

Reconceptualising Porter's Diamond for the Australian Context.

Dr Mark Wickham

University of Tasmania
School of Management
Locked Bag 16
Hobart 7001

Phone: 03 6226 2159

Fax: 03 6226 2808

Mark.Wickham@utas.edu.au

Dr Mark Wickham works as a lecturer at the University of Tasmania, specialising in the disciplines of Business Strategy and Marketing. Mark's PhD examined the 25-year relationship between the Tasmanian state government and the Tasmanian light shipbuilding cluster in order to advance a more strategic 'role of government' in industrial cluster development. Mark is also interested in researching strategic marketing concepts, particularly those concerning Ethics and Integrated Marketing Communications.

ABSTRACT

Porter's Diamond Factor Model (DFM) is a theoretical framework that achieved prominence in Australian economic policy development since its inception in 1990. Despite its widespread adoption, however, Australia has remained significantly below the OECD average in terms of its industrial clusters' contributions to innovation and real wealth creation. In order to conceptualise the specific role that Porter's DFM might play in the Australian policy development context, this paper analyses the 25-year history of the interaction between the Tasmanian state government and the Tasmanian Light Shipbuilding Industry cluster. This analysis provides an insight into the set of government roles that facilitated the development of one of Australia's most internationally competitive industry clusters, and proposes a re-conceptualisation of Porter's DFM that will potentially increase its value as a predictive tool for regional economic development.

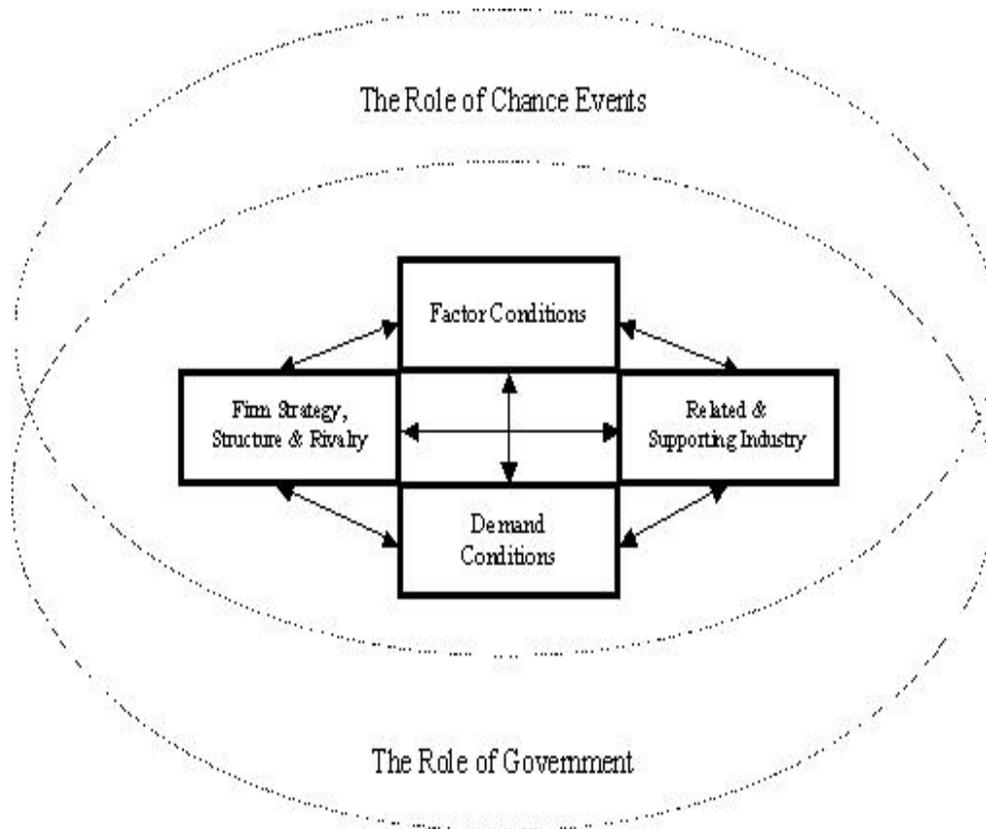
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Introduction.

Since the 1970s, the onrush of globalisation in Australia's markets has presented significant economic policy challenges to the country's federal and state governments (Everett, 2002; Goldfinch, 1999; Moustafine, 1999). A major concern for Australian legislators was (and remains) the question of making a nation previously protected by a 'fortress' of tariffs and subsidies more productive and competitive in world markets (Brown, 2000; Edwards, 2002; Martin, 2000; Quiggin, 1999). One theoretical framework that achieved prominence in Australian economic policy development was Porter's Industrial Cluster Theory (ICT) (see Australian Manufacturing Council, 1994; Bureau of Industry Economics, 1991; Keating, 1994; Kelty, 1993; McKinsey and Company, 1994). Porter's ICT proposes that for a region to increase its innovative capacity and export earnings, its government (and relevant industry players) must interact to develop a sustainable array of internationally competitive industry clusters (Porter, 1990; 1998). Porter's ICT argues that a nation's industry clusters will likely be internationally competitive if a synergistic interrelationship exists between four Diamond Factor variables (i.e. 'Factor Conditions', 'Local Demand Conditions', 'Related and Supporting Industries', and 'Firm Strategy, Structure and Rivalry') and the two influencing roles of 'Chance Events' and 'Government' (see Porter (1990) for a discussion of the Diamond Factor Model (DFM) that underpins ICT, and Figure 1 for a diagrammatic representation).

Figure 1: Porter's (1990) Diamond Factor Model.



Since the adoption of Porter's Diamond Factor Model (DFM) as a basis for policy development, however, there has been considerable debate concerning its effectiveness, and indeed its appropriateness as a policy framework for Australia (see for example, Boddy, 2000; Gordon and McCann, 2000; Lyons, 1995; Wejland, 1999; Yla-Anttila, 1994). The observed industry cluster failures (and under-performance) have been attributed to three main issues. The first is that Australian government policy development has largely been focused on descriptive information gathering rather than on achieving either business participation in, or greater understanding of the complex industrial clustering process (Davies, 2001). The second surrounds an assumption by Australian policy-makers that the facts explaining the existence of industry clusters around the globe are readily generalisable to the Australian context (Boddy, 2000). Of particular concern has been the assumption of Australian policy

makers that simply replicating the policy choices of governments associated with successful clusters (such as Silicon Valley) will be successful despite the lack of evidence to support this contention. The third issue concerns the ability of Australian governments' to effectively and efficiently allocate resources to potential clusters. Feser and Bergman (2000) note that, at least at the regional level, the approach frequently adopted by Australian policymakers involves little more than the identification of regional specialisations as targets for development initiatives. In such cases, cluster strategy has merely served as a means to allocate scarce resources to existing economic "winners", rather than as an investment in building the linkages and future inter-industry synergies documented so frequently in internationally competitive industrial clusters (Feser and Bergman, 2000).

Fundamental to all three issues is the observed difficulty of Australian policy-makers to conceptualise their role within Porter's DFM (Brown 2000; Enright and Roberts, 2001). Whilst Porter's DFM remains a powerful at explaining 'how and why' industry clusters have come to exist, it provides little prescriptive power in terms of a policy framework for government. Indeed, Brown (2000) suggests Australia's poor performance at developing internationally competitive industry clusters is almost entirely predicated on the 'confused role of government and its policy makers within the DFM', a statement echoed by Porter when he stated that:

...in Australia, what is less understood is that the government has some positive roles, like innovation and training, infrastructure, and things like that. I think that the real frontier is [understanding] the positive roles to be played by government whilst avoiding the distortion or intervention in competition (in Trinca, 2002:39).

In order to understand the positive roles that a government can play in the support of entrepreneurial activity and the development of innovative industrial clusters, this paper reports upon an examination of the 25-year history of one of Australia's most innovative and internationally successful industry clusters: the Tasmanian Light Shipbuilding Industry

(TLSI) cluster. The origins of the TLSI cluster can be traced to the tragic events surrounding the Tasman Bridge Disaster in 1975, when the government owned *Lake Illawarra* crashed into the 12th Pier of the bridge, causing it to collapse and sever the link between the Eastern Shore and Hobart City. The subsequent need for ferry transport and production led a local entrepreneur (Mr. Robert Clifford, the managing director of Incat) to the realisation that an untapped international market for innovative fast ferries existed, and this realisation represented the mechanism by which the world's first aluminium welding technology was developed. Since its inception, the TLSI cluster has grown substantially in terms of its sales volume, innovative output, and impact on the industry's overall development as a world-class maritime producer (Industry Audit, 1998). At its peak between 1996 and 1998, the TLSI cluster generated an annual turnover of AUD\$400 million (accounting for 25 percent of the state's merchandise exports), and was fundamental in the development of an industry council that represented and coordinated the majority of the state's maritime industry (Wickham and Hanson, 2002). Given its demonstrable importance to the regional Tasmanian economy, an examination of the TLSI cluster's development provides an opportunity to reconceptualise the DFM for the Australian context, and more specifically, the role that a regional government played in the development of an innovative and internationally competitive industry cluster.

Method.

This research comprised a series of semi-structured interviews with all of the key informants within the TLSI cluster and the state government during the period 1977 to 2002. In particular, interviews were conducted with each of the state Premiers that held office between 1977 and 2002, the managing directors of the TLSI cluster firms, and the heads of government departments and agencies with which the TLSI cluster had significant interactions. In total 25 semi-structured interviews were conducted, each lasting between 60 and 90 minutes. The interview questions posed to the participants were derived from an

extensive collection and analysis of historical data pertaining to the TLSI cluster's development. As such, the interviews contained both standardised interview questions (i.e. common to all informants) and specific interview questions (i.e. aimed at the key informants' specific involvement in the TLSI cluster's history), and were formulated to elicit the primary data required.

The interpretation of the data, and the verification of the conclusions, were facilitated by the use of the QSR NUD*IST software package. The interview transcripts were imported into the NUD*IST software database, following which the categories (i.e. the coding of the data) were established as a series of nodes. These nodes were initially generated from the themes highlighted in literature review process, formed part of an index system that allowed the researcher to categorise respondent data in terms of extant theory. Each node was then reviewed in order to identify common themes necessary for the researcher's second-round coding that underpins the discussion and conclusions in this paper.

Discussion.

A growing literature base suggests that 'who innovates' and 'how much' innovative activity is undertaken by an industry cluster is closely linked to the phase of the industry life cycle, and is of vital importance to effective policy implementation (Klepper, 1996; Leigh, 2003). It is therefore necessary for this research to report on the longitudinal variation in government policy development, and discuss their impact on the Diamond Factors over the TLSI cluster's life cycle.

The role of government during introductory stage of the TLSI cluster's life cycle.

During the introductory stage of its life cycle, three key government roles positively influenced the TLSI cluster's development. The first was the state government's initial non-

committal stance towards the development of the state's burgeoning shipbuilding industry. At the time, the government's policy focus was primarily on the macro-economic restructuring of the state's economy away from its dependence on hydro-industrialisation, and not the growth requirements of the potential industry cluster. Underpinning the government's inaction was the maritime industry's poor recent history at generating export earnings and employment opportunities within the state. Since the 1940s, the reduced global demand for traditional shipping coupled with the inefficiencies inherent to 'Fortress Australia's' shipping subsidies, meant that the international competitiveness and innovative capacity of Tasmania's maritime industry stood at virtually zero for three decades. Consequently, the development of Incat's innovative technologies between 1977 and 1984 became the sole responsibility of the private sector firms that existed during the industrial cluster's initial formation (i.e. Clifford and his array of maritime friends), with no additional input or direction from the state government.

The second key role was the state government's development of the region's reputation within the broader domestic maritime market as a national centre for maritime research. The Tasmanian government implemented a series of lobbying initiatives that resulted in the federal government providing additional funding to the Australian Maritime College and relocating its national maritime research institute (the CSIRO) to Hobart. These state government lobbying efforts were largely aimed at the federal government rather than the private sector, but their success had implications for the region's 'Factor Conditions', 'Related and Supporting Industry', and 'Local Demand Conditions'. The regional economy's factor conditions were advanced by developing the region's supply of human capital through both the generation of specialised employment and education within the broader industry. The regional economy's related and supporting industries were advanced by the increase in the sophistication of supply of inputs to the private sector firms (in terms of

products and world standard maritime research). The Tasmanian government's enhancement of the region's reputation helped to develop the demand conditions faced by the private sector shipbuilding firms, most significantly in the form of customers ready to import their products from interstate.

It was only after the domestic exporting success of Incat's innovative semi-aluminium catamarans in the early 1980s were realised that the Tasmanian government undertook its third key role, that of accommodating the growth requirements of the TLSI cluster's most innovative firm - Incat. Although the Tasmanian government did provide its first direct support for Incat's innovative management in the introductory stage of the TLSI cluster's life cycle, it did so only after the firm was able to demonstrate the potential in the domestic Australian market for fast-ferry transportation. The Tasmanian government's support for Incat's innovative capacity was provided only when the firm could demonstrate that it did not possess the resources required for its continued expansion. The Tasmanian government also required evidence that their support of Incat's expansion would result in additional jobs being created within the firm. This initial government support is consistent with the recommendation of Porter's ICT, as it allows for the challenges facing the burgeoning industry to be overcome whilst avoiding the inefficiencies associated with the government's direct involvement in private sector enterprise.

The role of government during the growth stage of the TLSI cluster's life cycle.

During the growth stage of its life cycle, a further three key government roles positively influenced the development of the TLSI cluster. The first was the Tasmanian government's continued effort to enhance the reputation of the regional economy, although the focus of these efforts changed from the domestic maritime market to one that encompassed the international market for Incat's fast-ferries. This change in focus was driven by the continued

success of Incat's innovative product line in the domestic ferry transportation market. Through the use of government sponsored trade missions and the associated negotiation activities, the Tasmanian government used the success of Incat to illustrate the region's maritime competency to international buyers of these products, in turn facilitating an increase in the international demand conditions for Incat's production. The Tasmanian government also applied pressure on the remainder of the TLSI cluster firms, and indeed the region's maritime industry as a whole, to similarly increase the quality of their production in line with the growing international reputation of the region.

The second role undertaken by the Tasmanian government was that of direct support during Incat's sales negotiations with their potential international customers. This was directed by the incumbent state Premier at the time, through his department of economic development, most notably in the form of funding for international customer visits to Incat's factory, but also by having the Premier accompany potential customers during their visit to the region. As a result of the state government's policy initiative to become involved in Incat's sales negotiation process, it provided a level of prestige, moral support and sales expertise that was otherwise beyond the ability of the innovative firm to provide. Indirectly, this policy also served to highlight the supplier firms within the TLSI cluster, as their inputs into Incat's final product were also supported by the state government's involvement in the sale.

The Tasmanian government's third key role was to undertake measures that deliberately maximised the synergistic relationship that existed between the TLSI cluster firms. Inherent to Porter's ICT is the notion that within a clustered network of firms, some forms of scale and scope economies exist through which an industrial cluster develops its international competitive advantage. Through its development of marine parks and industrial councils (in which firms complementary to Incat's innovative operations can more easily interact) the

Tasmanian government deliberately enabled the realisation of the synergies of both scale and scope inherent to the region's 'natural maritime industry'. The third state government role served to advance the diamond factors by developing the 'Firm Strategy, Structure and Rivalry' and the 'Factor Conditions' enjoyed by the TLSI cluster firms in residence at the TLSI cluster marine park in Hobart. With the TLSI cluster firms in close geographic proximity, the individual firms were better able to communicate and coordinate their production and training activities, as well as allowing them to access the advanced and specialised (and expensive) infrastructure developed for the marine park by the Tasmanian government.

The role of government during the maturity stage of the TLSI cluster's life cycle.

During the maturity stage of its life cycle, a further three key government roles positively influenced the development of the TLSI cluster. The first key role was the continued enhancement of the regional economy's reputation as a world centre for maritime manufacturing excellence, although the focus of its efforts changed from the singular promotion of Incat's success to incorporate the production of the entire set of industry members, be they TLSI cluster firms or otherwise. The functional strategies incorporated by the Tasmanian government included trade missions, direct involvement in the international sales negotiations process, and the provision of marketing assistance to the industry. The marketing assistance provided to the industry was specifically targeted at generating a consistent message for all of Tasmanian firms in the international marketplace.

The policy to incorporate the entire set of cluster firms developed the demand conditions for the regional industry, with the region now marketed as a 'one-stop-shop' for a wide variety of innovative and high-quality maritime production, not simply fast catamaran production. The state government could afford to undertake this marketing strategy given the success that the

TLSI cluster firms had enjoyed both individually, and as a network, during the growth phase. For example, by the end of the growth stage of the TLSI cluster's development, each of the supplier firms had secured their own export sales independent of those associated with their alliance with Incat. Further to this, two additional TLSI cluster firms, Liferaft Systems and Richardson Devine, emerged within the industry and enjoyed immediate export success, largely due to their association with Incat and the innovative and valuable nature of their output.

The second key role was to formalise the relationship between the region's entire set of shipbuilders and maritime manufacturers (TLSI cluster firms or otherwise) and the state government. After the TLSI cluster maritime park was established, the private sector firms, along with the Aluminium Welding School, formed the Tasmanian Maritime Network (TMN) within which the TLSI cluster could better develop its communications and lobbying efforts. After the Bacon Labor government's industry audit program of 1998 was completed, the TMN was restructured to form an 'Industry Council' that represented approximately 85 percent of the region's shipbuilding and marine manufacturing firms. The Industry Council program sought to provide the region's shipbuilding industry with a direct communication and lobbying channel between the industry as a whole and the Tasmanian government. The Industry Council arrangement also helped to ensure that that the set of firms within the industry could better incorporate the success factors of the TLSI cluster into their operations, and therefore become involved in the process of further developing the regional industry's 'Firm Strategy Structure and Rivalry' to comply with world-best standards.

The third key role was the Tasmanian government's strategy to dilute Incat's importance and impact within the regional economy. The policy was implemented through the attraction of

additional innovative shipbuilding firms to the region (producing vessels unlike those of Incat) in the hope that the TLSI cluster's supplier firms would have alternate sources of sales opportunities incremental to that of Incat. The Tasmanian government was able to attract additional innovative firms through marketing the region's advanced infrastructure, support that was initially provided solely for the benefit of Incat. Where needed, the Tasmanian government also provided the option to undertake an equity arrangement with the new hub-firms, an arrangement that involved funding of the new firms' relocation and start-up costs, but did not involve the state government intervening in the innovative processes of the individual firms. This policy initiative had a direct impact on the Diamond Factors enjoyed by the TLSI cluster (and indeed the entire industry) by effectively driving incremental demand from the international marketplace for the region's maritime production. In addition, it allowed the TLSI cluster's supplier firms to develop exponentially greater linkages within the industry, and more importantly, with firms of similar importance as the original hub-firm in terms of their innovative ability and supply requirements.

Implications

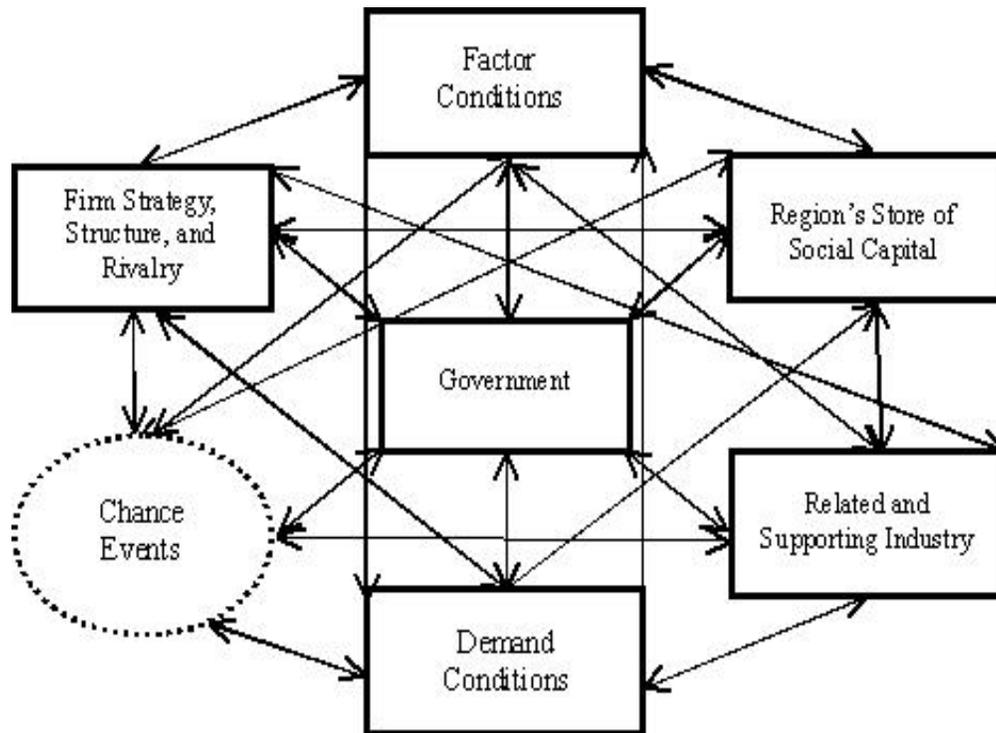
The findings of this research indicate that the role of government in the Australian context is far more significant than the exogenous one theorised by Porter (1990). Indeed, an analysis of the TLSI cluster's development indicates that the role of an Australian government is an endogenous, and arguably central to the machinations of the DFM for an Australian economy. As such, for the purposes of providing a role for an Australian government in a regional economy, the variable cannot be considered exogenous to the Diamond Factors underpinning Porter's ICT. Rather, the role of government must be considered fully integrated within the Diamond Factors, indicating that it is directly involved in their development, and indeed very generation over time.

The findings of this research also indicate that theorising the role of chance events within a regional economic model also requires some attention. Under Porter's original DFM, chance events are similarly considered exogenous to the diamond factor's interaction, and the role that the government has to play in the development of industrial clusters. This research indicates that the role of the government may be directly influenced by those chance events that serve to amplify the commercial importance of regional economy's Diamond Factors, as the Tasman Bridge Tragedy did with the shipbuilding skills inherent (yet dormant for decades) within the state. As such, the adapted model for a regional Australian economy includes an integrative link between the original Diamond Factors, and the occurrence of 'Chance Events' that serve to amplify their commercial value in the international market. It similarly indicates that government policy makers should view chance events that do not coincide with the 'natural advantages' or the advanced social capital developed within the region with some caution. The research also indicates that the adapted model must consider the region's store of social capital as an important variable in the development of internationally competitive industrial clusters. Unlike the economy's factor conditions, which refer largely to physical assets, the region's store of social capital refers to the latent or tacit knowledge possessed by an economy's labour market, their cultural understanding (based upon the region's historical dependencies) and their belief that efforts to leverage this knowledge and understanding in the marketplace will lead to commercial success.

Given the above discussion, Figure 2 presents a plausible alternative DFM for industrial cluster development in a regional Australian economy. In line with the research findings, the 'Role of Government' is altered from an exogenous variable to one that is central, and necessarily intrusive in the regional economic development process. As demonstrated in the discussion section, the key to an effective government role centres on the timing of its policy

initiatives and the changing life cycle needs of the industry cluster. Similarly, ‘Chance Events’ are incorporated into the adapted model, and although they are represented here as an important variable, their occurrence is not considered essential to the development of internationally competitive industrial clusters. Instead, ‘Chance Events’ are characterised as occurrences that serve to initiate industrial clustering activities. The region’s store of social capital is also incorporated into the adapted model. Although it may lie dormant for some considerable length of time (as with Tasmania’s shipbuilding competencies), the variable represents the set of intangible economic assets possessed by a region’s labour market, which may also serve as a basis for the formation of the regional economy’s internationally competitive industrial clusters.

Figure 2: A Reconceptualisation of Porter’s Diamond Factor Model for the Australian Context.



REFERENCES.

Australian Manufacturing Council. (1994) *The wealth of ideas: How linkages sustain innovation and growth*. Melbourne: Australian Manufacturing Council.

Boddy, M. (2000) 'Technology, innovation, and regional economic development in the state of Victoria.' *Government and Policy*. Vol 18 No 3, pp. 301-319.

Brown, R. (2000) *Clusters, innovation and investment: Building global supply chains in the new economy*. Canberra. Australian Project Developments Pty Ltd.

Bureau of Industry Economics. (1991) *Networks: A third form of organisation*. Canberra: Australian Government Printing Service.

Davies, T. (2001) 'Enhancing competitiveness in the manufacturing sector: Key opportunities provided by inter-firm clustering.' *Competitiveness Review*. Vol 11 No 2, pp. 4-16.

Edwards, M. (2002) 'Public sector governance – Future issues for Australia.' *Australian Journal of Public Administration*. Vol 61 No 2, pp. 55-61.

Enright, M.J. and Roberts, B.H. (2001) 'Regional clustering in Australia.' *Australian Journal of Management*. August: pp. 65-86.

Everett, S. (2002) 'Deregulation, competitive pressures and the emergence of intermodalism.' *Australian Journal of Public Administration*. Vol 61 No 3, pp.19-26.

Feser, E.J. and Bergman, E.M. (2000) 'National industry cluster templates: A framework for applied regional cluster analysis.' *Regional Studies*. Vol 34 No 1, pp. 1-25.

Goldfinch, S. (1999) 'Remaking Australia's economic policy: Economic policy decision-makers during the Hawke and Keating Labor governments.' *Australian Journal of Public Administration*. Vol 58 No 2, pp. 3-20.

Gordon, I.R. and McCann, P. (2000) 'Industrial clusters: Complexes, agglomeration and/or social networks?' *Urban Studies*. Vol 37 No 3, pp. 513-540.

Industry Audit. (1998) 'Marine manufacturing.' *Tasmanian State Government Report*.

James, D. (2002) 'How to kick global goals.' *Business Review Weekly*. Vol 24 No 12, pp. 50-55.

Keating, P. (1994) *Working nation: Policies and programs*. Canberra: Australian Government Printing Service.

Kelty, B. (1993) *Developing Australia: A regional perspective: A report to the Federal Government by the Taskforce on Regional Development*. Canberra: National Capital Printing.

Klepper, S. (1996). 'Entry, exit, growth, and innovation over the product life cycle.' *American Economic Review*. Vol 86 No 4, pp. 562-583.

Leigh, A. (2003) 'Thinking ahead: Strategic foresight and government.' *Australian Journal of Public Administration*. Vol 62 No 2, pp. 3-10.

- Lyons, D. (1995) 'Agglomeration economies among high technology firms in advanced production areas: The case of Denver/Boulder.' *Regional Studies*. Vol 29 No 3, pp. 265-278.
- Martin, J.F. (2000) 'Policy consulting and public policy.' *Australian Journal of Public Administration*. Vol 59 No 1, pp. 24-35.
- McKinsey and Company. (1994) *Lead local compete global: Unlocking the growth potential of Australia's regions*. Sydney: McKinsey and Company.
- Moustafine, M. (1999) 'Globalisation and the changing role of government.' *Australian Journal of Public Administration*. Vol 58 No 4, pp. 126-127.
- Porter, M.E. (1998) 'The Adam Smith address: Location, clusters, and the "new" microeconomics of competition'. *Business Economics*. 33(1): 7-13.
- Porter, M.E. (1990) *The competitive advantage of nations*. New York. Free Press.
- Quiggin, J. (1999) 'The future of government: Mixed economy or minimal state?' *Australian Journal of Public Administration*. No 58 No 4, pp. 39-53.
- Trinca, H. (2002) 'Absolute Porter.' *Boss - The Australian Financial Review*. September Edition.
- Weijland, H. (1999) 'Micro-enterprise clusters in rural Indonesia: Industrial seedbed and policy target.' *World Development*. Vol 27 No 9, pp. 1515-1530.
- Wickham, M.D. and Hanson, D.J. (2002) *Industrial clustering in regional Australia: The role of chance, entrepreneurs and government in the Tasmanian light ships industry*. Conference proceedings - Australia and New Zealand Academy of Management Conference. Victoria, Australia.
- Yla-Anttila, P. (1994) 'Industrial clusters – A key to new industrilisation?' *Economic Review*. Vol 1 No 4, pp. 4-9.