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The idea of integrating innovation: 1

Entrepreneurship and a systems perspective

Göran Roos, The University of Adelaide
Allan O'Connor, The University of Adelaide

Introduction: The ambition of this book

In 2011, the South Australian [SA] Government enlisted the services of Professor Göran Roos as Adelaide Thinker in Residence to examine the innovation challenges faced by the manufacturing sector. Professor Roos's brief was to work with a group of ten small- to medium-sized manufacturing firms and two government departments to guide the participants through a process that would actively engage them in business model innovation. At the time, a group of researchers were also engaged to work with the firms and government agencies to help document specific aspects and challenges confronted by the firm's leaders and managers and the government agencies that seek to facilitate regional transformation and transition.

Professor Roos's residency inspired this book and, with the support of the University of Adelaide Press, we issued a call for South Australian research that would not only demonstrate the drivers and processes of innovation but also illustrate the interdependencies of innovation across multiple levels, ranging from the individuals with innovation ideas and ambitions through to government support agencies that create the supporting context and infrastructure for innovation.

Although the manufacturing sector provided the setting for Professor Roos's work, for contributions to this book we loosened this constraint. We purposefully invited open submissions for research that dealt with innovation and correspondingly entrepreneurship from any perspective as long as it was original research based in South Australia which offered insight on the idea of integrating innovation through entrepreneurship strategies and systems. We welcomed articles that addressed relevant and related subjects pertinent to the South Australian innovation system. As a result we attracted articles dealing with both innovation and entrepreneurship that varied from not-for-profit firms with social missions to the research and development division of a pharmaceutical company; from public infrastructures such as education and intellectual property patenting systems to private infrastructures of Enterprise Resource Planning systems.

The book itself is designed as a seed for an innovative idea and its editors held three ambitions for the work. The first was to draw together initially South Australian research and researchers (later we wish to expand this collective) who are actively engaged in creating and contributing to new knowledge about innovation by adopting a systems view of entrepreneurship. The second was to facilitate a growth in understanding about the linkages between innovation and entrepreneurship and how these two distinct ideas are necessarily intertwined, how they interact and with what effect. The third ambition was to examine and establish a language that has relevance to the concept of integrated innovation and entrepreneurship. We felt that the field of intellectual capital offered a systems view that provided such a language; and consequently we review each article in the concluding chapter to draw together the salient points from each of the contributing authors and construct the links between innovation and entrepreneurship when considered through the lens of an intellectual capital system.

This introductory chapter is designed to provide the context for the subsequent chapters. It first outlines the South Australian economic context, which leads to the second discussion of the manufacturing sector and how the definition of manufacturing has changed. This introduces the idea of a much broader range of sectors that are responsible for innovation, and provides the platform for a much more open approach to thinking about innovation within the state's context.

Next we consider the question of how important it is to consider innovation as an integrated system concept. This section discusses the different levels, antecedents

and the broad range of influences on innovation. It particularly draws attention to the government role in innovation and how policy environments are changing to respond to the complexity of issues of such things as stimulating innovation.

We then discuss entrepreneurship with respect to the extent to which it is a study of a system that extends beyond a conceptual study of individual entrepreneurs. This system has a specific purpose and that is to introduce innovation. Hence we establish here the link between entrepreneurship and innovation. The discussion then moves toward the elements that are predominant in a social system that generates innovation and the deficiencies of academic studies in this critical area of concern. Lastly, we outline the language and tools of intellectual capital [IC] to provide a point of reference on the challenges of integrating innovation before the chapter draws to its conclusion.

The characteristics of the SA economy

South Australia is a small economy and, significantly, the smaller the size of the economy, the less relevant neo-classical economic theory is (Roos, 2012). A small economy does not have the opportunity that a large economy has to spontaneously generate optimal responses to change. Left to its own devices, compared to a large economy, a small economy as a whole has a higher risk of decline. To express it in neo-classical economic terminology, the smaller the economy, the more market failure becomes a feature of the economy as a whole.

The increasing openness of a small economy does not change its propensity for market failure, since its ability to digest and make use of knowledge is affected by its 'absorptive capacity' (Roos, 2012). The absorptive capacity of an economy is based on a firm's ability to recognise the value of new information, assimilate it and apply it to commercial ends. If the absorptive capacity does not increase while the information inflow increases, the economy will still not perform any better.

As a result of the resources boom, Australia — and South Australia — faced the risk of the so-called Dutch Disease: a term applied when the wealth generated by a country's booming resources sector drives up the exchange rate and inflates the domestic economy, making the country (and its manufacturing sector) less internationally competitive and compromising its long-term economic prosperity (Government of South Australia, 2012b). The South Australian economy is vulnerable to a high-cost environment, driven by the high exchange rate and terms of trade.

Many firms, as well as many government support systems, are yet to identify how to compete in this new environment. Failing to come to terms with this new dynamic will mean that the existing potential for agility and innovation, especially in small to medium enterprises [SMEs], is unlikely to be realised.

This necessitates a call to action to improve the competitiveness of the South Australian economy, especially through strengthening the innovation system to boost the absorptive capacity, collaboration and learning by firms, the level of firm management capability, and a shift to more balanced, diverse and high-value activities with global reach.

SA manufacturing: An innovation lead indicator

The South Australian manufacturing sector has been subjected to significant changes through globalisation, the repositioning of international markets, increased demands for customer responsiveness, and customisation and growth in global supply chains (Spoehr, 1999). Today, the challenge is ongoing with increasing complexity in global supply chains and new emerging demand for green technologies and products (Future Manufacturing Industry Innovation Council, 2011). According to the South Australian Plan (Government of South Australia, 2012b), in 1991 manufacturing accounted for 1 in 6 jobs and in 2011 this number had declined to 1 in 10.

As a result of the sectoral changes, together with the intensification of foreign competition, the comparative disadvantages in some manufacturing activities and the high value of the Australian dollar, the imperative for South Australian firms to engage with business model innovation and experiment with diversity is becoming increasingly urgent. While Australia generally faces an ongoing structural adjustment to the new global competitive environment, South Australia in particular risks losing proportionally 6700 jobs during the period up to 2016/17 (Government of South Australia, 2012b).

However, perhaps contrary to popular belief, South Australian manufacturing is not in terminal and in inevitable decline, nor is manufacturing an old industry whose death should be accepted to make way for growth industries like resources and services. In essence, the South Australian Manufacturing Green Paper (Government of South Australia, 2012a) argues several points including the following:

- Manufacturing still employs around 1 million Australians and has done so, more or less, since the 1960s.
- In SA, 10 per cent of the workforce is in manufacturing (79 000 jobs).
- Manufacturing still accounts for 8.7 per cent of GDP and most of Australia's high-value exports.
- In SA in 2011, manufacturing contributed $8.9 billion or 10 per cent of the Gross State Product and, importantly, there is evidence that manufacturing has a substantial multiplier effect on the rest of the economy by being a carrier of technological change and by driving jobs, investments and sales in other sectors.

While statistics suggest that the manufacturing sector's share of the Australian economy and rate of employment is declining, it is a relative downturn, characteristic of most developed countries. In absolute terms, manufacturing remains a substantial and important generator of economic activity and jobs, especially since most manufacturing firms are also directly involved in the services part of the economy. Manufacturing includes myriad activities in addition to production, such as design, logistics, customer solutions, support services and research. Its economic contribution is often underestimated as these other discrete manufacturing activities are not counted as 'manufacturing' in national statistics. And yet, firms involved in (sometimes oblique) sub-sectors of manufacturing are a major part of the South Australian economy, characterised by the small to medium enterprise sector.

Contemporary evidence suggests that innovation is not simply the fruit of research and commercialisation. Rather, the reality of innovation more commonly in evidence is a fluid, interactive, cumulative process involving a wide array of learning and problem-solving activities, with multiple actors drawing on a variety of resources, forming and reforming combinations of knowledge (Lam, 2004). Value-adding innovation also requires entrepreneurial management that couples new knowledge with commercial potential to a customer and, importantly, a market promoting adoption and diffusion (Zubielqui, Lindsay, & O'Connor, 2014).

Is an integrating innovation perspective important?

The UK Government paper, *Innovation and Research Strategy for Growth* (Department for Business, Innovation and Skills, 2011) is a cogent and comprehensive presentation

of evidence from academic scholarship and empirical studies by the OECD, NESTA, the EU and others. It shows a wider set of links between research knowledge and innovation, as well as elements of innovation that go way beyond research.

The Australian experience of innovation operating in many different modes at the enterprise level, including in SMEs, is documented in a series of studies over fifteen years by the Australian Business Foundation. Chief among these are the seminal study, *The High Road or The Low Road?* (Marceau, Manley, & Sicklen, 1997), linking innovation to productivity and growth; the collection of expert papers on the hidden human dimensions of innovation, *Inside the Innovation Matrix* (Australian Business Foundation (ED), 2008); and the recent analysis and case studies of business model innovation by Scott-Kemmis (2012). This body of work substantiates the variety of value creation and value-capturing activities undertaken by innovative enterprises and their workforces that meet market needs in exceptional ways, generate revenue, and transform business methods and capabilities to serve customers worldwide. These are not restricted to large firms or to high-tech sectors, but are pervasive across the economy.

At the heart of these innovative activities is the constant search and analysis by enterprises for market opportunities and how they integrate these with their own design, management, finances, engineering and organisational capabilities to gain and retain a distinctive competitive edge. Further, innovation in firms equally depends on a wider innovation environment, a system that has the infrastructure, finance, information and institutions that support firms taking the risks and reaping the rewards of business change, whether radical or incremental.

Too often innovation is a term whose meaning is obscured by vagueness and overuse. Of even greater concern, outdated and inaccurate understandings of innovation are widely held by business and government decision makers and by the general public. Further, there is little appreciation of how productivity growth can be improved by the innovative behaviour of enterprises and their workforces. This results in misguided views about innovation capabilities and how they contribute to a firm's competitive advantage, particularly when faced with concurrent shifts in the global economic competitive environment.

Being innovative is more than coming up with new ideas or inventions, and it does not simply equate with commercialising scientific discoveries or technology

breakthroughs. At its simplest, innovation is doing something new that is both useful and valued, and it requires an entrepreneurial management for its exploitation. The OECD (2011) report on skills for innovation and research suggests that a broad range of skills, including 'soft skills' such as entrepreneurial skills and capabilities, will become an increasingly important contribution to innovation in a nation. Similarly, Shane (2008) emphasises that would-be entrepreneurs need to be armed with skills that make them more successful, rather than just being encouraged to start a business. A key feature of such skills is the ability to implement transformative change in response to needs or problems that really matter to a customer, which creates a market and benefits a community.

From a policy perspective, an understanding of how to best stimulate and support the transformation of small- to medium-sized firms and assist the transition of others is not readily apparent. Part of the problem is embedded in the complexity of the relationships between the motivations and drivers of individual business owners or Chief Executive Officers, the issues and challenges faced by the management teams of firms confronting the need for change, and the dynamics that firms encounter within their regional environment. However, few studies have ever examined the interrelationships from within the dynamics of the firm to understand how broad policy approaches would or could impact behavioural change at such intimate levels of the firm and the individual.

Modern innovation policy will no longer be simplistic in its demarcation between portfolios. Marton and Phillips (2005, p. 81) attest that the characteristics of modern policy-making, leading into the future, will be 'forward looking, outward looking, integrated and participatory, inclusive of the views, values, objectives and practices of all concerned parties and based on lessons systematically learned from ongoing experience'. Policy-making organisations are faced with a greater need to provide new solutions driven by an array of stakeholders (Hess & Adams, 2002; Yapp, 2005).

Entrepreneurship: A system that integrates innovation

The earliest studies of entrepreneurship were conducted by economists who recognised the contribution of the entrepreneur in altering market economic systems (Hébert & Link, 1982). More recently, the idea of the entrepreneur as also contributing

to social system changes has resulted in the emergence of social entrepreneurship as an area of research (Christie & Honig, 2006; Thompson, Alvy, & Lees, 2000; Peredo & Chrisman, 2006; Peredo & McLean, 2006; Nicholls, 2010). One of this chapter's authors, O'Connor (2013), more particularly makes distinctions between types of entrepreneurship that may occur within the knowledge, social and corporate sectors of a national economy and argues that these tend to converge on the issue of expansion and growth of an economy.

Audretsch (2004, p. 188) traces the development of entrepreneurship with respect to its contribution to national economic systems and concludes that entrepreneurship serves 'as a mechanism facilitating the spill over of knowledge', and that in order for public policy 'to promote innovation and economic growth' there is a need for instruments that promote entrepreneurship. However, Audretsch continues by highlighting the need for future research 'to explicitly identify what exactly those instruments are and how public policy can best be deployed to promote innovative entrepreneurship'.

The process of entrepreneurship is centrally concerned with the recognition, discovery and/or creation of opportunity (Alvarez & Barney, 2005; Schendel & Hitt, 2007; Shane & Venkataraman, 2000). Substantivists view opportunity as a symbolic interaction between entrepreneurs and their environment (Dimov, 2011). Adner and Kapoor (2010) also claim that value recognition and appropriation happens through ecosystem interactions and interdependencies often mapped as an industry value chain, or perhaps better described as a value web from a systems perspective. In adopting a systems approach, it is important to recognise that the study of entrepreneurship does not start and stop with the actions of an entrepreneur or their firm but extends to the interactions and interdependencies of the entrepreneur, as the principle actor, and their firm, as a mediator, with the social, market and macro-economic environments.

The concept of panarchy (Gunderson & Holling, 2002) suggests that change within systems happens along various layers within the system and at different rates. Each system layer contained within the whole acts simultaneously to conserve and stabilise on the one hand and to generate and test innovations on the other (Holling, 2001). If one is to consider each layer of value creation in a value web, then it follows that different firm or actor interactions at each layer not only create but also reconfigure and/or destroy value. In order for the ecosystem to change and adapt, an

innovation must succeed within each layer, and the entrepreneur must envision and align not only one system layer but each successive and/or dependent system layer.

By way of example, technology systems must interact with social systems, and therefore advances in technology face two challenges; first, gaining a foothold in one or more of the successive technology value systems, and second, making sure that the inner and outer (or upstream and downstream) social value systems align with the technological advance (described as an ecology strategy by Iansiti and Levien, 2004). To confront both of these challenges, technologists must address not only the intersections between the economic and technology systems but also the social system intersections that carry and distribute information.

The introduction of innovation into an ecosystem represents a reorganisation phase (see Gunderson & Holling, 2002; Holling, 2001), which is the least examined and the least understood phase (Holling, 2001). McKelvey (2004) argued that reductionist methods fail entrepreneurship research, as the nature of entrepreneurship as a phenomenon resembles a complexity science whereby causality is considered through multiple lenses: the objective action and reaction among predictable and universal behaviours; the specific objectives of participating actors that shape specific behaviour; localised material conditions that alter the substance of, or inputs into, innovation and entrepreneurial venturing; and lastly, the influence of top-down and bottom-up hierarchical and institutional structures that impose means and ways of creating actor interactions.

The conclusion is that we can view the economy as an open system in dynamic disequilibrium. As a consequence, structural changes manifested in the contraction and death of old enterprises and the birth and growth of new ones are compelling evidence of an efficient economy at work. Holling (2001) outlines how human systems differ from systems of nature due to three factors — foresight/intentionality, communication and technology — and it is the entrepreneur who is a central actor in creating dynamic changes through these particular attributes of human systems.

The elements of an integrated innovation system

The complex interaction of market forces involving changing consumption preferences, changing production processes, changing production costs, changing market offerings, changing levels of value creation, changing levels of value appropriation and changing trade patterns results in a dynamic industrial structure

in terms of scope, profitability and location. These complex interactions have been the focus of many researchers and have resulted in many theoretical developments to help us in our understanding over a very long time. Some of the key insights, heavily simplified, are in chronological order:

- Industry locates to where rent opportunities are largest (von Thünen, 1826 [1966]).
- Patterns of trade are a consequence of shifting comparative advantages among regions (Heckscher, 1919).
- Economic activity is a constantly shifting spatial interaction between people and property (Lösch, 1939).
- Technological innovations are the driving force in a continually evolving capitalist system. Firms successfully deploying new technologies will replace those that do not, resulting in the birth and death of firms — a process known as 'creative destruction'. Technological innovation often creates temporary monopolies, allowing abnormal profits that are then removed by rivals and imitators. These temporary monopolies are necessary to provide the incentive necessary for firms to develop new products and processes (Schumpeter, 1911; 1939; 1942).

So far we can conclude that the most important elements of a regional innovation system are:

- knowledge, new to the firm, the industry or the world (a human attribute)
- competent people (a human attribute)
- an environment conducive to innovation (a structural attribute).

To these elements at least three further criteria that create the dynamic flow of innovation activity by entrepreneurs and their firms must be integrated into the system for successful innovation:

- The innovation must be desired by the market.
- A high level of value creation must be achieved through the innovation.
- A high proportion of the value created must be captured by the innovating firm.

We will discuss each of these in turn at its related systems level.

Knowledge

Knowledge new to the world is most frequently achieved through basic research carried out at universities and research institutes. Due to the existing pressures of the financial markets, it is difficult for listed corporations to invest in basic research, which by its very nature is long-term, risky and ever more expensive. In one survey of Chief Financial Officers in US firms, 80 per cent responded that they would cut R&D, if necessary to meet their firm's next-quarter's profit projections (Graham, Harvey, & Rajgopal, 2005).

For example, only one of every ten thousand chemicals investigated by pharmaceutical firms is approved for patient use (National Research Council, 2010). It is estimated to cost on average $802 million and take an average of twelve years to transition one new chemical from the exploratory phase to use by United States patients (Hewitt & Lowy, 2001). This is a large barrier to commercial investors. Under these boundary conditions, when publically listed firms are investing less in basic research and more in applied research and development, it is increasingly left to privately held firms, foundations, non-government organisations and government to fund basic research. This is consistent with the notion that governments should assume responsibility for supporting activities that produce benefits to society as a whole but not necessarily commensurately to the individual performer or underwriter. This means that research universities and research institutes will have to assume the primary responsibility for performing basic research, with the funding coming from federal government and foundations.

Knowledge new to the industry is most frequently developed through applied research at universities and research and technology organisations. In this area the contributions of the universities are frequently overestimated and the contributions of the research and technology organisations underestimated. The following statement illustrates this: 'To be blunt, if anything, there is a tendency in the literature to perhaps overplay the role of universities and underplay the role of the private sector in generating innovative technology clusters' (Betts & Lee, 2004).

Knowledge new to the firm is inherently executed as R&D-type activities within the firm or as collaborative activities between the firm and outside agencies (other firms, universities, research and technology organisations, etc.). Again the role of universities tends to be overestimated, as illustrated by the fact that in Government

Voucher programs aimed at enabling firms to involve themselves to higher degree in collaborative R&D with universities and research and technology organisations the overwhelming majority of vouchers are cashed in with research and technology organisations, not universities (ICS Ltd, 2010). New knowledge on the firm level covers a broad area including traditional scientific and engineering knowledge development but also areas like design and business models that are not normally classified as R&D.

Competent people

The key source of value creation in any nation resides in its people. The economist Jonathan Hughes (1973), argues that the economic wellbeing of any society is dependent on economic value creation, which in turn is strongly dependent on innovation, and since innovations are realised by a minority of the society's citizens, it has a very high dependence on these individuals for its continued economic wellbeing (Schramm, 2010). Given the ever-increasing speed of knowledge development, the demands on all categories of employees are higher than ever and will continue to increase, and this poses a challenge for the ability of firms to find a sufficient number of qualified employees in the available pool of potential employees. This situation is reaching critical status in the areas of engineering and science, where many OECD countries are unable to provide a future supply of these types of graduates sufficient in quality and quantity to enable the domestic industry to put to use available new knowledge and to grow at the speed for which the market provides the potential. In one instance, a firm seeking to hire employees was able to find only 47 who were qualified out of an applicant pool of 3600 (Rich, 2010); and almost one-third of US manufacturing companies responding to a recent survey say they are suffering from some level of skills shortages (*People and profitability: A time for change*, 2009).

The impact on quantity can be overcome by importing skilled talent if the attraction of the country is great enough but once a nation's ability to innovate, and hence to attract the type of individuals who are desirable from an economic perspective, have declined sufficiently the decline becomes self-reinforcing as quality students no longer seek to attend that nation's universities and high-calibre graduates seek work in more attractive nations. The impact of the quality at all levels of education cannot be underestimated. In a study by McKinsey and Company (2009) the researchers conclude that if United States youth could match the performance of

students in Finland, America's economy would be between 9 and 16 per cent larger. That equates to between 1.3 and 2.3 *trillion* dollars each year.

An environment conducive to innovation

What are the environmental requirements conducive to innovation? In a seminal study, Cushing (2001) objectively and systematically compared the effects of three common theories explaining economic growth — the social capital theory, the human capital theory and the creative capital theory. He found no evidence that social capital leads to regional economic growth; in fact, the effects were negative. He found that the human capital theory of economic growth is not as straightforward to interpret as the proponents may argue, in spite of it providing a good statistical account for regional growth. He further found that the creative capital theory produced equally strong if not stronger results than the human capital theory; and the Bohemian and Innovative Indices had especially high predictive power for regional economic growth (Florida, 2004). Like all theories, criticism can be directed at both the study's content and its scope (see, for example, Storper & Scott, 2009) but it is likely to contain some truth that can be simplified down to a shift in behaviour from individuals going to where the jobs are to jobs going to where the individuals are. This increases the importance of having locations that are attractive to individuals who will innovate and generate economic growth.

Once we have transformed the new knowledge to new offerings it is essential to bring these new offerings to market with the highest possible speed. Time is of the utmost importance in this process and any delay can have catastrophic consequences for economic value creation. The ever-increasing speed can be illustrated by the fact that it took almost two years for 1 million iPods to be sold, 74 days for 1 million iPhones (Apple Sells One Millionth iPhone, 2007), and 28 days for 1 million iPads (Apple Sells One Million iPads, 2010). Any environment that increases the friction, and hence slows down the process of getting an offering to market, undermines the whole innovation-driven economic value creation process.

One of the environmental issues is cost of labour. Experience from Sweden and Finland shows that if the cost of labour can be kept below 15 per cent of total cost there is normally no value to be had from outsourcing to countries with lower labour costs. This is due to the negative effects incurred by increasing the distance

between development and production, management and production, lead customers and production, and so on.

Another environmental issue to consider is legal risk. In the US, firms spend more than twice as much on litigation as on research (National Science Board, 2010). The class-act law-suit 'business' equals around 3 per cent of the GDP in the US. It is obvious that this type of situation will discourage firms from taking risks, and the launch of a new offering inherently entails risk; hence this has a not insignificant negative impact on the propensity to innovate.

A further environmental issue is Tax Policy. Obviously both corporate and private tax, and direct and indirect tax, will impact the attractiveness of a region as well as the attractiveness of exerting additional effort in pursuit of additional wealth for both individuals and companies. It is worth noting that the actual effectiveness of policies like R&D tax credits is very low — what looks like a statistically reported increase in R&D spending (which explains why all econometric and research papers using reported R&D statistics end up arguing for its positive effects) is frequently just a reclassification of other expenses into R&D expenses and not an increase in the actual R&D executed (which becomes obvious when in-depth interviews are executed in firms).

Regulation can be both a barrier and a driver of innovation. It becomes a barrier when it imposes friction in the process from offering development to market without providing a larger long-term benefit to the firm. It becomes a driver for innovation when it forces the firm to develop new offerings that enable the firm to reach new global markets faster than competitors. Having a policy philosophy that uses regulation as a driver of innovation builds on the thesis that health, safety, and environmental goals can be co-optimised with economic growth through technological innovation.

The approach that needs to be taken in creating an atmosphere conducive to innovation is outlined in an article by Ashford, Ayres, and Stone (1985):

> [A] regulator must assess the innovative capacity of the target industrial sector. The target sector may be the regulated industry, the pollution control industry, or a related industry capable of producing substitute technology. The analysis should focus principally on the process of technological change within the possible responding sectors. The regulator should analyze a sector's 'innovative dynamic' rather than its existing, static technological capability. An assessment

> of this innovative dynamic requires a historical examination of the pattern of innovation in the regulated industry, an evaluation of the technological capabilities of related sectors having incentives to develop compliance or substitute technology, and a comparison between the regulated sector and analogous sectors with documented technological responses to regulation. The assessment should include an analysis of the industry's existing technological capabilities as well as a reasoned prediction of its innovative potential under the challenge of regulation. This kind of assessment will assist the design of regulations promoting innovation beneficial both to public health and the environment, and to economic growth within the responding industrial sector. (p. 422)

The relationship between regulation and innovation is complex. When drastic innovation redefines the very framework for implementing and operating technologies it often means entering unregulated territory or breaking existing rules. Drastic innovations that generate paradigm shifts in value creation (for example, ICT, Biotechnology, Nanotechnology) call for a more holistic consideration of the link between innovation and mobilisation of value on the one hand, and regulation on the other.

Access to capital is a further perpetual environmental issue. In regions where access to venture capital is scarce, firms have developed alternative sources of funding like lead customer risk funding, business angel funding, university alumni fund funding or peer-to-peer lending. Peer-to-peer lending [P2P] is one of the clearest examples of modern financial innovation, as entrepreneurs have harnessed the internet and its associated economies of scale to exert competitive pressure on more traditional lending practices. As described by Brill (2010), P2P lending relies on online platforms that connect borrowers with lenders. These platforms are operated by firms that enable the initial connection between lenders and borrowers and that service the loans after they have been originated. The draw of P2P lending for both borrowers and lenders is that the companies serving as intermediaries charge just a small fee for their services — around 1 per cent.

Other environmental issues relate to:

- intellectual property protection
- freedom of distortions like crime and corruption
- free market access, which will result in emotionally charged events:

    - IBM's PC business is now owned by a Chinese company (Augustine, 2007, p. 17)
    - Bell Laboratories is now owned by a French company (Zarroli, 2006)
    - Volvo Car is now owned by a Chinese company after having been acquired from a US company (Reed, 2010)
- access to necessary infrastructure like roads (see, for example, Canning & Bennathan, 2004; 2000), rail, ports and airports but also energy, water, sanitation and ICT-infrastructure (for an interesting review see, for example, Skogseid, 2007).

Geographic proximity to key markets is also an important but decreasing environmental issue for innovation. The decreasing importance is due to increased global mobility combined with a higher digital content of the offering for which the transportation cost is very small compared to the corresponding cost of its physical equivalent. For example, the cost of sending a metal part for a car from Australia to the US is substantially higher than sending the corresponding digital file that can be uploaded to the machine tools for direct manufacture of the same part. The proximity issues are now more related to the benefit that can be derived from locating factories near potential customers; engineering facilities near factories; and research laboratories near engineering facilities (National Research Council, 2010).

To wrap up the range of issues that contribute to creating an environment conducive to innovation, Hindle, Yencken, and O'Connor (2011) suggest the various policy initiatives related to the different challenges faced by a firm. Figure 1.1 highlights a sample range of government policy focus areas, such as entrepreneurial capacity, finance and industry, innovation and market as areas that deserve attention if a government is to influence the creation and growth of high potential businesses.

The innovation must be desired by the market

This can either be achieved through an in-depth understanding of the value drivers in the mind of the customer (using sophisticated techniques like Conjoint Value Hierarchy [CVH]; see Roos, Pike, & Fernström, 2006, pp. 227-82) or using an intuitive approach with the assumption that customers cannot value what they do not know. These choices are not to be seen as mutually exclusive but rather as endpoints of a scale where it is also possible to move from one to the other in a cyclic way.

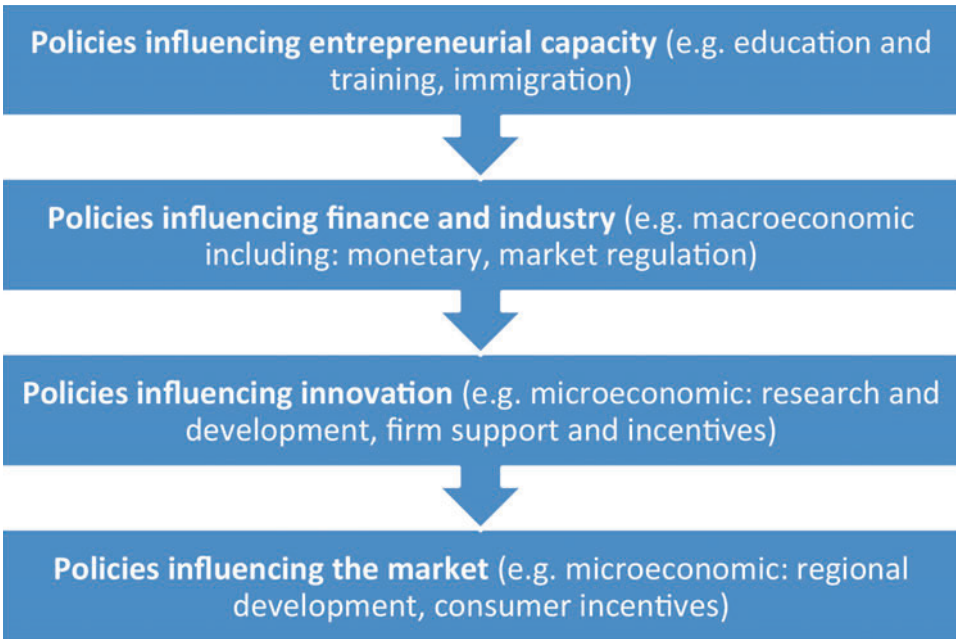

Figure 1.1: Policy initiatives related to the different challenges faced by a firm.
Source: Courtesy of the authors.

High value creation must be achieved through the innovation

High value creation is achieved by innovating offerings that are in high demand by customers and then rapidly bringing them to market with operational excellence in order to initially extract innovation-based monopoly rents followed by rents from superior competitive advantage grounded in operational excellence.

A high proportion of the value created must be captured by the innovating firm

The business model (for a detailed discussion see Osterwalder, 2004; further developed in Roos & Pike, 2009; and outlined in detail in Roos, von Krogh, Roos, & Fernström, 2010) of the firm will determine its ability to appropriate value in its existing business environment. Hence business model innovation becomes the key to increasing the appropriation of value. The power of the business model can be seen in the business model innovation. For example, Apple's iPhone went from a global market share of nothing to a global market share of 2.5 per cent in 18 months, whilst

at the same time moving from a share of the profit pool in the industry of 0 per cent to a profit pool share of 45 per cent, forcing all other players to reduce their profit pool share and hence their value appropriation (this being most felt by Nokia, with a reduction from around 80 per cent to around 30 per cent).

We next turn to consider how IC systems assist in charting the dynamics of human systems.

The usefulness of IC in understanding innovation and entrepreneurship systems

There is a need to further understand the relationships between intellectual capital resources and the systems and strategies that anticipate environmental and market changes (O'Connor & Yamin, 2011). Furthermore, innovation systems that provide significant regional and community benefit need to be considered from the perspective of cross-institutional frameworks and at national and international levels (Hall, 2005; Spencer, 2003). This necessitates different thinking about organisational form (Harkema & Browaeys, 2002). Hervas-Oliver, Albors Garrigos, and Gil-Pechuan (2011) argue that research addressing the strategies and systems which integrate innovation would be valuable for understanding how different organisations manage their intellectual capital to respond and contribute to innovation systems and develop innovation capability.

In order to create value, entrepreneurs bundle and deploy resources that are not necessarily owned or controlled by the entrepreneur (Stevenson & Jarillo, 1990). Similarly, firms allocate their limited resources between two fundamental processes of creating value and appropriating value. Although both value creation and value appropriation are required for achieving sustained competitive advantage, a firm has significant latitude in deciding the extent to which it emphasises one over the other. Research shows that a stock market reacts favourably when a firm increases its emphasis on value appropriation relative to value creation. This effect, however, is moderated by firm and industry characteristics — in particular, financial performance, the past level of strategic emphasis of the firm and the technological environment in which the firm operates. These results do not negate the importance of value creation capabilities, but rather highlight the importance of isolating mechanisms that enable the firm to appropriate some of the value it has created (Mizik & Jacobson, 2003).

The IC Navigator process developed by Roos and Roos (1997) and further refined by Roos and Pike (2007) offers an example of a powerful diagnostic into how firms actually operate, highlighting the importance of resources and the numerous value-creating pathways that connect them. Some groups of pathways will represent innovation processes, while wholesale changes to the structures will represent changes to the business model. It is possible that the resource-based view of the firm can indicate how different functional (technological and marketing) and integrative (internal and external) capabilities affect product development efficiency (lead time and productivity) and product effectiveness (fit with market needs and quality). However, only the most modern and sophisticated IC methodologies, which account for differences between forms of resources, such as those presented by Roos and Pike (2007), have the capability to explain the detailed interactions and explain real outcomes.

In firm-level analysis, IC refers to blocks or stocks of particular types of assets termed as different types of capitals, i.e. physical, monetary, human, relational and structural capitals. The IC Navigator is largely based upon the aforesaid capitals, although it should be noted that while the IC Navigator incorporates each resource type, it is only the human, relational and structural (referred to as 'organisational') capitals that are of the intellectual form, while physical and monetary capitals are of the traditional form treated more regularly by accounting theories and practices.

Hervas-Oliver et al. (2011, pp. 124-5) escalated the analysis of IC to the regional level by examining twenty-eight indicators used by the European Union across six years, and noted that while

> the traditional break up of national IC based on relational, structural and human, [is] useful and practical, [it] can be questioned due to the fact that similar results are obtained in IC national models without any classification or weight give[n] to any block. Put differently, it seems that further reclassification of the blocks of national IC systems can be developed in order to provide a more comprehensive and economic-friendly tool for policymakers. (pp. 123-5)

It is from this point that we embark upon the journey of discovery by examining the papers presented in this special call for research papers. To date we are aware that innovation consists of applying knowledge new to the firm, the industry or the world to the creation of desirable offerings. These new offerings are then speedily brought

to the global market in ways and forms that enable the capture of a large share of the value created through these offerings.

An overview of the proceeding chapters

This book is divided into three sections. The first section clusters chapters that adopt a South Australian regional perspective on innovation. In this section three papers are presented that discuss different aspects of the South Australian approach to innovation. Jane Andrew in her chapter 'Moving beyond policy path dependency: An approach to fostering innovation in South Australia' examines the theoretical and policy discourse that has informed South Australia's innovation policy. The chapter argues the case for a more holistic understanding of the contribution and value contributed by diverse knowledge domains and the multiple forms of transactions that inspire and support innovation across the economy.

The next chapter, 'A patent perspective of South Australian innovation: An indicator within the regional innovation system story', explores South Australia's innovation performance in the context of measuring and analysing patent data. From this analysis the authors, Kym Teh and Göran Roos, bring into focus a discussion of the state's regional innovation system [RIS] and raise pertinent and critical questions about the relevance and performance of such a system.

The third chapter in this section, by Gavin Artz, 'Innovation system symbiosis: The impact of virtual entrepreneurial teams on integrated innovation and regional innovation systems', draws upon the experience of technology entrepreneurship in South Australia. It alludes to a symbiosis between the evolution of a regional innovation system, the changes that such a system causes in managerial and cultural forms at the company level, and how these new collaborative forms then feed back into the regional innovation system as well as linking to national and international innovation networks. The three chapters together provide insight into the regional innovation system dynamics.

The second section provides three chapters that adopt integrative firm-level perspectives, each looking at different ways a firm or firms bring about innovation behaviour. The first chapter in this set, 'Do clusters matter to the entrepreneurial process? Deriving a conceptual model from the case study of Yalumba' by Huanmei Li and Allan O'Connor, attempts to conceptually model the interactions between multiple dimensions of industrial cluster involvements, a firm's entrepreneurial

process and a firm's entrepreneurial performance. The chapter draws implications for future industry cluster research and practice and particularly brings the entrepreneurial process into the innovation picture.

The next chapter, by Fiona Kerr, 'Operationalising innovation: Hotwiring the creative organisation', examines the complexity and sustainability of key business and innovation components. Kerr argues that those firms that successfully master complexity build adaptive, innovative capabilities that result in sustained competitive advantage and the ability to transgress industry boundaries.

The third chapter in this section, 'Business model innovation in nonprofit social enterprises', co-authored by Eva Balan-Vnuk and Peter Balan, adopts a different stance by examining nonprofit firms. This chapter proposes two key reasons for business model innovation among nonprofit firms, those reasons being to remain financially viable, and to expand the delivery of important services to the community. The authors further outline six dimensions of innovation capability that enable nonprofit social enterprises to innovate their business models. As a group these chapters provide a contemporary view of how firms integrate innovation into daily performance and practice.

The third section of the book presents four chapters that specifically focus on innovation management practices, particularly in South Australian firms. While the chapters in the second section treat the firms as innovating entities, the chapters in this section look specifically at the ways and means firms are managed in order to bring about innovation. The first chapter in this set, 'Complex systems adjusting stability levels and providing entrepreneurial opportunity', provides a contextual piece that examines the question of how firms discover and exploit entrepreneurial opportunities through the lens of complex systems. The author, Vernon Ireland, argues that in order for firms to benefit from the process of adaptation in changing system emergence, both the firms' organisation and individuals need to quickly sense the change in a complex system and the adaptation process, create meaning from the change in order to identify a direction of that change, and respond quickly to initiate the process using the entrepreneurial techniques and processes of the individual or enterprise. The chapter offers a number of prospective tools and techniques from complex systems management which may be useful and informative to innovative firms.

The next chapter, by Graciela Corral DeZubielqui, Pi-Shen Seet and Allan O'Connor, 'Intellectual capital system perspective: A case study of government intervention in digital media industries', explores how a systems analysis informs strategies of government program intervention using the case of a government-led initiative for the creative industries development in South Australia. The article contrasts an intellectual capital [IC] perspective employing IC analysis tools with a complex systems analysis model. The analysis creates deeper insights into how to manage the resources and capabilities and the knowledge resource interdependencies between the government, university and industry stakeholders.

The following chapter, by Paul Shum, 'A diagnostic tool for assessing innovation readiness', systematically develops an innovation readiness framework based on intellectual capital that captures a complete set of innovation capabilities with associated enterprise-wide interlocking mechanisms and cultural change requirements. This diagnostic tool will help SME practitioners to target more accurately and consistently important areas for improving their organisation's innovation capabilities.

The final chapter in this section, by Jiwat Ram and David Corkindale, 'Developing a framework for the management of Critical Success Factors in organisational innovation projects: A case of Enterprise Resource Planning systems', presents a framework of nine commonly identified Critical Success Factors [CSFs] for the management of the complexities involved in the organisational innovation process of Enterprise Resource Planning [ERP] systems. The authors propose the designed framework to assist SMEs in putting together an action plan to successfully manage the ERP innovation process. They argue that the framework can also serve as a basis for the development of a theory for the management of CSFs. The chapters assembled for the third section provide different viewpoints of how to manage the integration of innovation at different levels, be it at region level or firm level.

The final chapter of the book considers the collection of chapters to illustrate the integrated nature of innovation, and portrays a systems perspective of the interlinkages between the chapters. Innovation is idiosyncratic, and we requested the contributors to this volume to identify the future research agendas that extend from their analysis. The final chapter draws these viewpoints together to chart a course of research development that will increase not only our understanding of

how innovation is integrated within South Australia but how the management of the innovation system can be effected and outcomes can be improved.

Conclusion

This chapter has outlined the ambition for this book and presents the underpinning philosophy which we seek to explore through the coming chapters. Innovation is not the responsibility of any single individual, institution, firm or government department but is instead a result of system integration.

South Australia is a small economy that faces a fundamental need to reshape its approach to innovation. The manufacturing sector, as the backbone of the state's economy, has and will continue to change its nature and form. This necessitates a rethink about how innovation happens and how the respective actors within an economy interact and engage with each other. In effect, innovation relies on intersections between people, knowledge, information sharing, ideas, and financial and other resources. Innovation happens through regional, social and economic system dynamics; innovation relies on a systems view of entrepreneurship.

Entrepreneurship can be taken as a study of the entrepreneur and new business creation. However, this conception of entrepreneurship misses the critical link to economic outcomes; the ebb and flow of social and economic fortunes that are underpinned by the actions, reactions and engagement of individuals in a specific social and economic system that brings about innovation and change. In this book we are exploring how the linkages within the system can be conceptualised and made transparent.

Intellectual capital [IC] provides a means to capture the dynamics of innovation systems. Although developed for firm-level analysis and performance monitoring, the principles of IC have broader relevance. The challenge is to repackage and reconceptualise IC for the application to entrepreneurship systems. To this endeavour, this book is dedicated for the benefit of the South Australian entrepreneurial ecosystem.

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