Territorial Systems and Highways of Innovation in Australia: A Critical Approach for Research and Policy Development

Working Paper
2003-01

Prof Jane Marceau
Director - AEGIS
University of Western Sydney

and

Dr Cristina Martinez
Senior Research Fellow AEGIS
University of Western Sydney

AEGIS can be contacted at:
Level 11, 263 Clarence St
Sydney NSW 2000

PO Box Q1287
QVB PO
NSW 1230
Phone: (02) 8255 6200
Fax: (02) 8255 6222
Email: aegis@uws.edu.au
Web: http://www.aegis.uws.edu.au

Copies of this working paper can be downloaded at this address
The Australian Expert Group in Industry Studies (AEGIS)

AEGIS research is directed towards elucidating the dynamics of industrial growth and development and to mapping product systems so as to analyse and review the drivers of innovation in different industries. Our research focuses on exploration and analysis of innovative capacity in industry, including both technological bases and organisational arrangements; examining the relationships between such capacity and economic growth.

Our aim is to provide a more effective basis for public policy development to assist Australia’s shift, in the twenty first century, towards a knowledge-intensive economy.

AEGIS maintains three diverse series of research publications: Reports, Working Paper Series and Conference Papers. All of them can be downloaded at no cost from our website.

**AEGIS Working Paper Series**

In this series we report important research results that we wish to make accessible to others. The Working Papers may be independent studies, pilot studies for larger projects or new theoretical approaches in progress and contain data and analyses that address research problems related to innovation, technological, economic and social development and public policy.

**Editors for the series:**
Brian Wixted (2002)

© AEGIS 2003

Applications for permission to translate, copy or in other ways reproduce all or parts of this publication should be made to:

AEGIS, UWS
PO Box Q1287 QVB Post Office Sydney NSW 1230 AUSTRALIA
Territorial Systems and Highways of Innovation in Australia:  
A Critical Approach for Research and Policy Development

ABSTRACT

Do regions matter? The rediscovery of innovation as a driver of growth has prompted a search over the last decade or more among both analysts and policymakers for the drivers of innovation and mechanisms by which it can be encouraged. At the same time, recognition that some areas of nations were more innovative than others encouraged a policy search for the reasons why innovation had a geographically uneven spread: some spaces were growing fast while others stagnated or worse. The question as to why such uneven development has occurred has prompted further search for the characteristics of such spaces in the hope that ‘good’ characteristics could be replicated elsewhere while ‘bad’ ones could be reshaped by particular policy interventions.

As analysts have come to understand more about the dynamics of innovation, emphasis has been put onto understanding the nature of what makes nations continue to differ in their economic specialisation or differences. Thus, there has been much international work on ‘national systems of innovation’ (NIS) and why nations continue to matter to economic development in an age of increasing internationalisation of productive systems. At the same time, internationally there has been a great deal of work on innovation in other geographical spaces, notably within regions and different localities. This work focused on Regional Innovation Systems (RIS) and within even smaller areas, developing the notion of local innovation systems (LIS).

This is a useful development but it too has limitations. The most important of these is that it neglects one critical aspect of the dynamics of spatial development: the interaction of different aspects of activity in the spaces selected for study. This paper proposes a new analytical framework for territorial development looking at the interactions of regional dimensions that have not been contemplated together before. This means that what are normally referred to as policies for regional development need to fit the particular dynamics in any area with which they are concerned. This is a discussion paper that stresses the relevance of analysing Australian territories as critical elements that operate as different innovation systems.

1 This paper was originally presented at the University of Ballarat Conference 22-23 August:  
Innovation and Regional Development: Competing for the Future.

Aegis Working Paper 2003-01
Do regions matter? The rediscovery of innovation as a driver of growth has prompted a search over the last decade or more among both analysts and policymakers for the drivers of innovation and mechanisms by which it can be encouraged (Marceau et al. 1997; OECD 1996a; 1996b; 1997). At the same time, recognition that some areas of nations were more innovative than others encouraged a policy search for the reasons why innovation had a geographically uneven spread: some spaces were growing rapidly while others stagnated or worsened. The question as to why such uneven development has occurred prompted further search for the characteristics of such spaces in the hope that ‘good’ characteristics could be replicated elsewhere while ‘bad’ ones could be reshaped by particular policy interventions.

Policymakers have been trying to discover the secret of development success and putting in place a variety of measures to assist. This has been one area in which many countries have tried to learn from the apparent success of the models used by their neighbours. In the European Union many millions of dollars have been poured into the provision of infrastructure for innovation on the assumption that development had not occurred because of the lack of physical or cyber technologies, including roads, rail, optical fibre and research institutions (EC 1997, EC 1998, EC 1999a, EC 1999b, EC 1999c).

Geographical spaces, usually called ‘regions’ by both policymakers and analysts alike, have been the subject of concerted efforts in many OECD countries to create or encourage growth, especially high technology-led growth. Countless articles and reports have appeared that seek to analyse and reanalyse the apparently miraculous situation of Silicon Valley and Route 128, or their paler counterparts in the M4 Corridor, the Welsh valleys or the Scottish development areas (Saxenian 1985, Saxenian 1994, Saxenian 1990, Saxenian 1991). As the years have passed and little headway in either policy or analytical terms has been made in many other cases, attention has been drawn to the potential roles played by research organisations, defence expenditure, pools of skilled personnel or the existence of clusters or networks of activity among local firms and between firms and local public sector knowledge producers (Blakely 2000). In Australia, there have been AusIndustry programs (regional development funds for local services) to create formal networks and place strong emphasis on the creation of spin off companies, especially in regions which are relatively high tech poor in terms of the firms they host. Not many of these seem as yet to have had the desired effect to assure sustainable development.

The restricted level of success in Australia has largely been the case in other OECD nations. In some, such as Italy, Denmark and Germany, analysts have found industrial districts that have developed models of productive activity different from those that characterise western production systems as a whole. New models of how economies might be organised have been developed to explain the success of such areas and to try to provide a focus for actioning policies (Raines 2000; OECD 2002a). Thus ‘flexible specialisation’, ‘neo-Fordist’, egalitarian district or cluster models have been extensively promoted and examined (Porter 1990; Tremblay 1993; Roelandt & den Hartog 1999; Maskell 2001; OECD 2001b; Piore & Sabel 1984; Baptista 1996; Deitz & Garcia 2000; Marceau 1998; Cobb 1997; Martinez-Fernandez 2001). All show some initial promise but when the time comes to attempt to replicate them, most fail.
As analysts have come to understand more about the dynamics of innovation, emphasis has been placed on understanding the nature of what makes both nations and regions continue to differ in their economic specialisation or differences (Maskell 1998; Smith 2000). Thus, there has been much international work on ‘national systems of innovation’ (NIS) and why nations continue to matter to economic development in an age of increasing internationalisation of productive systems (Birch 1979; Dodgson & Bessant 1996; Dodgson & Rothwell 1994). Governments under the auspices of the OECD, for example, have devoted considerable resources to the analysis, benchmarking and management of different NIS (Lundvall 1992; OECD 1996a; OECD 1997; OECD 1999; OECD 2000). If institutional arrangements under the control of national governments matter then it makes sense for policymakers to learn from the experience of others. Thus many works have appeared on the elements of NIS, Australia has had a National Innovation Summit designed to ‘improve’ the functioning of the local NIS by bringing together all major players in both public and private sectors and by proselytising about the importance of well functioning relationships between public sector organisations and firms, whether in the financial markets or innovation-intensive manufacturing. ‘Backing Australia’s Ability’ was the overall policy response to the findings of the research behind the Summit and the recommendations made during the meeting and by the implementation committee set up to carry the agenda forward. This essentially focused on increases in the research undertaken in Australia and incentives for universities and other public agencies holding IP to go the extra step and commercialise it.

At the same time, there has been a great deal of international work on innovation in other geographical spaces, notably within regions and different localities. This work translated the NIS literature approach to analysis of activity by focusing on Regional Innovation Systems (RIS) and within even smaller areas, developing the notion of local innovation systems (LIS) (Braczyk et al. 1999; Cooke 2001; Landabaso 1997; de la Mothe and Paquet 1998; Acs 2000).

Despite the now substantial volume of analytical work in many countries, many of the policies put in place at regional and local levels on the basis of the analyses undertaken have had only moderate success. One of the reasons has been that the analysts lacked a coherent framework that made comparative work over time and space possible. This problem has recently begun to gain the attention needed (Feser & Bergman 2000). A second and critically important problem has been that most of the investigative work on regional innovation and development has proceeded by case studies. The difficulty has been that case studies tend not to be analytically very powerful and in most cases have proved hard to draw policy-relevant lessons from. As Markusen has noted (1999), analysis of articles appearing over 25 years on regional development reveals that very few analysts used easily replicable methods while some did not reveal much about the methods used and the reliability of the inferences presented in the papers concerned. There has been a general split between those from different disciplinary backgrounds (which can be roughly characterised as more or less economic) in the use made of quantitative methods (such as input-output or trade) and qualitative approaches which have focused more on relationships between players and emphasised such intangibles as level of trust or collaboration. Indeed, in a very interesting piece of research carried out in Canada, two observers collaborated in the analysis of innovation performance and the problems of a region in Quebec One, using quantitative methods, presented one picture (quite a lot of
innovation) while the other using qualitative interviews with players reported a quite different situation (pessimism about innovation levels) (Nimijeaj & Landry 2000). Perhaps both revealed some aspects of the truth but too often the reader is not presented with the appropriate evidence for what is recommended to policymakers.

THE NEED FOR A NEW APPROACH

It thus seems time to take a different approach. Storper, in a wide-ranging paper, has discussed the major approaches, both analytical and policy, to the analysis of regional innovation. He comes to the conclusion that an approach which combines some of the input-output insights on agglomerations of activities and some of the more qualitative work which looks at regional assets and resources and analyses why some are utilised by regions and some not is the most useful (1995).

This is a useful development but it too has limitations. The most important of these is that it neglects two critical aspects of the dynamics of spatial development: the interaction of different aspects of activity in the spaces selected for study and the interaction between regions and localities through activities carried out in different but related areas.

In any nation, the ‘real’ economy is a space in which many activities compete for scarce resources. Thus, for example, some industries may be headquartered in one city of the nation while their productive activities are located in several others where they compete for labour and other inputs. Similarly, since some companies operate in many arenas (spaces) they may not give to any particular one an exact return for what they take out and use in their productive processes: some regions ‘drain’ others. The drain may be of capital, wages or tax revenues but, perhaps more importantly where the focus is on growth via innovation, the companies concerned may use a disproportionate amount of the publicly provided knowledge generation capacity available to a region seeking to create the new knowledge needed for economic development. On the more positive side, some business activities may involve players in several areas in interacting as clients and suppliers, in one or more supply chains of different lengths and complexity and these interlinkages between spaces can be further developed through targeted local and regional policies that specifically recognise the interconnections. A good study of local and regional economic development therefore must take account of the spread of activities across a broader zone of the economy.

A real economy is also made up of a very great variety of activities. In any given space, it is very likely that there will be many different manufacturing and service or resource-based activities undertaken. While in a few locations, mining or agriculture may be dominant in terms of wealth generation and employment, in modern western societies this is increasingly unusual. The different activities taking place may involve players interacting as clients and suppliers, which is one definition of a ‘region’ used by analysts as well as being a policy prescription, in one or more supply chains of different lengths and complexity or they may essentially look to complementary activities located in other spaces (via imports, for example).

Moreover, within any space there will also be many different institutions, in the sense of ‘rules of the game’, which regulate how productive activities are carried out. These
rules of the game include both formal laws and established routines and informal expectations about ‘how things are done’. Some of the rules are national while others emanate from different level jurisdictions and from the actions of the players in production systems. In a political federation such as that of Australia there are as many formal rules of the game as there are ‘governmental’ players. Thus, spaces are governed by both ‘federal’ rules or policies, including those on major sources of taxation, and rules devised at the levels of States and Territories. There are also local administrative rules, including the provision of infrastructure such as housing for the population and for industry (eg industrial parks). In addition, there is a raft of quasi-public bodies such as the Australian Consumer and Competition Council (ACCC) or the Standards Associations which regulate specific productive activity, in some cases including that of knowledge-production organisations. It is not hard to see how easy it is for the ‘law givers’ in different spaces to provide a web of inconsistent rules regulating many actions.

In addition, any real economy has an uneven spread of knowledge-producing institutions, mostly publicly provided but also some privately funded ones, and hubs of activity – large cities – which provide the diversity often thought necessary for economic growth. Modern western economies are increasingly realising that the key to their future competitiveness lies in their success in generating and using new knowledge. International experience suggests that it is important for regions and nations to maximise the value of their public sector knowledge-generating institutions (OECD 2001a; Maskell 2001). The key to this maximisation is creating and improving links between knowledge producers and knowledge users, be the latter firms, other organisations or individuals needing leading edge training.

A knowledge hub is essentially an ensemble of knowledge-intensive organisations located in a specific geographical space and located in both public and private sectors. Some are research-intensive knowledge producers, such as research institutes or universities, while others develop new or higher level skills as well as undertaking research or knowledge transfer. Central to potential knowledge hubs are universities and other teaching and researching organisations, in Australia including CSIRO and the more industrially oriented areas of TAFE. Other players in the hub are demanding knowledge users, including firms but also service providers such as hospitals. The knowledge-users provide a focus for knowledge-generation, transmission and diffusion and are where producers and users are closely connected (although not necessarily physically co-located) (W.A. TIAC 2002) The experiences and economic impact of knowledge hubs such as the Silicon Valley and the North Carolina Research Triangle emphasise the integrated role of human resources, public agencies and firms in generating and applying both local knowledge and knowledge produced elsewhere.

Knowledge hubs generate new basic knowledge of relevance to many industries, both old and new. The impact of this knowledge is not necessarily direct, nor immediate. But it is influential. In addition, they also generate applied knowledge that is directly and immediately relevant to local industries. Secondly, knowledge hubs capture and participate in creating knowledge generated elsewhere, nationally or internationally, and develop this further to meet specific local needs. Thus national or international knowledge is translated or transferred into locally useful knowledge for supporting existing industries, generating new industries, informing public policies and meeting other kinds of community needs such as health, urban planning, environmental control, education, and aged care. The transmission function of a knowledge hub takes place through educational institutions such as universities and schools but also
through life-long learning processes that involve firms, community based institutions and a variety of government agencies and services including hospitals, clinics and professional associations.

Recent studies (OECD 2002b) have shown that universities and similar public sector research institutions differ in their relationships with user organisations both in relation to the type of new knowledge concerned in the transfer and to the mechanisms of such transfer; both the relationships, and knowledge transfer are critically affected by the level of sophistication of the receiving companies. It now seems that universities generating leading edge research have a very broad ‘footprint’ in terms of the organizations interested in receiving the knowledge generated. This means that sophisticated companies located very far away in geographical terms may well be the most interested in ‘breakthrough’ research in basic sciences whereas companies located closer to the source of knowledge are unable to see value. This is because, for example, breakthrough research information can be readily absorbed by the high level R&D personnel working in the science-intensive firms, even though they are further away spatially, and/or by the product development teams in that segment of industry which may be located in many places. In other words, personnel in some firms may be ‘symbolically closer’ to the knowledge generators than others located geographically nearby.

Distance is therefore an issue in the diffusion of knowledge. It is now recognised that proximity of knowledge centres and researchers is important for exchange of tacit knowledge. However, the creation of a ‘knowledge hub’ has many dimensions, which mean that spatial proximity to the sources of new knowledge does not automatically encourage firms to take advantage of what is on offer, and that special measures to encourage ‘take up’ of new knowledge may be required. As the institutions in a knowledge hub develop and mature the challenge is to maximise local benefit for local stakeholders. Universities, through collaborative partnerships, are becoming more international and are involved in activities quite different from their role 20 or 30 years ago. There is thus a challenge to ensure that universities remain knowledge diffusers or transmitters as well as knowledge producers for their local area and for organisations physically located elsewhere. Different universities in a region may perform these roles in different combinations and in different ways. Each can be very valuable. In order to maximise that value, however, we need to know what the different patterns are and how any gaps may be filled.

Very little work has been done in Australia in terms of the analysis of the relationships between a university and other organisations in its immediate geographical area. There have been some studies of relationships between firms and the commercial arms of universities, as for example, by NBEET-National Branch of Employment Education and Training (Crossing Innovation Boundaries) a decade or so ago, but these have not been systematic and have not taken account of the full potential of the transfer of technologies developed locally. There have been no studies of the complete range of technologies developed and the relationships between the differing technologies and the recipient organisations. We thus know almost nothing about the diverse ways in which different kinds of technologies are transferred, about whether and how local organisations bring in partners from other zones, such as venture capitalists from the Sydney CBD in the case of firms in western Sydney.

The task of mapping these highly differentiated relationships and hence the spread of technologies throughout a region is both critically important and highly complex if
knowledge organisations in a locality are to fulfil their potential. There is no model for doing it properly even in the international literature, although attempts have been made by the OECD to come to grips with the issue, attempts published in such works as Cities and Regions in the New Learning Economy (OECD 2002b).

And all of these organisations and institutions are distributed in different ways across particular ‘divisions’ of national space. They are also differentially distributed across sub-national space, including most significantly at the level of States.

Thus, in any given sub-national space the interactions between these critical elements are not going to be the same. This means that what are normally referred to as policies for ‘regional development’ need to fit the particular dynamics in any area with which they are concerned.

A ‘TERRITORIAL’ APPROACH

We call these differentially distributed elements ‘territories’. These ‘territories’ are the building blocks of any given national and regional economy and policymakers need to understand them. They especially need to understand the dynamics of the interaction between them in different spaces so that policy provision can be better targeted and thus more effective.

In our view there are eight important territories. These are:

• technological (spread of industries and emerging technologies);
• knowledge production, transmission and transfer;
• financial and business services (including innovation services);
• production and consumption;
• institutional;
• human capital (skills and credentials);
• infrastructure (hard and soft);
• cities as innovation hubs.

Each territory has been selected because considerable international work has both suggested their importance to local development and suggested hypotheses that can be tested for Australia in relation to them. To date, each has been studied in isolation from all or most of the others: no one has yet tested them together in relation to the same spaces.

The approach that we propose departs from the current thesis focusing in a ‘sole’ Australian innovation system. We propose instead a research and policy agenda focusing on elucidating the functioning of the interactions between these critical ‘territories’ as they are operating in different spaces in Australia in the early years of the twenty first century. This understanding underpins the capacity of policymakers to devise and deliver effective policies for growth and development in any given geographical space or region. This approach promises to deliver strong analytical understandings as the basis for policy at different levels of government and in different kinds of spaces within Australia. We think this critical approach will provide policymakers with more effective ‘tools to think with’ when planning regional development initiatives.
At present there is no theoretical underpinning for the choice of ‘regions’ to be assisted and policymakers have too often seen their interventions deliver less than has been expected. This is in part good because ‘regions’ have been defined by the purpose to which a particular policy was to be put and not by the dynamics of their situation as seen in broader national and international contexts.

Each of our analytical 'territories' has a real spatial spread and a 'symbolic' or more abstract presence. They come together in different ways in specific areas. Thus, for example, in an area where one industry has long been dominant, the institutional territory 'rules of the game' may have been constructed so as to favour the interests of that industry and make it harder for new businesses or industries to emerge, meaning that policymakers need to pay attention to that possibility. In other spaces, long established industries may be 'locked in' to older areas of Australia’s technological territories and special efforts by policymakers need to be made to help firms make the transition to new technologies or methods of work. Such policies may require linking different areas together to spread the reach of a newer element of the technological territory available elsewhere in the nation or State. In yet other spaces, the local university may be more engaged in dialogue with peers in other countries than with local enterprises. Policymakers then need to decide whether specific measures are needed to encourage greater local dissemination of leading edge knowledge, for example, by assisting firms to upgrade their capacity to 'receive' and add value to the new technologies available or to encourage universities to try a new tack in attempting to reach potential local clients.

The approach proposed here, with the focus on the interaction in given spaces between the different ‘territories’ operating, suggests that new ‘mapping’ techniques are needed and that research needs to be oriented so as to develop the tools policymakers need for most effect.

We need to know not just the geographical distribution of the different ‘territories’ as they are spread across Australia, but also how local configurations of the broad ‘territories’ interact in the specific spaces with which policymakers deal, so as to ensure that the predictions about the effects of policy which justify intervention will be sustainable. In doing this we are testing the thesis of the National Innovation System as an approach that may prove to be inadequate for understanding how regional development works and what the necessarily interacting elements of regional policy are.
REFERENCES


WORKING PAPER SERIES

Previously Published Titles

2001-04  The Disarticulation of the Australian Clothing Supply Chain and its Reconfiguration within Global Networks. 
Dr Alastair Greig

2001-03  Drivers of Innovation in the Australian Automotive Industry. 
Dr Wendy Riemens

2001-02  Retailers and the Shape of the Australian Clothing Industry. 
Dr Alastair Greig

Prof Jane Marceau

2000-03  What is the ‘Knowledge Economy’? Knowledge-intensive Industries and Distributed Knowledge Bases. 
Prof Keith Smith

Prof Maureen McKelvey

Ms Ester Basri