% of the total New Zealand population, indicating that one in 60 people in New Zealand are NE’s.

Gender distribution is 60.7% male, and 39.3% female, indicative of the New Zealand male being the dominant breadwinner in the family. Over 78% of NE’s support households of two or more people. Of these, 35.7% support children under the age of 18 years. Within Age category, the 35-44 age group dominate with 39.3% of NE’s; followed by the 45-55 age group at 21.4%, and 24-34 age group at 17.9% of NE’s. Necessity Entrepreneurs below the 24 age group only account for 7.1%, whilst those in the 65-74 age group only account for 3.6% of total NE activity. This is again reflective of the higher the proportion of the adult population with pension provisions, the lower the rate of NE (Abell, 1995).

The majority of NEs view themselves as Self-employed professionals, followed by being Business managers or executives in their businesses. They tend to start small service
businesses, often employing only themselves. NE’s don’t as a rule; start companies that employ a lot of people. 72.7% of TNA own and manage their businesses, with the balance predominantly including family members. Three out of Four NE believe they will employ only themselves over the next five years. Only 2% of NE expect their businesses to employ 20 or more people within five years (Bailey, Wall Street Journal, 2003). One in four NE have a tertiary qualification, with an additional 35.8% having a school certificate. Only 7.1% have a trade certificate, indicative of trade professionals being Opportunity Entrepreneurs.

Necessity Entrepreneurs come from various ethnic backgrounds, with New Zealanders of Maori descent accounting for 14.3% of total NE’s. New Zealanders of European descent account for 67.9%, with Asian, African and others accounting for 14.3% of total NE. Interestingly enough, the New Zealand Indian community account for 3.6% of the total NE activity.

Combined Household Income (before Tax) for NE varies, with 35.7% of NE earning between 52-77k per annum. Only 7.1% of NE earn in excess of 77k, indicative of NE being in business due to no other alternatives. The majority of NE live and run their businesses in urban areas (64.3%), with 75% of them having internet access in their homes. Eight out of Ten NE operate their businesses from home. NE activity is dominant in Auckland (14.3%), followed by Wellington and Tauranga (10.7%), Christchurch, Hamilton, Dunedin, Palmeston North (7.1%). These seven business districts account for 64% of total NE.

The majority of NE are Christians, with 72.8% being either Catholic or Presbyterian. Of these, 61.1% practice their religion once a week or more. NE are of the firm belief (70.4%) that Entrepreneurs create jobs for the economy, with only 59.2% believing that Entrepreneurs create wealth that the whole nation shares. 80.7% of NE however agree that Entrepreneurs are important for the nation’s economy. 71.4% of NE believe small firms contribute to society, despite 35.7% believing entrepreneurs are only interested in making money. Only 10.7% of TNE have in the past twelve months shut down, discontinued or quit a business they owned and managed. This is indicative of the necessity to operate their businesses, as they have no other alternatives. 35.7% believe there will not be good opportunities for starting a business in the area in which they live, once again highlighting their necessity motive.

Close to 90% of TNE believe they have the required skills to have started their business, however, 21.4% expressed the presence of a “fear of failure”.

Three out of four NE believe those successful at starting a new business have a high level of status and respect, however, only two out of four consider a new business as a desirable career choice. Only 14.3 % of TNA believe they have no direct competitors, offering the same product or services to their potential customers. In addition, NE predominantly operate in service-based industries, requiring low start up costs. Ninety percent of NEs believe their businesses do not offer their customers a product or service that is new and unfamiliar. This facilitates low barriers to entry, and minimal development of technology. When it comes to procedures required to market their services, eight out of ten believe that technologies were generally available more than a year ago.

Only 4.5% of NE believe they started their business as a result of taking advantage of a business opportunity, whilst the majority believe they had no better choice for work. Funding NE activity indicates that one in ten NE started their business with less than $1000. Three in ten started with less than $10000, and seven out of ten with less than $50000. Eight out of ten
NE fund their own start-up businesses, the balance acquiring funds from friends and neighbours. Once their businesses have however been established, 25% of NE use funding from Financial Institutions. Government programs only constitute 7.1% of NE funding.

AN INTERNATIONAL PERSPECTIVE

Necessity Entrepreneurship between the participating 27 nations, as identified in GEM2003, reflect that 2.72% of the population are NE’s. In New Zealand, a NE figure of 1.67% is prevalent. Whilst the New Zealand and Global NE activity is within similar parameters, the New Zealand Opportunity Entrepreneurship rate (11.51%) is 4.5% higher than the global rate (Average 6.95%). It must however be noted that that the TEA (TOE and TNE) is skewed by the top two countries, Uganda and Venezuela. These two countries, with TEA at 13% and 12% respectively, result in increasing the variance from 7% to 13% should they not have been included. New Zealand ranks fourth highest of the GEM countries in Opportunity Entrepreneurship, but a dismal eighth when it comes to Necessity Entrepreneurship.

FIGURE 1 HERE

The GEM Necessity Entrepreneurs amongst all entrepreneurs is 27.6%, substantially higher than the New Zealand NE rate of 12.3%. Countries with high NE activity are indicative of the lack of social funding in developing countries, including Brazil, China, Chile, Venezuela, Argentina, Uganda and South Africa. These countries are also high growth developing economies. GEM 2002 projects that NE will increase significantly in nations with little or no social benefits for the unemployed, but will increase very little, if at all, in nations with strong benefits for the unemployed.

New Zealand has however the highest NE activity in developed countries, despite having a good social and welfare system. Developed countries, such as Spain, Netherlands, Germany, Finland, Denmark and UK have relatively low rates of NE activity, and are characterised by high-welfare. The more generous the welfare system the lower the rate of NE; when unemployment is low NE rates will be low (Bygrave, 2003).

NECESSITY ENTREPRENEURSHIP IN CONTRAST TO TOTAL ENTREPRENEURIAL ACTIVITY AND OPPORTUNITY ENTREPRENEURS IN NEW ZEALAND

The New Zealand GEM 2002 identifies New Zealand as being at the forefront of entrepreneurial activity. The positive link between entrepreneurship and economic growth has been indisputably verified, in that entrepreneurship turns innovation into wealth.

Total Entrepreneurial Activity (TEA) consists of Opportunity Entrepreneurs (OE) and Necessity Entrepreneurs (NE). OE are people who identify available opportunities and exploit them, whereas NE are those who create self-employment in response to job loss or redundancy, when options for work or participation in the economy are absent or are considered unsatisfactory.

Data provided by the Digipole2003 analysis identify New Zealand TEA at 13.6%, marginally down from 14.01% in 2002. This is made up of OE at 11.5% and NE at 1.67%, both marginally down from 2002. Based on the New Zealand population and size and proportion of adults, this means there are 537200 New Zealand Entrepreneurs, consisting of 471200
opportunity entrepreneurs, and 66000 necessity entrepreneurs. Of all New Zealand Entrepreneurs, 12.4% are NE, and 84.6% OE.

FIGURE 2 HERE

DISTINGUISHING CHARACTERISTIC DIFFERENCES BETWEEN OPPORTUNITY AND NECESSITY ENTREPRENEURS

Whilst OE and NE share many demographic characteristics, the following depict distinct differences: Gender split depicts male domination in NE (64.7%), with OE male domination at 60.3%.

FIGURE 3 HERE

Education qualifications are representative of OE being substantially higher qualified. Interestingly enough, 44.3% of OE is tertiary qualified, as opposed to only 25% of NE being tertiary qualified. Trade qualifications account for 10.9% of OE (7.1% of NE).

FIGURE 4 HERE

Ethnicity identifies a higher proportion of Maori NE (14.3%), in contrast to 8.4% of Moari OE. European descent is higher in OE (74.2%), compared to 67.9% in NE.

Combined Household Income is indicative of OE earning a lot more than NE. 34.6% of OE earn in excess of $77kpa, compared to only 7.1% of NE earning in excess of $77k pa.

Funding the continuation of the business for OE is heavily reliant on banking, with 53.8% using financial institutions, as opposed to only 25% of NE using this form of funding. OE also use close to double the funding from government (13.6%).

In 2002, New Zealand had the highest rate of opportunity entrepreneurs amongst the OECD and developed countries, with necessity entrepreneurs ranking in the middle of all GEM countries. NE however ranked tenth (albeit highest of the developed countries), with TEA ranking sixth on the Global Monitor.

Like most of the rest of the world, New Zealand experienced a drop in TEA in 2002. Globally, the TEA dropped from 9.77% to 7.98%. The entrepreneurship link to economic activity forecasts a further decline in Global TEA in 2003 (GEM 2002).

PROPOSITIONS

p1: When unemployment rates are high, necessity entrepreneurship will be high (Cowling and Bygrave, 2003)

p2: The more generous the welfare system the lower the rate of necessity entrepreneurship (Cowling and Bygrave, 2003).

NECESSITY ENTREPRENEURSHIP LINK TO UNEMPLOYMENT

The New Zealand unemployment rate has fallen to the lowest level since 1987, reducing the rate of a further cut in interest rates by the Reserve Bank (Fallow, 2003).
Employment grew 0.8% in the June 2003 quarter, compared with an average quarterly increase of 0.6% over the past four years and market expectations of 0.3% rise. The unemployment rate, which had been expected to rise from the 5% recorded in March 2003, fell to 4.7%, the lowest since December 1987. Statistics New Zealand (November 2003) published unemployment at 4.4%, the lowest since 1987. New Zealand can now boast the fifth lowest unemployment rate in developed countries, after Korea, Luxemburg, Switzerland and the Netherlands. The rate across OECD countries is 7.1%.

Statistics New Zealand (November, 2003) advise that the working population increased by 65000 over the year ended June, of which 34000 came from net immigration. In the June quarter migrants contributed 3600 of the 15500 increase. The bureau records that the unemployment rate is skewed by new migrants not being able to find employment. Immigration New Zealand have dramatically altered the skills migrant policy, facilitating a reduction in unemployment. All migrants now require job offers, prior to receiving permanent residency.

FIGURE 5 HERE

GEM 2002 indices however reflect that New Zealand has the highest rate of NE in the OEC developed countries, which is contrary to the notion of a correlation between Unemployment and NE. New Zealand have a NE rate similar to that of South Africa, despite South Africa having a 47% unemployment rate.

Cowling and Bygrave (2003) predict that when unemployment rates are high, necessity entrepreneurship will be high. They observe that their model is statistically significant, with unemployment rates exhibiting minor temporal variation between countries. Additional predictions by Cowling and Bygrave (2003) include:

The more generous the welfare system, the lower the rate of Necessity Entrepreneurship. In a nation such as New Zealand, generous welfare benefits may result in an unemployed person choosing to enjoy 24 hours of leisure rather than work, commonly referred to as the labour-leisure trade off. The higher the proportion of the adult population with pension provisions, the lower the rate of necessity entrepreneurs. The aging population relate to the pension system when individuals become inactive in the labour market due to old age. The incentive to work is further reduced by the provision of state funded pensions (New Zealand specific), by raising total lifetime income from non-work sources.

Where barriers to market entry by new businesses are high, the rate of necessity entrepreneurship will be low. An entry barrier, in the economic sense, refers to potential obstacles that operate to discourage entry. There is little empirical evidence to support entry barriers in New Zealand, however, GEM 2002 identifies that New Zealand ranks third in the world in market openness for new and growing firms.

Analysing the above predictions, one can only but assume that the resultant New Zealand NE rate will be low. Unemployment is at an all time low, welfare systems are generous, pension provisions are adequate, and market openness is positive; all resulting in a predicted low NE rate. However, New Zealand has a NE rate in the top quartile of the 27 countries participating in GEM 2003, and the highest rate in OECD developed countries.
Unemployment Link to Immigration

These findings highlight that the unemployment effect is far more complex than previously believed. Since the *a priori* predictions do not stack up for the New Zealand specific, other market forces must be attributable to the relatively high NE rate. Until new legislation was tabled in Parliament in June 2003 (Immigration policy update), whereby the skills levy was replaced by formal employment offers, migration was at an all time high in New Zealand. The retrospective effect however has resulted in a huge influx of skills applicants, entering the country legally, despite having no firm employment offers.

New Zealand is founded on immigration. It continues to be a feature of national life, with nearly one New Zealander in five being born overseas. The proportion in Auckland is however one in three, also highlighting Auckland as the country hub of NE’s. The personal networks of Asian immigrants in particular underpin New Zealand’s $ 21.5 billion two way trade with Asian countries, attract investment, provide new sources of cultural knowledge and language skills, promote tourism, and strengthen external links (Morgan, 2002). In September 2001 the annual number of immigrants was set at 45000, to be maintained for three years. Asian migrants admitted to New Zealand under the business migration schemes between July 1992 and June 1998 contributed $ 969 million in investment capital to the economy (Ho & Bedford, 2002). Overall, Asian investment in New Zealand through resident companies as well as individuals has been estimated at around $ 7 billion (Walters, 2002). It is proposed that much of this is due to the Migrant NE.

Unemployment rates for resident New Zealanders, from the 2001 census figures, show that among Asian New Zealanders 13% are unemployed, compared with a national average of 5.7%. The under employment of migrants with high skill levels is a problem (Venter, 2002). New migrants take time to find new jobs and the rate at which they are being employed has deteriorated: from 64% in 1986 to 46% in 1996 before increasing again more recently to 50%. Migrants who integrated most readily had high education levels and came from an English-speaking background. Even then, they took five to ten years to achieve employment rates and income equivalent to those comparable to New Zealanders.

Research by North (2003) found immigrants wishing to benefit from their own employment included 26 immigrants, all of whom set up their businesses within two years of coming to New Zealand. All 26 (of Asian descent) started their own business due to being unemployed, or underemployed. The research also identified that the respondents were tertiary educated, yet could not find suitable employment. Without exception, they were informed that they were not suitable for their desired employment paths due to a lack of local knowledge. North (2003) identified that most NE tend to be self-reliant. Most funded their ventures, the majority using personal funds, followed by family funds, then bank loans.

Additional research conducted by Maritz (2003) placed emphasis on the reason for tertiary qualified immigrants being unable to find suitable employment in a country with a 4% unemployment rate. The respondents were identified as NE, as they were unable to find suitable employment in the waged sector of the economy, and all started their own businesses as a result. Whilst the study of twelve cases varied in response, local knowledge (or the lack thereof) was cited as the main cause. All twelve respondents reported English as being their first language, and all twelve were permanent residents of New Zealand. Whilst not being empirical, the respondents expressed concern that New Zealand employers placed little or no interest in their international business experience. Seventy five percent of the respondents
perceived New Zealand employers to be threatened by external (migrant) management experience and practices (unprompted). Respondents were of European descent, and experienced business-people in their own right.

Rotherham (2003) highlights that immigrants could account for the majority of the New Zealand NE, perhaps because of the attributes that caused them to leave their home country are similar to those needed in business. Frederick (Unitec, Professor of Innovation and Entrepreneurship) further adds that the most risk-taking people leave their country. “In order to survive in this climate, which is not a South Pacific paradise, people have to be innovative and entrepreneurial.”

As a priori, it is proposed that Immigration accounts for a large percentage of Necessity Entrepreneurs. This together with the notion that these NE have unique psychological needs; due to a lack of self esteem and fear of family survival, as a result of being unprepared for entrepreneurship (particularly in a foreign country).

Whilst little empirical evidence highlights the magnitude of unemployed immigrants, the high rate of migrants in New Zealand is a point of concern. Independent research is indicative that these migrants are not entering the work force, particularly not at the 96% Employment rate as depicted by Statistics New Zealand (June, 2003).

**FIGURE 6 HERE**

**The New Zealand Migrant Necessity Entrepreneurs**

GEM (2002), together with independent research conducted by North (2003) and Maritz (2003); highlight issues that Migrant NE experience when setting up and running their businesses. These include: A lack of formal networks, in that they were never prepared to enter into their own business. This includes local kiwi market support, local alliances, training, education and development.

Unique Psychological needs, a direct result of lack of self-esteem, fear of family’s survival, lack of self-respect, local skills, insecurity and n (ach) achievement.

Funding, indicative of self and family funding, a direct result of inadequate government funding and involvement.

The fear of failure and the unknown pushes many of these necessity entrepreneurs to consider Franchising as an option (Kroll, Forbes 2002). Whilst this system has its benefits, immigrants are often exploited due to uncertainty and local knowledge being mistaken for ignorance (Maritz, 2003).

Although migrants who arrived in New Zealand in the 1980’s and 1990’s were on average more highly educated and younger than working-age New Zealanders, it was difficult for many to adjust to the New Zealand labour market (Dol 2002)

**FINDINGS**

*p1: When unemployment rates are high, necessity entrepreneurship will be high (Cowling and Bygrave, 2003)*
The more generous the welfare system the lower the rate of necessity entrepreneurship (Cowling and Bygrave, 2003).

The ex-post-facto formal research from GEM (2002) and Digipoll (2003) indicates that New Zealand Necessity Entrepreneurship is amongst the top 10 in the participating countries, however, low levels of unemployment prevail. In addition, New Zealand social welfare benefits preclude many unemployed persons from seeking work, highlighting the labour-leisure trade-off. As such, the above propositions are rejected within the New Zealand context. As a priori it is however proposed that unemployed migrants contribute substantially to the New Zealand necessity entrepreneurship level.

CONCLUSION AND RECOMMENDATIONS

New Zealand has the highest level of necessity entrepreneurship in developed countries (GEM 2002), and the tenth highest activity of all participating GEM countries. The prediction that high unemployment levels, coupled with lack of welfare systems (Cowling and Bygrave) lead to increased entrepreneurial activity are not distinct in the New Zealand context. New Zealand’s high necessity entrepreneurial level is characterised by low unemployment levels, and generous welfare benefits. The proposition that migrants contribute substantially to the NE rate requires additional research, but secondary data to date are indicative of such activity.

Since there is a direct correlation between Necessity Entrepreneurship and economic growth, and that high growth is achieved by raising the necessity rate (GEM 2002), it is imperative to develop the escalation of NE in New Zealand. Recommendations include Government Intervention towards assisting Necessity Entrepreneurs, with particular reference to migrant necessity entrepreneurs. Such initiatives may include:

- Metropolitan Migrant Strategy addressing migrant’s difficulties in getting work, notwithstanding incubator and training assistance in new venture developments.
- Identifying industries and regions experiencing labour and skills shortages, and facilitating migrant training and development in this regard.
- Accessibility to government and venture capital, within formal developed migrant networks. Possibility of reviewing the incentive structure for informal investments of this nature.
- Introduction of Business Information programmes, particularly directed at entrepreneurship networking, local business knowledge, and taxation, administrative and legislative issues.
- Initiatives designed to make the integration of migrants into New Zealand easier. This may include printed and web-based information, migrant helplines, and employment referral service.
- Home Tutor services helping migrants to get work in the field they are qualified in.

Further research is to study the dilemma of the New Zealand Necessity Entrepreneur; together with introspective research comparing New Zealand NE’s with both developing and developed GEM countries. Such initiatives may highlight other entrepreneurial characteristics, notwithstanding unemployment and social benefit relationships.
REFERENCES


APPENDIX

Figure 1: Necessity Entrepreneurship Actual Prevalance Rate by Country 2003

Source: GEM 2003

Figure 2: New Zealand Entrepreneurial Activity 2001-2003

Figure 3: Opportunity and Necessity Entrepreneurs by Gender

Source: Digipoll 2003.

Figure 4: Opportunity and Necessity Entrepreneurs by Education Qualification

Source: Digipoll 2003
Figure 5: New Zealand Unemployment Rate

Source: Statistics New Zealand 2003

Figure 6: Immigration Rate in New Zealand (Residency Programme Approval)

Australia’s Strengths And Weaknesses In Technology Transfer And R&D Exploitation: Gem Survey “Experts” Views Compared With Public Policy And Other Published Data.

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ABSTRACT
There has been increasing public debate in Australia in recent years about research culture in universities and other publicly funded research agencies such as CSIRO and its impact on Australia’s performance in generating economic, social and environmental benefits to the Australian community from the large amount of public funding for R&D. This is the supply side issue. On the demand side there is equally concern about the technology absorptive capacity of Australian business as illustrated by the low proportion of gross business research expenditure (GERD) spent by business (BERD). Against this background, this paper has explored the views of about 100 “experts” interviewed in the Australian Global Entrepreneurship Monitor (GEM) studies in the years 2000, 2001, 2002 and 2003 on the issues, strengths and weaknesses of Australia’s technology transfer performance as it applies to new technology small firms. The paper has also explored evidence for any longitudinal change over this period.

INTRODUCTION
There has been increasing public debate in Australia in recent years about research culture in universities and other publicly funded research agencies such as CSIRO and its impact on Australia’s performance in generating economic, social and environmental benefits to the Australian community from the large amount of public funding for R&D. This debate peaked at the National Innovation Summit in February 2000. This was followed by the Chief Scientist’s report The Chance to Change in November 2000. The implementation of the Summit’s outputs lead to a major Commonwealth Government policy document and funding initiative in 2002, Backing Australia’s Ability: Real Results Real Jobs 2002-2003. This is the supply side scenario. On the demand side there is ongoing concern about the technology absorptive capacity of Australian business as illustrated by the low proportion of gross business research expenditure (GERD) spent by business (BERD) (Yencken and Gillin 2003). Against this background, this paper explores the views of the thirty “experts” interviewed in the Australian Global Entrepreneurship Monitor (GEM) studies in 2000, 2001, 2002 and 2003 on the issues, strengths and weaknesses of Australia’s technology transfer performance as it applies to new technology small firms. The paper explores evidence for any longitudinal change over this period.
METHODOLOGY

The research methodology has involved qualitative research based on interview transcript and other text analysis. The first step has been to review the relevant and recent literature on these topics particularly relating to Australia. The raw data for this study came from the Nudist® text analysis of the GEM expert interview transcripts to identify key issues and perceived technology transfer strengths and weaknesses. These extracts were further analyzed using NVivo® text analysis software used to explore any evident trends over the three-year period.

The final step was to relate these findings to published data on public policy and technology transfer performance that had previously been collected and analysed by the authors.

The GEM expert interviews

Each GEM national team selects a minimum of 18 ‘experts’ in entrepreneurship and conducts interviews with them. A different group was selected for each year’s GEM survey. The Australian interview targets were thirty to thirty-five experts each year. The database thus includes transcripts of interviews involving over 100 different “experts”.

Each expert was asked what they felt were the top three weaknesses impeding entrepreneurial activity in Australia, the top three strengths supporting entrepreneurial activity in Australia and to suggest changes they believed would improve Australia’s performance.

The interview content was then classified, using qualitative analysis techniques, into the nine framework conditions, with the freedom to create new categories where comments do not fit any of the framework conditions. Extensive use was made of sub-categories – for example Financial Support weaknesses might include a sub-category of problems relating to obtaining funding for early stage ventures (Hindle and Rushworth, 2002. Appendix 4 p.35)

The Global Entrepreneurship Monitor (GEM) 2002 Executive Report (Reynolds et al., 2002) describes the GEM experts interviewed:

The national experts were a distinctive group in a number of ways: (a) 82 per cent were men. (b) 90 per cent were over 35 years of age, (c) 95 per cent had college/university degrees, (d) 69n per cent had post-college/university educational experience, (e) 57 per cent had over 10 years of work experience, and (f) they were evenly divided across the nine entrepreneurial framework conditions in terms of their respective areas of expertise (p. 39).

The nine framework conditions were:

β Openness (External Trade)
β Government (Extent, Role)
β Financial Markets (Efficiency)
β Technology, R&D (Level Intensity)
β Infrastructure (Physical)
β Management (Skills)
β Labor Markets (Flexible)
β Institutions (Unbiased, Rule of Law).
These framework conditions are set out in more detail in the Australian GEM 2002 report (Hindle and Rushworth, 2002 p.56).

The extracts used were under the heading *Research and Development Transfer*, defined as “the extent to which national research and development will lead to new commercial opportunities and whether or not R&D is available to new, small and growing firms (Hindle and Rushworth, 2002 p.57)”.

**The Australian Background**

The most commonly used indicator for comparison purposes is the ratio of expenditure on R&D to gross domestic product (GDP). As table 25.3 shows, in 2000-01 Australia’s R&D expenditure was 1.53% of its GDP, ranking it below Sweden (3.78%), Finland (3.37%), Japan (2.98%), the United States of America (2.70%), Korea (2.68%), Switzerland (2.64%), Germany (2.48%), France (2.15%), Denmark (2.09%), the Netherlands (2.02%), Belgium (1.96%), the United Kingdom (1.86%), Canada (1.84%) and Norway (1.70%).

In terms of business enterprise R&D, Australia's ratio of R&D expenditure to GDP (0.72%) is again below the ratios for the industrialised countries referred to earlier, and is also below the rate for the Czech Republic.

For government sector R&D as a percentage of GDP, Australia ranks higher. An R&D to GDP ratio of 0.35% places it fourth in the group of OECD member countries for which data are available, behind only France (0.38%), Korea (0.36%) and Finland (0.36%). Government sector R&D as a percentage of GDP is much higher for Australia than for the United States of America or Canada.

For the higher education sector, Australia ranks in the top half. With an R&D to GDP ratio of 0.41%, Australia ranks behind Sweden (0.81%), Switzerland (0.61%), Finland (0.60%), Canada (0.57%), the Netherlands (0.53%), Norway (0.49%), Belgium (0.47%), Japan (0.43%) and Denmark (0.42%) (ABS 2003).

The literature (Forsyth 2000, Gruen and Stephens 2000 and Productivity Commission 1999) has shown that productivity improvement across business sectors in Australia has been uneven. It also suggested that innovation in regulation and to some extent services has been the important contributor rather than in product. The importance of process innovation is however almost certainly evident in sectors such as mining and agriculture. The much less important contribution of technological innovation to multifactor productivity (MFP) growth in Australia has been consistent with Australia’s poor innovation performance among OECD countries:

- In proportion of manufacturing firms with 20 or more employees undertaking technological innovation, ahead of only Spain, Mexico, Belgium, Poland and Turkey;
- In expenditure on technological innovation as a percentage of total sales, manufacturing sector 1996, the second lowest percentage figure, ahead only of Spain (Marceau et al 1997).

These findings have shown that high levels of innovation do not necessarily and/or immediately lead to increased MFP growth rates. The preceding discussion showed that in Australia (unlike the USA) in recent years regulatory and services innovation have been the key contributors to MFP growth, with computer and communications technology still to make an important contribution outside the communications sector. There has however been evidence of a strong contribution from technological innovation, particularly process innovation, in the more traditional mining and agriculture sectors. These sectors historically
Gregory, 1993) have seen high levels of research expenditure both by government and from
industry funds. The conclusion has to be that technological innovation will be an important
contributor to total factor productivity growth in some but not all market sectors.

Commonwealth and State governments have in recent years, particularly in the aftermath of
the National Innovation Summit, have started to recognise the importance of innovation and
to devote resources to support it.

In Australia, the main emphasis has been on increasing public sector R&D expenditure and on
programs to promote and facilitate the commercialisations of these public sector research
outcomes (Yencken, 2003). At the same time, increasingly there has been concern at the low
level of business investment in R&D (BERD). The recent House of Representatives Standing
Committee on Science and Innovation Inquiry into Business Commitment to Research and
Development in Australia concluded with some qualifications that:

…the public sector in Australia…is supporting R&D at an internationally
competitive level but that the level of business R&D is less competitive (p.6).

Attention has also been drawn (Yencken and Gillin, 2003) to European research showing the
linkages between business R&D investment and national technology absorptive capacity as
measured by the BERD to GERD (Gross Expenditure on R&D) ratio or the percentage of a
nation’s research scientists and engineers employed in industry and business generally. For
Australia, this latter percentage is 27 per cent (DEST, 2002 Chart 9). The latest OECD data
for other countries highlights this issue:

In 2000, approximately 2.1 million researchers (about 64% of the total) were
employed by the business sector in the OECD area. In the major economic
zones, the share of business researchers in the national total differs widely. In
the United States, four out of five researchers work in the business sector but
only one out of two in the European Union (OECD, 2003 p.56).

There exists another important difference in focus between Australia and EU countries that is
particularly relevant when discussing GEM findings. The EU sees new technology small
firms as a very important factor in regional development and job creation, whether they end
up as new high growth businesses or remain quite small quality of life businesses. In many
countries, their formation is facilitated, their progress measured and their identities recorded
and broadcast by their research provider parents. European data suggests that this latter group
of entrepreneurial new ventures involves twice to three times as many ventures as classical
research provider spin-offs (Chalmers; 1992; ERI, 2002)

RESULTS AND IMPLICATIONS

Interview data analysis

The inter-relationships underlying the analysis of the GEM expert interview data have been
illustrated in the model in Figure 1, which was developed alongside the coding frame for the
second stage NVivo® analysis of the Nudist® extracts.

The data has been analysed under five main headings

- Intellectual property
- Demand side
- Growth and development including New ventures
- Government policy, initiatives and R&D performance
- Research provider attitudes.
For some of the resulting tables positive or neutral responses have been shown in separate but a parallel columns to negative responses. The GEM reporting year in which the interviews took place has also been shown in some tables to allow longitudinal comparisons where possible. These comparisons have been hampered by the differing analysis frameworks used for the original Nudist® analysis of the interview transcript data.

**Intellectual property**

The responses on intellectual property issues (Table 1) tended to be neutral or negative rather than positive, that is suggesting the need for changes in present practices, but the changes suggested were constructive, rather than suggesting the need for radical change to Australian IP policies and systems. The changes indicated related more to the application of the system by IP owners and their advisers.

<table>
<thead>
<tr>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
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<tbody>
<tr>
<td>IP protection is dependent on industry sector - in bio-tech, for example, it is very important because it can take 10 years to develop a product to market readiness and you need protection during that time. On the other hand, in IT, first mover advantage counts for more and in many cases it is better to have your IP public so you can be the one who sets the standard.</td>
<td>Universities have to have a system for giving credit where it is due to the originator of the IP - provide individual incentives for commercialisation rather than regarding it as community property. Unis are not comfortable with the technology transfer process and each one does it differently - fragmented approach. Valuing IP is a major barrier to entrepreneurship in educational institutions.</td>
<td>Protection of IP is driven by how much money you have to defend it which gives the big players with deep pockets a major advantage. Need to ensure that IP laws do not impede innovation by allowing a few multinationals to own break-through knowledge e.g. gene patenting.</td>
</tr>
<tr>
<td>Reluctance by technology sector (including government) to embrace licensing - perceived as 'selling the farm'. In reality is a useful way of generating cash flow and building infrastructure for further R&amp;D.</td>
<td>Protection of IP in the form of artwork and cultural artefacts is a huge issue for the indigenous population. They are becoming much more aware of the need to get paid for their IP and are demanding proper contracts.</td>
<td>Many government and university schemes don't give sufficient ownership of IP to the actual researchers - inadequate incentive.</td>
</tr>
<tr>
<td>It is becoming imperative for entrepreneurial businesses to keep up with the latest technology in order to grow or even survive.</td>
<td>Good lawyers in IP are expensive, but there are a few firms now who are prepared to take equity at least in part payment. Many of the problems of IP protection require worldwide cooperation to resolve - Australia can't fix alone.</td>
<td>Government funded [university] research is often poorly organised w.r.t. IP protection - varies by university.</td>
</tr>
<tr>
<td>IP rights are a major issue</td>
<td>There is too much emphasis in</td>
<td>Believes that companies</td>
</tr>
<tr>
<td>Positive</td>
<td>Neutral</td>
<td>Negative</td>
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<tr>
<td>(globally, not just in Oz) in the marketing and media industries - examples: - If a company is paid to design a logo, is fee for service adequate compensation for what might become a worldwide trademark? - Does the artist who worked on the logo have a right to royalties on the design - debate currently happening about this - &quot;moral rights&quot; issue? - If a marketing strategy produced by a consultant turns around a company, should the consultant have a right to a share in the upside?</td>
<td>technology commercialisation on gaining patents. Patents are only one way of protecting intellectual property. In some cases it is better to publish the IP and put it in the public domain. Focussing on patents can make academics reluctant to disclose discoveries even to their own colleagues. Each university needs a process and resources by which academics can disclose new knowledge and get help to assess the appropriate path for a particular discovery. Most universities in Australia do not have such resources. University of Queensland and Sydney University are exceptions and have high disclosure rates.</td>
<td>sometimes invest inappropriately in IP protection (where for example early mover advantage is adequate), on the advice of legal professionals who have a vested interest in promoting registration of patents etc. People don't protect their IP early enough - they worry about cost and effectiveness. Australia does not tend to disperse the R&amp;D and share with others; instead it is sold off and not commercialised. More sharing needs to take place.</td>
</tr>
<tr>
<td>There isn't enough focus on the technology/IP that arises from government R&amp;D programs - if the program doesn't succeed in commercialising it, it shouldn't be just forgotten - it is a potentially valuable resource.</td>
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</table>
Demand side
The demand side of a national innovation system is about generating and sustaining demand for new knowledge and for the exploitation of the new opportunities that may result. This will lead to new technologies, innovations generating new products and process improvements—that result in commercial success and consequent employment and wealth creation or in other community social and environmental benefit. All such activities carry varying levels of risk. There are therefore both drivers for such technological innovation and barriers or blockages that put at risk successful commercial development of the opportunity. As might have been expected, the demand side comments (Table 2) were generally critical of the inadequate demand coming from existing businesses for R&D outcomes from others, eg public sector research providers or from their own R&D investment.

The two main themes in the GEM 2000 comments were:
- Australia as a branch office with R&D investment decisions made elsewhere
- The low level of private (business) investment in R&D
- R&D as a cost rather than as an investment.

These perceived attitudes well illustrated the demand side negative perceptions of the “experts” interviewed. There were some indications of a change in focus from the year 2000 to the year 2003 responses, with a greater emphasis on the importance of attracting large companies/multinationals to spend more of their research budgets in Australia. This may possibly have had some connection with the termination of the Commonwealth R&D syndication investment program and the reduced rate of tax deductibility (earlier 150 per cent of R&D expenditure). This change would have had a greater impact on large companies with large taxable revenue streams than on smaller companies (eg new technology based small firms) with small or negligible taxable earning streams.

Table 2 Demand side comments

<table>
<thead>
<tr>
<th>Year</th>
<th>Comment</th>
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<tbody>
<tr>
<td>2000</td>
<td>Australia becomes a minuscule player on the world stage - big players in Australia are mostly multinationals with their R&amp;D focus elsewhere in the world. There is a head office / branch office issue with foreign owned multinationals with a large presence in Australia, which makes it hard for the 'branch offices' to take initiative.</td>
</tr>
<tr>
<td>2000</td>
<td>Decline of private investment in R&amp;D is of great concern. Aversion to investing in technology beyond 'throwaway' dollars</td>
</tr>
<tr>
<td>2000</td>
<td>Australia is very reliant on R&amp;D transfer because there is so little private R&amp;D and public R&amp;D is not commercially oriented. Level of R&amp;D in the private sector is appalling by world standards. Corporate Australia regards it as 'not our business' - expects it to be done by government agencies such as CSIRO.</td>
</tr>
<tr>
<td>2000</td>
<td>Business needs to get actively involved, not just scientists and governments. Amazed that so few big companies have academics/scientists on their board. How do they expect to understand the potential of R&amp;D?</td>
</tr>
<tr>
<td>2000</td>
<td>There is an urgent need for better linkages between the university sector where much of our scientific and medical research goes on with industry. If we don't get that working better, we will find it very hard to achieve our potential and at the moment the gulf between those two areas is huge. There are many people who would rather</td>
</tr>
</tbody>
</table>
have a $50,000 government grant than $500,000 from industry. CRCs are helping to change that situation.

2000 Australia becomes a minuscule player on the world stage - big players in Australia are mostly multinationals with their R&D focus elsewhere in the world.

2000 We have to have R&D within the big corporations that plugs into global needs and global analysis. Within those corporations, they actually have to internally capitalize those developments - they need a vibrant R&D - they need staff who actually are R&D staff.

2003 The ‘pull’ side of R&D transfer needs to come from large companies and most of these aren't interested as a strategic direction. Any support that comes from them tends to be as a result of the personal interest of the CEO and when that person moves on, the support disappears with them. So links between researchers and industry that are sustainable over time are very hard to build. Also an alliance with the Australian branch of a multinational doesn't necessarily give you access to foreign markets because the Australian CEO doesn't have that much influence over the purchasing or investment decisions of Head Office.

2003 There is an obsession with ‘sexy science’ ie developing new technology. Historically, Australia has been very good at invention and technology development, so there is a tendency to build on this historical strength. This fails to recognize the importance of entrepreneurship in commercializing these technology developments. As a result, insufficient resources are put into commercialization, many promising technologies do not get commercialized successfully and therefore businesses are less willing to invest in R&D because they have not realized the benefits they hoped for. This generates a downward spiral in R&D investment in the private sector.

2003 There is still a legacy of the protectionist culture of the past which limits innovation especially in big businesses - tendency to rely on the government to do research, keep Australian businesses price competitive etc

Growth and development
The responses (Table 3) showed an awareness of the importance of science and technology in driving economic growth and again drew attention to weaknesses in the Australian national innovation system. In these responses, the focus tended to be on the lack of effective industry policies and strategies, both overall and for specific sectors such as information technology (IT) and biotechnology.

The responses on issues to do with new technology based ventures (Table 4) were disappointing—given that they derived from a national survey of entrepreneurship performance. They were generally limited to operational issues such as incubator strategies.

Table 3 Growth and development

<table>
<thead>
<tr>
<th>Year</th>
<th>Comments</th>
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<tbody>
<tr>
<td>2000</td>
<td>It is becoming imperative for entrepreneurial businesses to keep up with the latest technology in order to grow or even survive. Studies of the fastest growing Australian businesses show an increasingly large gap between the most successful</td>
</tr>
<tr>
<td>Year</td>
<td>Comments</td>
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<tr>
<td>2000</td>
<td>Australia has a much lower level of R&amp;D than we should have (OECD reports) because we are not willing to invest in strategic industry policy. R&amp;D is seen as a cost - it isn't a cost, it's an investment and should be viewed as such. If a company doesn't invest in R&amp;D to keep itself up to date then it will go out of business. If government doesn't invest in R&amp;D then the country's skills base will decline and Australia will not be attractive as a country to build a business in.</td>
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<tr>
<td>2000</td>
<td>Companies need a formalized system for channeling ideas, which is manageable in terms of resources required to operate it, and is timely enough that windows of opportunity are not missed. Such systems exist - there are well-researched 'stage gate' models, but very few companies apply them. Few companies can afford to do basic research, so it makes more sense to outsource it to specialist research centers such as universities.</td>
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<tr>
<td>2000</td>
<td>Many industries are very fragmented and don't look at themselves in the global sense. So anything that encourages them to start to work together is a step in the right direction and should be encouraged by R&amp;D programs. New manufacturing, which embraces the whole supply chain from lab to market. All processes occurring concurrently with all disciplines working together in projects - no silos.</td>
</tr>
<tr>
<td>2000</td>
<td>R&amp;D under the one heading represents a psychological contradiction. R = 'dreaming' - creative, unstructured; D = implementation - methodical, structured, focused. Most big companies try to put the two together in one department and end up with big R, small D.</td>
</tr>
<tr>
<td>2000</td>
<td>There is a need for industry sector networks to make it easier to pull together all the resources, which are needed to get a new venture off the ground in a particular industry.</td>
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<td>2000</td>
<td>Concerned about the huge growth in number of undergraduates doing courses in business, finance and accounting in preference to science and engineering, where enrolments are dropping. Undergrads are attracted to 'glamour industries' - where does this leave our base skill level for scientific R&amp;D?</td>
</tr>
<tr>
<td>2001</td>
<td>So we need a coordinated strategy for biotech, because at the moment you have got Victoria, Bio 21, you know, da, da, da, you have got Queensland powering away and various other initiatives. You have got New South Wales suddenly realizing after several false starts that it actually hasn't got off the ground Because the other thing, which probably is less recognized, is that the time frames in biotechnology can be very, very long, and the amounts of money increasingly large.</td>
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</tbody>
</table>
| 2003 | It is becoming imperative for entrepreneurial businesses to keep up with the latest technology in order to grow or even survive. Studies of the fastest growing Australian businesses show an increasingly large gap between the most successful
<table>
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<tr>
<th>Year</th>
<th>Comments</th>
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<tbody>
<tr>
<td></td>
<td>businesses that invest in technology and in R&amp;D and the majority who are being left behind.</td>
</tr>
<tr>
<td>2003</td>
<td>The R&amp;D tax concession does not give enough incentive to persuade businesses to invest in R&amp;D. It is just sufficient for financially literate businesses to structure their accounts to get a tax benefit from existing activities that can be classified as R&amp;D, but not sufficient to encourage businesses to do R&amp;D that they would otherwise be unable to afford. Also not enough businesses know about even this limited incentive.</td>
</tr>
<tr>
<td>2003</td>
<td>R&amp;D under the one heading represents a psychological contradiction. R = 78: ‘dreaming’ - creative, unstructured; D = implementation - methodical, 79: structured, focused. Most big companies try to put the two together in 80: one department and end up with big R, small D.</td>
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</table>

**Table 4 New ventures**

<table>
<thead>
<tr>
<th>Year</th>
<th>Comment</th>
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<tbody>
<tr>
<td>2000</td>
<td>Australia needs to find more creative ways of achieving efficient and profitable technology transfer - the Innovation Summit demonstrated this. Israel has an excellent government incubator program: Companies get $350,000 over 2 years, $50,000 of which must be privately funded. The entrepreneur must retain 50% of equity and reserve 10% of employee options. Incubator usually gets 20% and private investor up to 20%. Theory is that at exit point, entrepreneur has something to trade. Also reduces uncertainty (‘equity blues’). Excludes dot.coms because two-year period is too long for them, but works well for other sectors. Means that Israel is not focused on dot.coms alone.</td>
</tr>
<tr>
<td>2000</td>
<td>There is a lack of understanding of the stages to market, the risk / reward curve and the different players who should be involved at each of those stages.</td>
</tr>
<tr>
<td>2000</td>
<td>The idea/technology is one tenth of the business - it is the people and the business model, which really matter.</td>
</tr>
<tr>
<td>2000</td>
<td>Australian university incubators have not developed the strong links with local business, which have worked well for incubators in the USA (for example). Local businesses will get involved because they see the incubator spin-offs as a potential client or supplier. - Penn State has the most impressive program (the Ben Franklin program) and could be used as a model for Australian universities.</td>
</tr>
<tr>
<td>2001</td>
<td>I used Vision Systems as my example of the sort of business we can grow in Australia and I think when you look back at what he started with and the fact that the business employee 600 people and is growing and in addition to that it provide jobs for 1000 others as suppliers if we could breed 10 of those a year for the next decade.</td>
</tr>
<tr>
<td>2001</td>
<td>I think about people who have come up with really very good business ideas and have created very successful businesses but I tend to think about and it is something we haven't yet explored in these opening remarks and perhaps needs to be clarified. I tend to think about start-ups, and I tend to think about good starts up. I tend not to think about more major companies that have successfully re-thought their business. And I don't know that I have many domestic examples of the second category. Of course I can think of lots of examples of the first category.</td>
</tr>
<tr>
<td>2001</td>
<td>And the third one, I think the focus on biotechnology as a sector, as much because it is identified as an area where we believe we can succeed, and it is an area that is an emerging area, not one where we are just getting in as the sun is setting, and it is</td>
</tr>
</tbody>
</table>
where we would like to see entrepreneurial activity in terms of a possible but we also need it because we need 100 people to be out there, because only one of them will actually break through, so we need that multiplicity of endeavor.

2001 Well the biggest single issue is commercialization, in other words the essence of what entrepreneurship is about. It's turning our good ideas into good businesses and we've been very good in Victoria and in Australia in developing and creating ideas, we've creative a common if you like has always been a strong theme but where we've fallen down badly is in commercializing and it doesn't matter whether your scientific R&D, or even IT R&D, R&D generally we've been always strong on the research side, we've been weak on the development side.

2002 More schemes such as technology Park in Brisbane, which encourage start up companies to get together physically. Not an incubator - later than that. At the moment start-up companies are located in different parts of the city, which prevents critical mass and slows down the planning process.

2003 COMET is a good program, but the funding balance is wrong. It places too much emphasis on technical development and not enough on developing the necessary management skills. That component - the MDS scheme - is tiny. It leads to the problem of running out of money for business development… and having to go to the public equity market too early.

**Government policy, initiatives and R&D performance**

The single most surprising conclusion from this examination of experts’ comments (Table 5) was that there were many comments on the poor R&D investment history of Australian business (BERD)—with much attention given to inadequate taxation and other government financial incentives. There were no specific comments suggesting that the present level of government funding of R&D was inadequate. This was in clear contrast to recent agitation by sectors of the Australian research community, particularly the biotechnology and medical technology sectors.

The critical comments related to the way in which existing R&D funding was used, and particularly to the poor performance of the Australian national innovation system as a whole in ensuring a nationally effective focusing of this innovation effort and in more efficiently commercializing and utilizing public financed research outcomes.

**Collaborative Research Centres (CRC)**

The few comments on CRC performance in contributing to creating value out of intellectual property were mixed:

2000: Businesses receive tax breaks for their role in R&D. The respondent stated that they promote work that is interesting, but not necessarily related to entrepreneurial activity. In particular CRCs are not adding any value to the company. Instead they are just providing tax breaks. The respondent said that the issue is that there is no follow through commitment with the results. Also, that big businesses make a small contribution for big tax breaks and that the CRCs ill advise the Government on their direction. The cycle needs to stop, by making business more accountable for their output of R&D.

2002: More needs to be done to encourage people with commercialization skills to work with researchers. Some CRCs are doing this well, but more of this activity needs to be encouraged.
2003: Respondent was involved in a CRC in the past and found it of little value. Believes Government funded research centers tend to be too academic and not sufficiently commercially focused.

### Table 5 Government R&D and other policies and R&D performance

<table>
<thead>
<tr>
<th>Year</th>
<th>Positive</th>
<th>Negative</th>
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<tbody>
<tr>
<td>2000</td>
<td>Suspects that a lot of the former government monopolies did some very innovative research, but didn't have a commercial focus. May be there to be exploited?</td>
<td>There isn't enough focus on the technology/IP that arises from government R&amp;D programs - if the program doesn't succeed in commercializing it, it shouldn't be just forgotten - it is a potentially valuable resource.</td>
</tr>
<tr>
<td>2000</td>
<td>Government needs to continue to fund pure research because it will never be funded by the private sector, and if you lose that pure research base, you don't see the impact till 20 years down the track and by then it is too late to catch up.</td>
<td>Government funding for R&amp;D can undermine corporate activity because their lack of commercial focus means they sell of their research outputs and research activities too cheap. Once they reach their target, anything else is a bonus and hence often sold off well below true market value.</td>
</tr>
<tr>
<td>2000</td>
<td>Industry sectors need to form networks to create a unified voice to convince governments to change their attitude and allocation of resources in favor of the entrepreneurial sector. Business needs to get actively involved, not just scientists and governments.</td>
<td>R&amp;D allowances have not been very successful. They have failed to stimulate private sector research and have been exploited in some cases. Australia is near the bottom of OECD countries in terms of private sector</td>
</tr>
<tr>
<td>2001</td>
<td>First of all, we have always had great tech. You know, I think it is 300 world firsts, what seven Nobel Prizes. So we have always been really good at the ....and that came because of our culture. We are a long way from Mother England. We used to buy machinery from overseas, the damn thing would break down, and you couldn't get parts for eight to ten weeks. So Australians are very inventive and they would invent a solution to keep their businesses running. And that is translated into some huge innovations for Australia.</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>A long-term investment in basic research which has laid down a solid foundation of skill and knowledge in several areas of science and technology and a small, isolated marketplace that provides strong</td>
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</table>
motivation to go global early.

And the other sort of natural advantage that I think we have in Australia is, that for a long time we've been throwing a lot of money into education and hence basic research, so there's just good raw technology in Australia.

2001 The fact of the matter is that the government, I think, recognizes it's key role, because unlike the US, we don't have any major Australian corporations that are involved in R&D. You know, there is not the equivalent of Bell Labs, for example, that we have. And we certainly don't have deep pocket companies, even CSR and BHP in their prime, were not, you know, they did let us say, product support R&D. They never did any fundamental research. And so, you know, the Australian government is cast in the role of being the seeder of some of these ideas through some of the grants and programs they actually have. And it is a little bit like, you know, in 1948 with the Cold War in the US, that the R&D for some of the defense was too risky for industry, so the government stepped in. You fast forward 30 years to Australia and you have got the government has obviously got deep pockets and it can afford to take the risk, and in fact, the payoff is for future generations of Australia in terms of high paying jobs from technology businesses created by this initiative.

2002 Improve federal government financial support of R&D to encourage commercialization of innovative new technologies and companies.

The respondent says that science needs to meet entrepreneurship. He went on to say that unfortunately too much money is thrown at R&D and science. The government will not change their policy if they are not personally educated in the meaning of ethical entrepreneurship and process for economic and social growth.

2003 The respondent says that science needs to
meet entrepreneurship. He went on to say that unfortunately too much money is thrown at R&D and science. The government will not change their policy if they are not personally educated in the meaning of ethical entrepreneurship and process for economic and social growth.

<table>
<thead>
<tr>
<th>Year</th>
<th>Positive</th>
<th>Negative</th>
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<tbody>
<tr>
<td>2003</td>
<td>The federal government should restore and improve incentives for the private sector to invest in R&amp;D. Cutting the R&amp;D tax concession led to reduced business expenditure on R&amp;D and Australia is now well behind other countries in this respect.</td>
<td>The R&amp;D tax concession does not give enough incentive to persuade businesses to invest in R&amp;D. It is just sufficient for financially literate businesses to structure their accounts to get a tax benefit from existing activities that can be classified as R&amp;D, but not sufficient to encourage businesses to do R&amp;D that they would otherwise be unable to afford. Also not enough businesses know about even this limited incentive.</td>
</tr>
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</table>

**Research provider attitudes**

Comments in the 2000 GEM survey on research provider attitudes (Table 6) were strongly negative in relation to both research provider policies and their implementation and to individual academic researcher attitudes. The limited data from surveys in later years suggested some softening of these attitudes between the year 2000 and the year 2003 GEM surveys. Findings from parallel research in this area by the authors (Yencken and Gillin, 2002) have supported these indications. Comments on Cooperative Research Centres (CRCs) (as indicated earlier) and particularly on CSIRO (Table 7) were limited but tended to be negative.

**Table 6 Research provider attitudes**

<table>
<thead>
<tr>
<th>Year</th>
<th>Positive/Neutral</th>
<th>Negative</th>
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<tbody>
<tr>
<td>2000</td>
<td>Many government and university schemes don't give sufficient ownership of IP to the actual researchers - inadequate incentive.</td>
<td>Universities do not understand the value of the 'D' part of the equation - they expect to get 25% of a venture for the 1% 'inspiration' without recognizing the 99% 'perspiration' that has to follow.</td>
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</table>

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<tr>
<th>Year</th>
<th>Positive/Neutral</th>
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<tr>
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<td>Universities do not understand the value of the 'D' part of the equation - they expect to get 25% of a venture for the 1% 'inspiration' without recognizing the 99% 'perspiration' that has to follow.</td>
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</tr>
<tr>
<td>Year</td>
<td>Positive/Neutral</td>
<td>Negative</td>
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</tr>
<tr>
<td>2000</td>
<td>Transfer between IT companies is working well across Australia and internationally. BUT transfer between university sector and IT industry pretty abysmal. Major gulf between the pure research of the university IT arena and the applied needs/research of the IT industry. Gulf put down to difference in cultures between the two worlds and to a misalignment of the way universities are funded for research by government.</td>
<td>Australian universities lag way behind the rest of the world (especially USA) in commercializing university research. It is not seen as core business of a university.</td>
</tr>
<tr>
<td>2000</td>
<td>Australian universities do not have sufficient external focus to stimulate start-up activity i.e. they do not build the necessary networks with local business and government and they do not employ entrepreneurial people on university staff. Best practice incubators have a very strong business committee and ventures without a sound business plan don't get in. We don't see that in Australia.</td>
<td>Universities develop too great a focus on deep research: graduates could benefit from more exposure to applied research on shorter time frames</td>
</tr>
<tr>
<td>2001</td>
<td>More significantly in the last year across Australia there were 42 new bio-tech start ups, and 18 of them in Victoria so we're running at nearly half of all new start ups and I just think that you'll look in the future where bio-tech and the like sciences are going to go, more and more of it will be focused around the medical research aspects, we are so strong in that area, both in our medical research institutions, you know all the minds there all the top ones in Australia plus you know the strength of our university system.</td>
<td>Australian universities lag way behind the rest of the world (especially USA) in commercializing university research. It is not seen as core business of a university. Australian universities do not have sufficient external focus to stimulate start-up activity i.e. they do not build the necessary networks with local business and government and they do not employ entrepreneurial people on university staff</td>
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<tr>
<td>2001</td>
<td>We have had to be smart about knowing our own environment and science has been a factor over in the agricultural and mining areas. So naturally we've sort of been clever</td>
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<tr>
<td>Year</td>
<td>Positive/Neutral</td>
<td>Negative</td>
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<td></td>
<td>and we are acknowledged internationally as being clever, I mean we've had Noble Prizes and so on. So there's no question about the innate capability of our skills population.</td>
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<td>2001</td>
<td>Broadly I guess in terms of the university as a key part of our society, I think attitudes to the entrepreneurial activities that the university is doing are very positive, a sign of a successful university and I think it is perceived that way. About the people leading the charge, Oh I think probably some of them are viewed as being cowboys within the university community if that's what you mean, but I think your dealing in there with sort of a very much a clash of cultures but I think basically they're respected and admired for what they've done.</td>
<td></td>
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<tr>
<td>2001</td>
<td>Obviously scientists are getting more and more into ownership and activity in their own ventures.</td>
<td></td>
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<tr>
<td>2002</td>
<td>The process of commercializing university research needs to be better understood. Academics rarely make good entrepreneurs, but a company needs an entrepreneurial champion, so a 'surrogate' entrepreneur needs to be brought in to manage the venture through the critical start-up stage. Later a more traditional CEO will usually replace this person.</td>
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<tr>
<td>2003</td>
<td>Academic researchers need to be rewarded for building external relationships as well as for publishing academic papers. An ARC study (1998/99) found that only a third of academic researchers were interested in building external relationships. You don't need to turn researchers into entrepreneurs - just put them in touch with entrepreneurs or people who can lead them to entrepreneurs.</td>
<td>Academic career advancement is based on publications. Exploring commercial opportunities takes time that could be spent on producing more publications, so not only is there no incentive to do it, there is a definite disincentive. The few researchers who have commercialized their work have done it in spite of rather than with the help of their research institutions. Many researchers are happier staying within the lab, so external bridge builders are needed to raise their awareness of</td>
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</table>
There is a need for scientific researchers to be educated in the basics of commercialization. This will help them apply for commercialization grants or even become part of a start-up business. Universities and other public research institutions think commercialization has happened when you have a working prototype. They are not good at assessing whether a market for the product or process exists. Once they understand the commercialization process, they realize they can't do it alone. Once they accept that, they become a very valuable member of a team because they usually have excellent analytical skills and that often complements the skills of the people with business experience.

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<tr>
<th>Year</th>
<th>Positive/Neutral</th>
<th>Negative</th>
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<tbody>
<tr>
<td>2000</td>
<td></td>
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<td></td>
<td></td>
<td>If you consider developing university research as an engine of economic growth as a traditional S curve continuum, then Australia is still on the flat - we haven't really got off the ground at all - whereas the USA is on the growth.</td>
</tr>
<tr>
<td>2003</td>
<td>We are all about science and there is too much pressure on our science community to make money. Commercialization should take more precedence. The industry base spent is a fundamental weakness. As a country we divert a lot of money directly into the science end rather than into industry. We should put more money into industry, which should then flow through science as needed.</td>
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Table 7 CSIRO

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<tr>
<th>Year</th>
<th>Positive/neutral</th>
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<tbody>
<tr>
<td>2000</td>
<td></td>
<td>Organizations like CSIRO have great difficulty commercializing outside of the government sector. There are restrictions on holding shares in spin-offs.</td>
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<tr>
<td>2000</td>
<td></td>
<td>Linkages between business sector and research sector (CSIRO, universities etc) need to be improved</td>
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<tr>
<td>2000</td>
<td></td>
<td>Government research organizations such as CSIRO have no marketing plan. They are very creative, but they do not know how to sell what they create.</td>
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</tbody>
</table>
CONCLUSIONS

“I think we're very smart coming up with ideas, I don't think we're smart translating them into outcomes.”

This individual comment encapsulated the experts’ comments generally. There was wide recognition that Australia had invested well in publicly funded research and that nationally we had the creativity and inventiveness to benefit from this investment. The strength of these views was in surprising contrast to widespread demands from academic researchers for more money for research. Both Queensland and Victoria were going to be the world’s leaders in biotechnology — in a tiny domestic market with only a very small proportion of the developed world’s research expenditure on biotechnology. The need for more collaboration and strategic alliances and less going it alone were clearly expressed. There were comments about the lack of national (as opposed to State level) industry strategies for key sectors such as IT and biotechnology.

 Respondents also recognized that not all research had to have a commercial outcome and that there were risks in trying to turn good researchers into indifferent entrepreneurs. The recognition of Australia’s R&D performance was surprisingly high. The comments on research commercialization and technology transfer performance generally reflected other published data, but tended to show greater confidence in potential and achieved community benefit. At the same time, gaps in the public support structures for research and its commercialization were identified. Given the small number of respondents there was little evidence of longitudinal change in attitudes despite significant Commonwealth and State government initiatives in R&D expenditure and support for innovation. There were indications of changing attitudes in universities to commercialization of research outcomes, supporting other evidence to this effect (Yencken and Gillin, 2002; Yencken 2002).
REFERENCES


Figure 1 GEM data nodal relationships

Source: NVivo® model of code structure for GEM interview transcript analyses.