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small-i or BIG-I?

How Entrepreneurial capacity transforms 'small-i' into 'Big-I' innovation: some implications for national policy

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OVERVIEW

Hindle (2002) introduced the terms 'Big-I' and 'small-i' innovation to contrast two distinct perceptions of an important phenomenon. 'Big-I' Innovation is essentially defined as: 'the process whereby new ideas are transformed, through economic activity, into a sustainable value-creating outcome' (Livingstone 2002:3). The 'Big-I' perspective emphasises the importance of value-creating commercialisation through applied, entrepreneurial capacity. 'Small-i' innovation is 'any form of new knowledge capable of providing the basis for a Big-I transformation process'. In the 'small-i' perception, value creation remains an implicit potential rather than being highlighted as an explicit process. The emphasis is on the new knowledge itself.

The aim of this study is to articulate a perceived distortion in Australia's national innovation policy and explore its implications. The distortion affects both the inspiration and execution of national innovation policy. The paper is motivated by clear evidence that the 'small-i' school of thought dominates both public perception of innovation and the national innovation policy agenda. This paper contends that it is the wrong school – in the sense that 'wrong' means 'less publicly beneficial'. Theory, international best practice and expert opinion all indicate that adoption of a 'Big-I'

approach would be conducive to superior policy outcomes. The 'Big-I' school views the creation and development of 'small-i' new knowledge as a necessary but not sufficient condition for innovation. Accordingly, it views most of the subject matter pertaining to new knowledge creation as fitting more appropriately into the policy domain of other areas (education and research in particular) than into the domain of innovation.

This paper explores the contention that, at the level of national consciousness and national policy-making, a change of perspective from 'small-i' to 'Big-I' innovation is justified in theory and necessary in practice.

DEFINITION AS A PREDICATE TO POLICY ANALYSIS

What and where is Australia's national innovation policy?

Australia's national innovation policy is overt and accessible². It is substantially embodied in statements and programs that preceded and succeeded the National Innovation Summit, which took place in February 2000, in Melbourne. The Summit was preceded by substantial preparation embodied in a frameworking document called *Shaping Australia's Future* (DISR 1999)¹. The deliberations of this discussion forum were then distilled by the Innovation Summit

The paper provides a theoretical demonstration that the distinctive domain of innovation policy should be entrepreneurial capacity, which, in any innovation process ('Big-I' innovation), is the principal mechanism for transforming new knowledge ('small-i' innovation) into economic value. This leads to the proposition that national innovation policy should emphasise programs that enhance national entrepreneurial capacity. Empirical investigation finds this proposition is supported by expert opinion and example but substantially ignored in Australia's current national innovation policy. Directions for policy improvement are explored based on two major themes: cultural change and education.

Implementation Group (ISIG). The government, acting in response to ISIG's recommendations, produced a set of policy initiatives titled *Backing Australia's Ability*, which promised, and is in the process of delivering, a spending program – allegedly for 'innovation' – totalling \$3 billion. The best reference resource for everything to do with all these Summit initiatives is the 'Innovation Policy' subset of the website of the Department of Industry, Tourism and Resources (www.industry.gov.au/innovation).

The importance of transformation in the innovation process

As indicated in the introduction, Australia contains two distinct, general schools of thought about the meaning of the word 'innovation'. Only one of them emphasises the importance of transformation.

Evidence from a national survey (DITR 2002a) and case analysis of Australia's dominant innovation policy initiative (DITR 2002b) show that the 'small-i' definition of innovation is dominant among the both the general public and policy makers. The resultant focus of policy attention is, accordingly, upon the production of new knowledge, the undeniable importance of basic research and the valuable commercial potential of new technological discovery through research and development (R&D).

The 'Big-I' school views innovation as a lengthy, detailed, commercial process (Hindle 2002; Dodgson and Bessant 1996). 'Big-I' proponents would argue that getting an idea to the stage where its commercial potential is evident but not yet implemented, is merely the start, not the end, of the innovation process (Rothwell 1992). For them, the development of the new knowledge embodied in an idea with commercial potential, represents, at most, about ten percent of the journey in any full innovation process. The other ninety percent of effort involves matching the new idea to a market need in order to create value. The ability of management to transform the potential of a new idea into an outcome that results in value creation and sustainability is the crucial determinant of the innovation process and deserves to be a central concern of innovation policy.

This transformational ability has attracted various labels, among various proponents of the 'Big-I' school of thought but three examples illustrate the strong consensus of intent. Dodgson and Bessant (1996: *passim*) use the term 'innovative capabilities' to

describe it. Penrose, a seminal scholar in the development of resource-based theories of the firm uses the term 'entrepreneurial competence' (Penrose 1959/1995: 34). Others (Hindle 2002; Reynolds et al. 1999) prefer the term 'entrepreneurial capacity'. In all cases the thrust is identical. For members of the 'Big-I' school, development and possession of high-quality new knowledge – even a high-potential technological breakthrough – is not sufficient to ensure innovative success. It is only one of many factors that increase the probability of ultimate success.

The question becomes: Are these different definitional perspectives just academic hair-splitting? Do they have any practical importance? They do.

Definitional imprecision leads to waste

The practical consequences of imprecise definition result in waste of resources and effort. In particular, a lot of public money is thrown at 'innovation' in the hope that the spending will somehow help to generate productive businesses. It is bad public policy to spend money imprecisely. It is bad business policy to waste opportunities. And that is what happens when stakeholders lack precision in both understanding and expression of exactly what they mean by 'innovation', 'entrepreneurship' and the relationships that exist between them.

A VALUE-FOCUSED DEFINITION OF INNOVATION

Three problems impeding the search for a definition of innovation

It is not contentious that 'innovation' and 'entrepreneurship' are linked in some way. The corporate strategy literature has witnessed an accelerating emphasis on the critical importance of entrepreneurship and entrepreneurial capacity to all aspects of a firm's strategy, especially those aspects that affect innovation (Alvarez and Barney 2000). What is contentious is how these concepts are linked. So, the first problem in defining 'innovation' is to confront the even thornier problem of making clear what is meant by 'entrepreneurship'.

'Entrepreneurship' is a word with an undeserved but substantial legacy of negative connotations. Legge and Hindle provide a proper distinction between ethical entrepreneurs and exploitative swindlers (Legge and Hindle 1997: 4-5). Unfortunately, in Australia, the term 'entrepreneurship' has suffered – and still does to a reduced extent – from the taint of some false entrepreneurs

of the 1980s, who created no new value, but simply shuffled paper assets to create chimerical empires doomed to eventual collapse. This paper adopts the following definition:

Entrepreneurship is the creation and management of a new organisation designed to pursue a unique, innovative opportunity and achieve rapid, profitable growth. (Hindle, 1999: 21)

Our second definitional problem in this paper concerns the fuzzy familiarity and generality of the word 'innovation' itself. In common parlance it proves to be just as troublesome a term as 'entrepreneurship', though for quite the opposite reason. 'Innovation' has the positive, comfortable feel of a familiar word. It does not have academic or technical overtones that might risk alienating some audiences. The downside of such comfort and familiarity is that 'innovation' is rarely perceived to need any formal definition. This creates the risk that each speaker or writer on the subject attaches a different meaning to the word without that meaning being articulated. Accordingly, discussions take place without acknowledgement that the debaters are talking about subtly but significantly different concepts.

Our final definitional problem is the sheer contentiousness of the definitional task. History bears witness. Attempts to debate appropriate meanings for 'entrepreneurship' and 'innovation' and the relationship between them, have often generated more heat than light. Hence scholars, practitioners and policy makers in Australia and many other nations have favoured an approach of 'getting on with the business' rather than 'quibbling about nuances'. It is true that arguing semantics for the sake of argument is futile. But this is a debate with real money at stake. Public and private resources are likely to be ineffective when money is thrown at blurry, moving targets. Given the substantial investment this nation makes in 'innovation' – three billion dollars for the *Backing Australia's Ability* program alone – clarity of definition is not an academic ideal, it is a policy necessity.

The 'Big-I' definition of innovation

The August 2002 issue of *Harvard Business Review* had innovation as its theme. Within that issue, Peter Drucker identified seven distinct sources of innovation. New technology or 'new knowledge' as Drucker called it, was only one of these and, in Drucker's opinion, the most contentious:

Knowledge-based innovations differ from all others in the time they take, in their casualty rates, and in their predictability, as well as in the challenges they pose to entrepreneurs. (Drucker 2002: p100)

From the same edition, former editor, Theodore Levitt criticised the 'creative types' who think that coming up with a bright idea is the start and finish of innovative responsibility. He argued:

By failing to take into account practical matters of implementation, big thinkers can inspire organisational cultures dedicated to abstract chatter rather than purposeful action. In such cultures, innovation never happens – because people are always talking about it but never doing it. (Levitt 2002: p137)

Drucker and Levitt confirm that what Hindle (2002) calls 'small-i' – the idea, the knowledge breakthrough (even in the form of a tested prototype) – is only the start of the innovation process. This perspective ('Big-I') was clearly articulated by Catherine Livingstone, then Managing Director of Cochlear Limited, one of Australia's most successful examples of commercialisation of technology, in delivering the Warren Centre Innovation Lecture of 2000:

I will interpret (successful) innovation as meaning 'the process whereby new ideas are transformed, through economic activity, into a sustainable value-creating outcome'. There are two key words in this interpretation which are worthy of emphasis: 'process': innovation is not just the idea – innovation is only achieved when the idea has been transferred into an outcome which has value... The second key word is 'sustainable' ... Sustainability requires good integration with those who assign value i.e. the customers, the market, and it implies rigour and continuous measurement. (Livingstone 2000:3).

The definition is compatible with most of the prevailing literature from many disciplines. The common theme stresses innovation as a value creating process (Dodgson 1999). This paper also adopts the Livingstone, 'Big-I' definition of innovation. This definition has wide support in Australia. Its advocates include Dr Alan Jones of the Department of Industry Tourism and Resources, the body charged with administering innovation policy. At a recent international forum, Jones presented a paper on Innovation in

Australian SMEs, which commenced by endorsing Livingstone's definition (Jones 2001). The definition is worthy of wide acceptance and promotion in Australia because it conveys three main benefits.

1. It stresses that the full impact of innovation is not achieved until ideas have been transformed into tangible outcomes. This is compatible with many influential theories of innovation (Dodgson and Bessant 1996: *passim*; Dodgson 1999: *passim*; Rothwell 1992).
2. It is applicable to a public good as well as commercial outcomes.
3. It overtly emphasises the indivisible, mutual importance of good science³ and good business. One without the other means innovation is incomplete.

**THEORETICAL FRAMEWORK:
A MODEL LINKING 'BIG I' AND
'small-i' INNOVATION
THROUGH ENTREPRENEURIAL
CAPACITY**

A major issue for innovation theory concerns the choice of the principal level of analysis. For instance, Schumpeter (1934 and 1942) focused on the economy-wide implications of innovation and stemming from his influence a deep body of scholarship has culminated in interest in what are now called 'national innovation systems' (see, for example, DISR 1999). The influential Harvard researcher, Michael Porter (1980 and 1991)

focuses his attention at the industry level. The deepest body of recent innovation scholarship concentrates on the firm as the unit of analysis. In his contributed note to the *Shaping Australia's Future* document (DISR 1999), Mark Dodgson (1999) provided a concise review of recent literature pertaining to system integration of the innovation process within the firm. Dodgson stressed the important work of Rothwell (1992) in demonstrating the evolution of process concepts of innovation through five conceptual 'generations'.

In the economic literature, there is a perspective that has come to be known as the 'Penrosian' view of the firm (Penrose 1959/1995). This view sees the firm as a collection of the potential services embodied in a set of resources that are – actually or potentially – under the administrative control of a team possessing both managerial and entrepreneurial competence (paraphrase of Penrose 1959/1995: 31-64). In a paper entitled *A special theory of the value of innovation*, Hindle developed a theoretical, mathematical model of the value accruing to the innovation process from the point of view of the management of a Penrosian firm (Hindle 2002). The heart of the mathematical model is an equation describing the net present value accruing to a full ('Big-I') process of innovation. It is not necessary in this paper to reproduce the full mathematical argument. Figure 1 summarises the key relationships of the Hindle model.

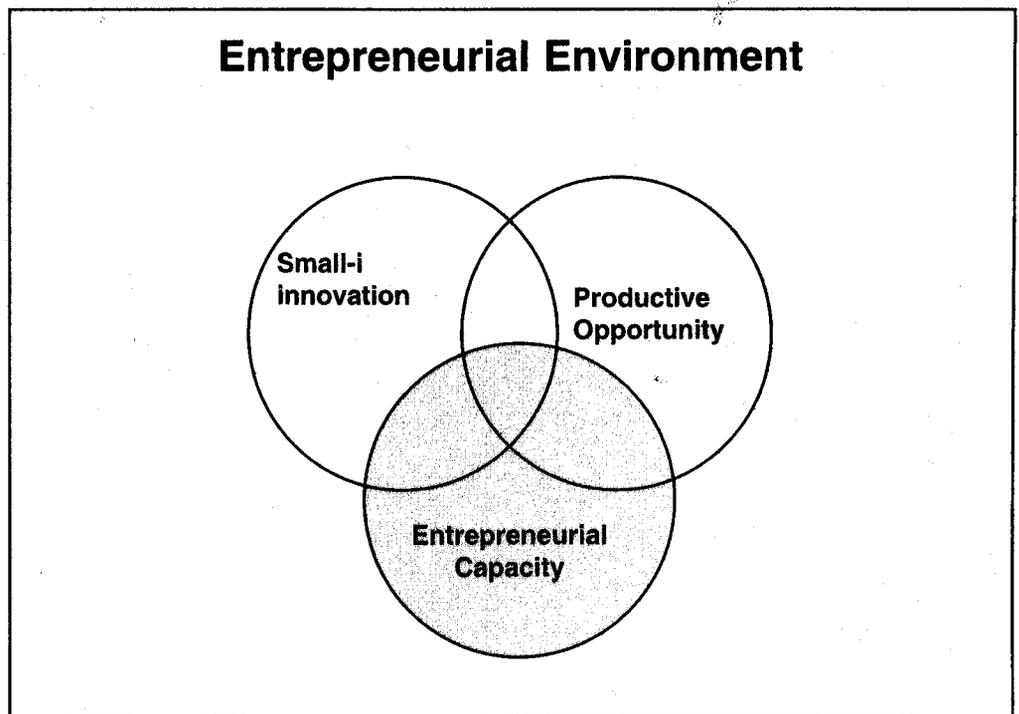


Fig. 1 - The 'Big-I' Innovation Process (Source: Hindle 2002)

Within an entrepreneurial environment, the iterative process of Big-I Innovation (and the resultant value pertaining to it) is a function of the interaction of small-i innovation (the intrinsic value of new knowledge), productive opportunity, and entrepreneurial capacity in multiple periods. The act of value creation through transformation is not a static state but requires continuous managerial effort in an iterative process.

Brief consideration of three general states of this model leads to one major policy implication.

First, the only case where the full value of the total potential value embodied in new knowledge can be realised is when the firm can monopolise all available productive opportunity and possesses 100% of the entrepreneurial capacity required to exploit that opportunity for the full duration of the entrepreneurial process. In terms of a possible 'real world' example, we might cite the case of the sale of a licence to exploit the rights to a patent. If a firm felt that its productive opportunity was maximised by this sale and had discovered a buyer willing to pay the full price of the firm's estimate of the intellectual property, then the value of Big-I (the full innovation process) and small-i (the inherent potential of the new knowledge possessed by the firm) are equated. This is because the opportunity is monopolised and the requirement for entrepreneurial capacity is so minimal (a signature on a contract and a bank account for receiving the cheque) that it is easily and fully met. In this case, entrepreneurial capacity is of virtually no importance. New knowledge is everything. If all cases were of this type innovation policy and new-knowledge policy would and should be synonymous. Unfortunately, the real world seldom matches this scenario.

A second class of cases is far more realistic. The value actually achievable by a firm in any complex innovation process (Big-I) will always be less than the potential value embodied in the new knowledge at the core of that process (small-i) whenever either:

- the firm cannot monopolise all of the productive opportunity pertaining to the new knowledge, or
- the firm, in any period of the innovation process, possesses less than the full entrepreneurial capacity required to exploit the productive opportunity available to it in that period.

In terms of the real world, this situation covers the vast majority of practical cases involving innovation. Competition, scarcity of

resources and scarcity of skills are just three of a multitude of factors sufficient to ensure that a given firm can never monopolise all of the productive opportunity inherent in any piece of new knowledge. The same factors are equally sufficient to ensure that the firm could never obtain or apply 100% of the entrepreneurial capacity required to extract full value from a given productive opportunity – even one that it *could* monopolise.

As a third case, assume that a firm comes into possession of new knowledge (small-i) of vast potential value: say, hundreds of millions of dollars. But suppose also that it does not have or cannot apply any of the entrepreneurial capacity required to exploit the productive opportunity inherent in this new knowledge. In this case, the Hindle model shows (Hindle 2002:12) that it does not matter how potentially valuable the new knowledge may be. Its practical, economic value is zero.

The upshot of all this is that, in the absence of entrepreneurial capacity, the achievable value to a firm of any new knowledge will *always* be zero, irrespective of its inherent potential value or the scale of the productive opportunity it generates. Accordingly, the theory leads to one, dominant implication for innovation policy: *entrepreneurial capacity* – not the quality of new knowledge – is the critical determinant of ultimate economic value. Put another way, 'Big-I' not 'small-i' should be the perspective adopted for policy formation.

This in no way belittles the importance of new knowledge. It is axiomatic that if there is no new knowledge (small-i innovation) created and available to a firm, there can be no value creation based on it. But the theory articulated above indicates that the *distinctive domain* of innovation policy should centre on entrepreneurial capacity, which is the principal mechanism of knowledge *transformation* in an innovation process. Only through applied entrepreneurial capacity can any implicit value of new knowledge be made explicit in the form of economic value. The new knowledge may have value for its own sake or value for its creative satisfaction or value measured in myriad ways that do not involve dollars. It may even be beautiful. But, sadly, it will have no economic value. Remorselessly, the theory leads to the proposition that national innovation policy should emphasise programs that enhance national entrepreneurial capacity.

The next section of the paper contains

empirical support for this proposition from the expert testimony of respondents participating in the *Global Entrepreneurship Monitor* (GEM) study.

THE EVIDENCE THAT A 'BIG-I' FOCUS IS NEEDED

The GEM Australia context

Belief in the national importance of entrepreneurship has existed for a very long time, but until recently there was no attempt to measure entrepreneurship at the national and international levels in a manner capable of providing consistent data and reliable insight. Recognition of this knowledge gap gave rise to the *Global Entrepreneurship Monitor* (GEM) project (Reynolds et al. 1999). A group of international colleagues assembled to develop a theoretical model (see Figure 2) and a practical research design.

The GEM project aims to explore three fundamental questions:

- Does the level of entrepreneurial activity vary between countries, and, if so, to what extent?
- Does the level of entrepreneurial activity affect a country's rate of economic growth and prosperity?
- What makes a country entrepreneurial?

The research was piloted with 10 countries in 1999 and the annual study now includes 37 countries. Australia has been part of the project since 2000. For information on the project and reports published by participant

countries, visit www.gemconsortium.org.

GEM has shown that entrepreneurial activity – as measured by population participation rates in start-up and early-stage venturing – does vary significantly between countries. In 2001, the participation rate varied from a low of less than 5% to a high of over 18% (Hindle and Rushworth, 2001: 8). Australia was among the countries with the highest start-up and new-venturing rates in both 2000 and 2001 (2002 results will be released on 14 November, 2002).

However, the quantity of businesses started is no guarantee of quality or their ultimate value to society in terms of the growth and employment they ultimately generate. Australian Bureau of Statistics data indicate that most small businesses do not create jobs. Almost 50% of Australian businesses employ no one but their owners (ABS 2001). Such businesses are not contributing to the complex task of commercialising innovation. What Australia has is a lot of small businesses. The question remains: why they are these businesses not better at value creation? The answer, coming back from the GEM research, is that they lack entrepreneurial capacity.

To explain the 'why' behind the 'what' of its quantitative survey, the GEM project's methodology includes depth interviews with experts (called 'key informants') in entrepreneurship. They come from a wide variety of backgrounds and possess a wide variety of expertise. For names and brief biographies of all distinguished Australians

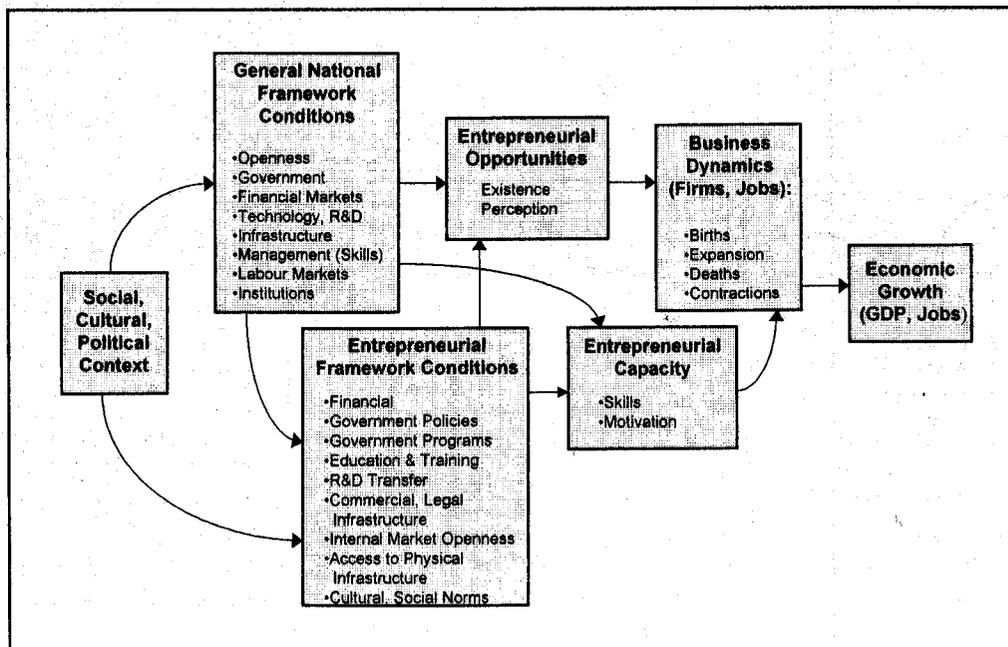


Fig. 2 - The GEM Research Model

interviewed to date, see the *GEM Australia* reports for 2000 and 2001 (Hindle and Rushworth 2000, 2001: Appendix 1). From the two completed years of the GEM project in Australia, there is a database of 84 transcribed interviews where each expert is asked, among other things, to nominate the top three weaknesses they consider impede Australia back from achieving its entrepreneurial potential. They also list their opinions of Australia's top three entrepreneurial strengths as a nation. Selected comments, illustrated in side boxes, demonstrate that GEM's key informants stress both the importance and scarcity of entrepreneurial capacity.

Consensus on the importance of entrepreneurial capacity

Neither R&D capacity nor R&D activity levels emerged as a key weakness in the two years of GEM research in Australia. Although several interviewees were concerned about the low investment in R&D by the business sector, most felt this was a problem of Culture and Entrepreneurial Capacity rather than being due to any structural impediments in the R&D sector. In fact, world-class science and technology education and research capability, together with a national talent for creativity and improvisation, were frequently quoted as among Australia's strengths. With respect to 'small-i' innovation (generating ideas and new knowledge, whether technology-based or otherwise) the consensus was unequivocal: Australia is a world class nation.

Consistently, two themes – comportsing with two of GEM's framework conditions - have topped the list of key issues which key informants believe impede effective entrepreneurial activity in Australia. They are *Cultural and Social Norms and Education and Training*. Straddling these two framework conditions, was respondents' propensity to address the theme of Entrepreneurial Capacity – the skills and motivation to carry out entrepreneurial activity successfully. As illustrated in Figure 2 above, *entrepreneurial capacity* is a key component of the GEM conceptual model. It emerged as a strong, spontaneous theme in the *GEM Australia* depth interviews.

What do GEM experts mean by Entrepreneurial Capacity?

Selected quotations from interviews are the clearest way to illustrate the importance attached by the GEM experts to 'entrepreneurial capacity'. All quotations are extracted from interview transcripts and edited only for flow and conciseness of

expression. A consensus of GEM key informants indicates that entrepreneurial capacity includes or should include:

- A widespread understanding among the community of the process of turning ideas into business;
- Having access to a support network, which in turn implies people able to add value as mentors and adviser; and
- Understanding the importance of building a team and having the ability to do so.

How and why Australia lacks entrepreneurial capacity

In many cases comparison was made with the USA, the country most often held up as an example of national possession of substantial entrepreneurial capacity. In these comparisons, Australia was held to lag behind in several ways:

- We do not recognise sufficiently the importance of skilled and motivated individuals;
- We do not have enough experienced entrepreneurs;
- Australian entrepreneurs have enthusiasm, but without skills to match;
- Lack of skills is not widely acknowledged among practitioners;
- The importance of teamwork is not sufficiently recognised; and
- Australians don't think big enough.

When a policy construction is placed upon the GEM evidence, it leads to the same conclusion as that derived from the theoretical model in the previous section. Innovation policy should be focused on entrepreneurial capacity. The evidence that follows shows that it is not.

THE EVIDENCE THAT A 'SMALL-I' FOCUS PREVAILS

Small-i public perception: a national survey

This year, the National Innovation Awareness Council (NIAC) commissioned a survey to investigate public awareness and perceptions of innovation in Australia (DITR 2002a). For the purposes of the study, respondent demographics were distinguished into four distinct group classifications: 'youth' (students aged 13 to 21); 'parents of students in full-time study'; 'educators and career advisers' and 'proprietors of small to medium size enterprises (SMEs)'.

The survey confirmed that the majority of Australians were able to offer some kind of definition of 'innovation' (though a sizable

'There is a definite need for know how in the commercialisation process. To have some experts that can actually come in and say, this is what you need to do. I can do this for you, I can help you find someone who can do that for you, I can help you drive the whole process.'
 '[Getting] Finance is nowhere near as hard as [getting] somebody beside you who will tell you what you're doing wrong and when you're doing it wrong so that don't go under before you've even realised you're in trouble.'
 'It's not just a matter of having technology skills. It's not just a matter of having a good idea. It's having the business acumen to be able to convert that good idea into a sustainable business. To do that you need to surround yourself with people who can balance your skills.'

minority, particularly among the students, could not). Degree of definitional emphasis differed between the four groups, but the most common concepts associated with 'innovation' were:

- New ideas (topped the list in all four groups);
- New ways of doing things (in top 3 in three out of four groups);
- New technology (in top 4 in three out of four groups);
- Creativity (in top 4 in three out of four groups);

Only one of these concepts – new ways of doing things – even remotely embraces the concept of achieving a tangible, valuable outcome. The rest focus on the idea-generation, new knowledge, 'small-i' component of the innovation process.

Small-i Policy: the National Innovation Summit initiatives

The National Innovation Summit initiatives (discussed in the first section of the paper, above) resulted in the overt creation of an innovation policy for the first time in the history of Australia's federal government. Irrespective of content, it must be said that the mere existence of an innovation policy is a giant positive advance in national policy development. But ultimately a policy must be judged by what it contains. One department of state has a distinct subset of its activities committed to an innovation policy that is accessible to all citizens to read and criticise (DITR innovation policy site 2002). The initiatives thus published provide a rich data set for case analysis in the field of national innovation policy. Scrutiny reveals a national approach to innovation policy that is flawed and inconsistent.

The Summit Initiatives have two main defects:

- First, they confused means and ends. The Summit and its resultant programs overtly stated *ends* compatible with a 'Big-I' innovation perspective, but mandated and funded *means* compatible mainly with a 'small-i' perspective.
- Second, they mentioned but scarcely treated any aspect of entrepreneurship.⁴

Perhaps the best brief illustration of the trajectory of the Summit process from 'Big-I' aspiration to 'small-I' implementation can be seen in the degeneration of the definition of 'innovation' observable from late 1999 to mid 2002. The Innovation Summit process started with a 'Big-I' perspective. It moved to

emphasis on opportunity rather than outcome at the recommendations stage. It has reached a current position where the national innovation policy documentation (*Backing Australia's Ability*) contains no clearly articulated definition at all. A brief amplification follows.

The precursor document to the National Innovation Summit, *Shaping Australia's Future – Innovation Framework Paper*, did provide a succinct, one line, 'Big-I' definition of innovation. Chapter one was entitled *What is Innovation? And the very first sentence gave a one-line, 'Big-I' answer.*

Innovation is the process that incorporates knowledge into economic activity. (DISR 1999: 9)

So far, so good. But immediately after the conclusion of the Summit, the mission statement adopted by ISIG was:

To identify the optimal mechanisms to enhance Australia's competitiveness through innovation. In doing this, to encourage commitment from the industry, research and government communities to a set of innovation targets to be achieved over the next eighteen months, with a sustained and ongoing effort thereafter, that will raise the capacity to generate ideas and turn them into national wealth, and provide high quality business and employment opportunities. (ISIG 2000, p34)

Although this statement seems to be talking about creating 'national wealth', it falls short of emphasising outcomes. The major emphasis has shifted from the capacity to transform knowledge into economic outcomes (Big-I) to a capacity 'to generate ideas' (small-i). And even this is not directed to ultimate value but only to the intermediate stage of 'opportunities'. An opportunity only becomes an outcome if somebody acts on it. In the case of innovation, both theory and expert opinion agree that action should involve the application of entrepreneurial capacity.

No subsequent publications resulting from the Summit initiatives contain any explicit definitions of what is meant by 'innovation'. The foreword the progress report on *Backing Australia's Ability* (DITR 2002b) talks of 'using innovation to turn local ideas and invention into incomes and jobs for Australians'. But this is a language expressing hazy aspiration, not precise meaning.

It is true that the Summit initiatives included 'Big-I' innovation aspirations such as stimulation of the creation of new businesses

'What's the biggest barrier to entry? Getting good people. Australia is very, very innovative but we just don't have people who can commercialise it.'

'In Australia, we lack a talent pool - folks who have actually run businesses like this before, been successful, got the bug and are coming back for the second and third deal.'

'Australia has plenty of people with the right mindset and many of them are actually running their own business, but they're limited because they don't understand the process and don't recognise some of the skills they need.'

'Many entrepreneurs don't know what they don't know. They have blind spots and don't recognise that there are certain skills and talents that they may not be able to bring to the commercial table.'

'Working in a team is a key skill. You don't do it all on your own. Formal education can be good for forcing you to understand teamwork. You have to learn how to get the best out of each individual or else the team fails.'

'Australian businesses don't think big enough. There's no expectation that Australia could ever produce a Nokia or an Ericsson.'

and the expansion of existing ones. But the *means* (which is where the money goes) for achieving these ends betray an indisputably 'small-i' philosophy. An examination of the recommendations of the Innovation Summit Implementation Group (ISIG) and the specifics of *Backing Australia's Ability* document, reveal overwhelming emphasis on the generation of ideas – as opposed to translating of those ideas into an outcome of value.

At time of writing (September 2002), the Innovation Summit initiatives, and with them national innovation policy, have directed the substantial majority of public funding to 'small-i' objectives. The recommendations contained in the final report delivered by ISIG in August 2000 (ISIG 2000) were clustered under three headings: creating an ideas culture; generating ideas; and acting on ideas. The emphasis is on the early-stage, 'small-i' end of the innovation process, rather than the totality of the value creation process. 'Big-I' has almost totally disappeared and this is reflected in the budget allocations that stemmed from the recommendations. Of the \$2.9 billion (later expanded to \$3 billion) initially pledged over five years under the *Backing Australia's Ability* banner (DISR (2001a), at least 80 percent is unequivocally classifiable as 'small-i' spending. It is aimed at developing Australia's Science, Engineering and Technology R&D capacity. A list of government programs allegedly supporting innovation, contains a far higher proportion of programs supporting R&D, than programs aimed at building entrepreneurial or commercialisation capabilities (DISR 2001b).

At roughly the same time as the Innovation Summit Implementation Group (ISIG) was preparing its recommendations, the Chief Scientist of Australia, Robin Batterham, was working on an assessment of Australia's Science, Engineering and Technology (SET) base (Batterham 2000). In his report, Batterham offered this definition of 'innovation':

Innovation is the process that translates knowledge into economic growth. Innovation is much more than invention or R&D. It encompasses all activities encouraging the commercialisation and utilisation of new technologies— scientific, technological, organisational, financial and business (Batterham 2000: p15).

In all substantial respects, this definition is compatible with that of Livingstone quoted earlier and the definition of innovation that

appears in chapter one of the Summit frameworking document (DISR 1999: 9). It is unequivocally a 'Big-I' perspective as defined and developed throughout this paper.

The Chief Scientist's recommendations did not explicitly address building the capacity and skills to commercialise successfully, because Batterham's terms of reference were to examine Australia's SET capability and how it could be enhanced.

Commercialisation skills are not part of SET capability per se, but are an essential ingredient in converting that capability into new businesses, new wealth and new jobs. Nevertheless, it is an ironic contrast. The scientist, not charged with a commercial mission, produced an overtly 'Big-I', process-focussed, commercially oriented definition of innovation. The Innovation Summit Implementation Group, charged with a commercialisation mission, avoided definition of innovation altogether and restricted most of its focus to the 'small-i', 'scientific' end of the spectrum.

Synthesis of the evidence

The results of the recent national survey and scrutiny of the Innovation Summit initiatives provide strong empirical support for the proposition that both the Australian public and Australian policy makers have a 'small-i' rather than a 'Big-I' understanding of innovation. The crucial importance of entrepreneurial capacity as the transformation agent capable of converting a good idea into a commercial reality is well understood by experts – including some politicians and influential scientists – but has not found its way into either public consciousness or public policy. This has two major observable consequences.

1. **General.** 'Innovation policy' in Australia is currently a misnomer. What is currently called 'innovation policy' (most particularly as represented by the Innovation Summit initiatives and *Backing Australia's Ability*) is not really about innovation in its fullest sense. It is about Research and Development (R&D) in quite a narrow sense. And it is more about research than development, and more about basic research in the physical sciences than applied research in a range of disciplines. Somewhere in the Summit process, the 'innovation policy' label has been usurped and misapplied. What is now classified as a national 'innovation policy' might more credibly be labelled 'more-money-for-research-under-another-name' policy.
2. **Specific.** If innovation is to produce value,

entrepreneurial capacity is the key issue. But the public does not understand this fact. And the policy-makers have not focussed on it despite expert opinion (congruent with both theory and international best practice) that, in the context of innovation, entrepreneurial capacity is a far bigger problem for contemporary Australia than is knowledge creation and idea generation.

DISCUSSION AND IMPLICATIONS

Two themes should motivate policy improvements

If Australia is to improve its performance at turning our world-class science and technology capability into commercial outcomes, we believe it needs to focus on building entrepreneurial capacity at least as much as it does on sustaining and developing our R&D base.

If we accept the policy importance of Australia's minimal understanding of and possession of entrepreneurial capacity, the question becomes: What actions can we take to redress the deficit? The GEM experts' policy improvement suggestions (Hindle and Rushworth 2000 and 2001) converged on two main themes as priority areas for improving entrepreneurial capacity. These themes were: cultural change and education. For GEM experts, 'Cultural change' involves the need to change prevailing public attitudes toward entrepreneurship so that it becomes a more socially legitimate activity – in short, a 'profession' that parents would feel comfortable about their children undertaking. 'Education' involves both building the skill level of those who are already playing in the entrepreneurial space or aspiring to do so, and educating the general population about what entrepreneurship actually involves.



The two are related. If more people understood the long, risky and difficult process involved in turning an idea into a business, they would be more respectful and less resentful of those who succeed and more tolerant of those who fail. And if more of the population valued entrepreneurial ability, then there would be greater interest in learning how to do it better and therefore more support for educational initiatives that teach the necessary skills. Policy aimed at cultural change through a variety of entrepreneurship education programs at all levels of society would encourage more people to get involved in entrepreneurial activity. That, in turn, would lead to more people with the experience to manage effectively the business risk involved in new knowledge dissemination, thus improving the probability of success.

Some specific areas for action identified by the GEM interviewees follow.

Cultural change

- More widespread and accurate reporting of entrepreneurship so that the process becomes understood and respected. Entrepreneurship is not about getting rich quick, nor is it rocket science that only 'born entrepreneurs' can achieve. And it is not confined to 'for profit' ventures.
- A more positive portrayal of entrepreneurs in the media and encouragement of positive role models.
- More tolerance of failure. If it was more widely accepted that honest failure is a learning experience rather than a black mark, then more Australians would be prepared to have a go at turning their good ideas into commercial reality.

Enhancing entrepreneurship's legitimacy and skills through education:

- Present entrepreneurship as a legitimate career choice.
- Identify, nurture and educate students with entrepreneurial potential.
- Train non-entrepreneurs in entrepreneurial skills, so that they can work more successfully with entrepreneurs.

Appropriate delivery of entrepreneurship education:

- Use the right sort of teachers. The business world is prepared to help.
- Use an experiential approach. Let people learn by applying classroom knowledge to real life businesses – their own or others.

- Integrate entrepreneurship education into existing courses, so that every student can get a 'flavour' of it.
- Build mentoring programs.

Encourage learning by doing

Entrepreneurial activity breeds better entrepreneurs. The best way we can build entrepreneurial capacity in Australia is to provide more opportunities for Australians to get entrepreneurial experience. This includes Australians from all backgrounds, professions, skills and disciplines – from scientists to creative artists. Australia has a higher level of enthusiasm and 'have a go' mentality than most countries, but we lack entrepreneurial skill and we lack cultural support. Some of the skill deficit can and should be addressed by education, but the most effective way to learn is by doing. We need to create an environment that encourages entrepreneurship and supports those who have a go and fail to learn from the experience and try again.

CONCLUSION: TIME FOR A SHIFT IN FOCUS

The GEM expert interviewees send a consistent message that Australians are already very good at 'small i' innovation. Australians are well-regarded in the world for turning out top-quality science and technology graduates from our universities. But, as demonstrated by the selected quotations in the previous sections, experts provide a consistent message that Australians are not good at transforming their ideas and creative ability into commercial outcomes. This is not news and it is not in dispute. The Federal government would not be committing \$3 billion to 'innovation' over the next five years if it believed Australia were fulfilling its entrepreneurial potential. The Victorian and Queensland state governments would not have each appointed a Minister for Innovation, unless they believed that a higher level of value creation from new knowledge was a priority for action.

Australian policy makers took a great step forward with the National Innovation Summit and subsequent initiatives. They formally recognised for the first time, not only that commercialisation of innovation was crucial to our nation's continued growth and prosperity but that Australia's innovation performance was falling behind that of other developed countries. Having recognised a problem and invested heavily in addressing

it, it would be a tragic waste of resources if the investment failed to pay off because it had only addressed part of the problem – and not even the major part.

What is needed now is for policy makers to adopt the 'Big-I' perspective of innovation. This perspective, supported by theory and best practice, will allow them to see that in order to reap the benefits of innovation policy to date, the problem of Australia's poor entrepreneurial capacity must be addressed. Otherwise, as the explanatory examples of the theoretical model clearly illustrate, the return on that investment will be severely limited.

With the benefit of a 'Big-I' perspective, initiatives that build entrepreneurial capacity in Australia can augment the 'small-i' initiatives currently prescribed. Nothing need go to waste except the false and naive notion that, if enough new knowledge is created, some of it will achieve some commercial success some how. That is a passive view of the transformation process and what is needed is people with the capacity to act: more of the right people with more of the right skills. Fortunately, there is a small but articulate cohort of expertise in this country that is available to assist policy makers develop initiatives that will help expand entrepreneurial capacity. Well-considered and practical suggestions are offered by the GEM experts every year. One recommendation flowing from that expertise and detailed in the Yellow Pages® GEM Australia, 2001 report, was to establish a program of Collaborative Development Centres (CDC), analogous to the national Collaborative Research Centre (CRC) program (Hindle and Rushworth, 2001: 47-48). Others can be developed and cost-effectively implemented.

If innovation policy makers are prepared to recognise the right problem, those Australians who do understand the crucial importance of entrepreneurial capacity are prepared to help find the right solutions. Currently, Australian 'innovation policy' is to fund leading-edge research in the absence of the entrepreneurial capacity to commercialise it on a global scale. For as long as this remains our policy, the dividends from our R&D investment will continue to be stamped: 'made in Australia - banked overseas'.

NOTES

- ¹ In late 2001 the 'Department of Industry Science and Resources' (DISR) changed its

name to the 'Department of Industry Tourism and Resources' (DITR). This has the potential to confuse documentation referencing. The responsibility for 'Science' moved to the education portfolio. The responsibility for innovation policy remained with the restructured department.

2. Australia is a federation. State governments also have innovation programs. Much that constitutes 'innovation policy' is covert: diffused under the auspices of many other policy domains such as, education, defence, small business and so on. This paper, confines its analysis to the overtly articulated innovation policy of the federal government as embodied on the DITR Innovation web site at www.industry.gov.au/innovation.
3. This paper takes a catholic view of the meaning of 'science'. Here, it means simply 'knowledge' of all kinds and is in no way limited to 'high technology' or even 'technology'. New knowledge could be as simple as an act of recognition as articulated by Mitchell (2000: 7).
4. The fifth ISIG 'information paper' was promisingly entitled 'Entrepreneurial Training' (ISIG 2000). Unfortunately, it was merely an incomplete listing of some programs currently in existence. It contained no recommendations for action. A listing of commonwealth and state government programs classified as 'supporting innovation in firms' contains substantially more 'small-i' than 'Big-I' initiatives (DISR 2001b).

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