

AUSTRALIAN CLUSTER POLICY AND ELECTRONICS CLUSTER DEVELOPMENT

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ABSTRACT

Innovation is the basic driver for sustainable competitiveness. In Australia, Small to Medium Enterprises (SMEs) account for over 50% of employment and a large share of innovative activity and growth. SMEs have benefits such as increased flexibility and low overheads, but also face problems such as lack of financing, limited access to markets, difficulties in obtaining or exploiting new technologies, and the need to upgrade managerial and technical skills. SMEs working in clusters can attain the advantages of large firms by addressing these issues as a group while retaining the benefits of specialisation and flexibility. Clusters play a vital role in enhancing innovation among their members.

Industry clusters are receiving increased attention in Australia as a form of competitive strategy. This paper outlines the progressive cluster mapping and cluster development programs conducted by the Australian Electrical and Electronics Manufacturers' Association (AEEMA). While the AEEMA cluster development programs are primarily industry-led, they are also supported by Australian government grants that are designed to enhance innovation among SMEs.

1. INTRODUCTION

Innovation is the basic driver for sustainable competitiveness. Small to Medium Enterprises (SMEs) are responsible for over 50% of employment in Australia, and a large share of innovative activity and growth (Ghassemi, 2001). SMEs are likely to exhibit innovative behaviour, and many technology-based SMEs are strong innovators – at the cutting edge of the ‘new economy’ (OECD, 2000b).

SMEs have benefits such as increased flexibility and low overheads, but also face problems such as lack of financing, limited access to markets, difficulties in obtaining or exploiting new technologies, and the need to upgrade managerial and technical skills. Cooperative competitive strategies enable SMEs to address some of these difficulties. A cooperative competitive strategy involves two or more separate organisations that work together to improve the future competitiveness of both or all participants. Strategies to promote industry cluster cooperation are enhancing SME success in many areas of the world (McPherson, 2002, Mytelka, 2000)

1.1 METHODOLOGY

This paper outlines the current program to develop industry clusters by the Australian Electrical and Electronics Manufacturers Association (AEEMA). Background and

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rationale for the program is provided by a short summary of the literature on industry clustering and an overview of the electronics industry in Australia. The evolution of the AEEMA cluster development process is explained. Anticipated outcomes are discussed and measures that will be used to identify success are identified.

1.2 CLUSTER COOPERATION

Cluster definitions vary, but most definitions explicitly mention the geographical or regional agglomeration of firms (Porter 1998). Clusters involve cooperation between competing as well as complementary organisations, where most alliances and business networks only include complementary organisations. Rosenfeld (1997:4) defines clusters as “concentrations of interdependent businesses that are intrinsically linked through common or complementary inputs, innovations, processes, or products”. The OECD puts forward a more production-focused definition:

Clusters can be characterised as production networks of strongly interdependent firms (including specialised suppliers) linked to each other in value-adding production chains. In some cases, clusters also encompass alliances with universities, research institutes, knowledge-intensive business services, bridging institutions (brokers, consultants) and customers. (OECD, 2000a)

The existence of ‘clusters’ of competing and complementary companies can improve competitiveness for all players, and increasingly groups of companies are cooperating to identify and enhance the cluster benefits.

1.3 INDUSTRY CLUSTERS AND BENEFITS

The defining of clusters with relevance to modern-day organisations has occupied much effort since Michael Porter (1990) revived interest in the clustering phenomenon. The evolution of regions of significant competitiveness in certain industries has been documented in many nations and in a wide range of industries. The clustering of organisations in a region reaches a ‘critical mass’ when that region becomes a magnet attracting customers, companies and people with skills to the region. In this way, once a cluster becomes established, it develops a life of its own and can grow and change in response to changes in the environment.

Traditionally clusters developed a specialty due to the availability of resources and materials in the region. Once an area becomes known for competitive advantage, in many cases the growth of the cluster accelerates – customers are drawn to the area, opportunities grow, people come looking for jobs and as a result education, training and skill sharing also become elements of the cluster.

Clustering is not a new phenomenon, and the location of firms near each other and near supply sources has been a natural occurrence in a range of industries for centuries. This phenomenon and its effects on local employment and skills were recorded in the late 19th century by Alfred Marshall (summarised in Marshall, 1920). In fact clustering has been described as an ‘organic’ process due to the tendency of clusters to slowly form and to grow, evolve and mutate over time. Material resource-based clusters still exist (Tile industries in Italy near the clay sources, regional Wine clusters in Australia such as the Barossa Valley in the state of South Australia, and the Hunter Valley in the state of New South Wales), but more and more clusters are based on knowledge resources that accumulate in a region (Silicon Valley is the best known example). Instant global communication and Internet capabilities should theoretically render geographical considerations practically obsolete, so the strength of the clustering phenomenon in our

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knowledge-based industries has surprised many analysts. Many are looking at the social factors that shape a region and recognise the importance of informal information links that develop directly and in close quarters (Brown and Duguid, 2000)

Multiple alliances and networks usually form within a cluster, but a cluster's influence goes beyond that of a network. Clusters play a vital role in enhancing innovation (Porter, 1998). Clustering will result in better visibility in the market for the cluster's output. This visibility will also create a market for skill that attracts labour, and in turn a pool of skill that attracts businesses. Cluster members often share a high level of understanding and may be better able to identify possibilities and risks (Brown and Duguid, 2000). SMEs working in clusters can attain the advantages of large firms while retaining the benefits of specialisation and flexibility (OECD 2000b).

Most important is the learning environment that exists within a cluster and helps it to evolve and grow. The non-competitive framework within a cluster fosters the sharing of experiences and opportunities and the transfer of knowledge – increasing the capability of all players as well as advancing the underlying technology. Clusters play a vital role in enhancing innovation among its members and industry clusters are receiving increased attention in Australia as a form of competitive strategy.

1.4 CLUSTER POLICY

While clusters have been around for centuries, economic policies for clustering are a more modern tool created as policy makers look for a balance between globalisation and the tendency for localisation of industries through clustering. It has been suggested that it takes at least ten years for a cluster to form and develop to a point where real competitive advantage is created (Porter, 1998). The challenge for today's industries is to harness the advantages of clusters without having to wait for decades. Cluster development initiatives hope to speed up and direct the cluster development process. Development policies to promote clusters of firms and industries have become common all over the world (McPherson, 2002), however the best method for assisting cluster development is not agreed upon. Porter (1998) believes that government policy should reinforce ALL clusters, and not intervene and target 'desirable' industries, while the OECD policies recommend that some prioritisation among clusters is generally necessary (Nolan, 2003). The OECD (2000a) recommends that cluster encouragement programs should be primarily industry-led and directed, although it is recognised that governments can play a role especially in the start-up phase. Porter (1998) recommends that cluster development efforts build on existing or emerging clusters instead of trying to create new clusters. Although clusters are localised entities, McPherson (2002) notes that many countries have a national cluster policy and asserts that Australia should also have a national approach to cluster development.

2. CLUSTER POLICY IN AUSTRALIA

The Australian government has long recognised the importance of SMEs to Australia's economy, and has introduced a number of programs to help address some of the challenges faced by SMEs. The Australian government's Business Networks Program and Supply Chain programs introduced during the 1990s were targeted specifically at SMEs (AusIndustry, 1997, Killen, Hunt, Janssen and Ayres, 1998). Both of these programs encouraged SMEs to work together in cooperative network arrangements with complementary firms. It is now recognised that cooperative relationships among competing firms are also important drivers for innovation. Although Australia does not have a national policy for clusters, support for cluster development initiatives among

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SMEs is now available through some of the initiatives within the Australian government's "Backing Australia's Ability" program. Industry-led approaches like the AEEMA cluster building initiatives outlined below have benefited from government support through this program.

2.1 BACKING AUSTRALIA'S ABILITY

The Backing Australia's Ability (BAA) program announced by the federal government in January 2001 is billed as a comprehensive and integrated package of funding for science and innovation (Commonwealth of Australia, 2003a). This program assists with many of the elements of successful innovation by addressing the development and retention of skills, research and development and the commercial application of research (Commonwealth of Australia, 2003a). Although some elements of the program will assist with cluster development, there is no national cluster policy in Australia. McPherson (2002) believes that the government needs to move beyond the current *laissez faire* approach and to provide more comprehensive innovation policies that enhance cluster development. In addition, most of the emphasis in the BAA program is focused on technology-push innovation. Livingstone (2003) believes that successful innovation will require more market-pull support such as enhanced access to market intelligence, understanding of global markets, and participation in 'solution clusters' as distinct from 'technology clusters'.

Although the BAA does not represent a national cluster policy for Australia, the Innovation Access Program is one initiative of the BAA that has the scope to lend some support to cluster development. The Innovation Access Program has been allocated \$100 million over five years and crosses three government portfolios, DITR (Department of Industry, Tourism and Resources), DEST (Department of Education, Science and Training) and DCITA (Department of Communications, Information Technology and the Arts). The program aims to increase Australian access to and uptake of global research and technologies. Another example of a cluster friendly initiative is the Information Technology Online (ITOL) program, which is part of the Innovation Access Program. The ITOL program is especially focused on encouraging clusters of SMEs to adopt business-to-business e-commerce solutions through special grants and funding.

2.2 THE ELECTRONICS INDUSTRY IN AUSTRALIA

Electronics is a key enabler in an increasing number of fields; therefore a leading edge electronics industry is essential for the success of many other industries. Worldwide, electronics is one of the fastest growing industries with a global turnover of A\$1.6 trillion annually. Australia is a small player with only 0.05% of the world turnover at A\$8.7 billion - A\$4.9 billion of which is exported (Commonwealth of Australia, 2003b). In this important and growing area, Australia's electronics industry is in a good position to continue to develop and to contribute significantly to Australia's economy.

However, until recently, the full scope of the electronics industry in Australia did not receive government recognition. Much of Australia's electronics industry is hidden within other industries such as the bio-medical, automotive and defence industries. The large spread of electronics focused enterprises has fragmented the industry and made it hard for the electronics industry to lobby for support and to achieve critical mass. However, without a strong electronics industry, many other industries in Australia will suffer.

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The Australian Government's announcement of the development of an Electronics Industry Action Agenda (EIAA) in May 2001 marked an important step for the future of the Australian Electronics Industry and related industries. Action Agendas are a result of industry working with government to strengthen key Australian industries – particularly with a view to enhance international competitiveness. Action Agendas provide an overview of the industry in question and help focus on ways to remove impediments and exploit opportunities.

The EIAA was championed by the Australian Electrical and Electronics Manufacturers' Association (AEEMA) and approved by the Australian Government Cabinet in June 2003. It presents a 10-year vision for the industry and includes measurable goals. (Commonwealth of Australia, 2003b) The EIAA provides recognition of electronics as an industry itself, and signals the government's recognition of the importance of the industry in underpinning future economic growth. The EIAA also provides the framework for the industry to speak with one voice. An industry-led Implementation Group coordinated by AEEMA has been formed to oversee and report on Action Agenda strategies. An Advocacy Group provides high-level assistance to the Implementation Group.

The Chair of the Advocacy Group is Christopher Janssen, the Managing Director of GPC Electronics, and also the current President of AEEMA. GPC electronics is a telecommunications equipment contract manufacturer that works within an embryonic cluster of industries - GPC and its competitors use a network of suppliers for resources such as sheet metal and plastic parts (Killen et al, 1998). All of these organisations have learned from each other, however, these linkages have not developed the momentum to become a true cluster, and Christopher Janssen believes that industry associations have a role to play in assisting cluster development. Australia has a world competitive advantage in complex electronics manufacturing which has enabled GPC to experience high growth and consistently export 90% of its output. However Australia does not yet have the reputation or the critical mass of contract electronics manufacturers to attract international customers easily.

2.3 AEEMA - THE AUSTRALIAN ELECTRONIC AND ELECTRICAL MANUFACTURERS' ASSOCIATION

AEEMA is the key national association for the Electronics industry and is taking a lead role in the EIAA's development and implementation. Angus M Robinson, Chief Executive of AEEMA, has been a leading advocate for both the EIAA and cluster development generally.

AEEMA was established in 1969 and now has membership of around 500 local or multinational corporations in three main sectors: electrical, electronic and information and communication technology (ICT) industries. AEEMA is an influential association that has moved beyond the protection of its members' industries to working proactively with government. (AEEMA 2004)

AEEMA aims to create a more cohesive, prosperous, and favourable industrial environment for its industry sector. It believes that new opportunities in the global marketplace will result from formalised cluster development activity and has a major initiative for the development of clusters.

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2.4 THE AEEMA CLUSTER DEVELOPMENT PROCESS

Within the framework of the national strategy set out by the EIAA, the AEEMA approach to clusters is an export-focused industry-led initiative designed to create sustainable economic benefits. AEEMA advocates that a newly forming cluster should initially target the ‘low hanging fruit’ – or to target the low risk/early return activities as recommended in the policy recommendations on Enterprise Clusters from the OECD Bologna Conference (Nolan, 2003). The Bologna recommendations also highlight the importance of private sector players such as AEEMA taking the lead in cluster enhancement.

AEEMA has led the development of clusters in Queensland during the past two years and throughout this process has been refining methods to map, develop and measure the success of clusters. John Humphreys, the convenor of the Queensland cluster, believes that “as a nation we need to move beyond the rhetoric to establish the true worth of such entities as key economic and social development tools” (AEEMA, 2003:1). The AEEMA approach to cluster development is “unashamedly project focused” to generate commercial results and demonstrate cluster benefits (Humphreys, 2003:68). Under the Australian Government’s BAA’s Innovation Access Program, AEEMA has recently received a grant from the Department of Industry, Tourism and Resources (DITR) for an initiative titled “Enhancing National Economics Through a New Cluster Paradigm” (Humphreys, 2003). AEEMA will develop and disseminate information about a commercial framework for cluster development (AEEMA, 2003).

A new cluster is proposed for New South Wales that would be associated with the Australian Technology Park (ATP) in Sydney using the methods developed by AEEMA. The goals for the new cluster reflect the range of benefits found in established clusters - to: Unify the fragmented industry; Create a shared vision; Assist with commercialisation of R&D; Promote Australian Electronics Industry Branding; and Enhance export opportunities (Robinson, 2003b).

2.5 STAGES OF CLUSTER DEVELOPMENT

Cluster mapping is the first exercise in the AEEMA cluster development process. The cluster mapping process involves identifying the elements of the cluster and identifying and mapping linkages between the elements. When cluster capabilities are mapped and gaps and needs are addressed, the AEEMA approach is to seek a large-scale ‘signature’ project to involve collaboration of cluster members, and to further develop the cluster. (Robinson, 2002)

The elements of a cluster are all the entities that contribute to the creation of competitive advantage in a cluster: These elements are generally:

- Key players such as suppliers, customers, clients and markets
- Support infrastructure such as universities, research institutes, training organisations and industry associations
- and the Regulatory framework

(Robinson, 2003a)

There are three main approaches to cluster-based studies that the mapping exercise should take account of:

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1. Geographic location -- Studies of the co-location of, and linkages between, firms in specific national or regional economies.
2. Transactional (a 'vertical' perspective) -- studies of the interaction between 'industries' up and down the value chain
3. Innovation systems (a 'horizontal' perspective) -- Studies of linkages and information/knowledge flows within a system of similar technology developers/user/suppliers. (AEEMA, 2002)

The elements of the cluster and the linkages are mapped in a 'product system' framework (Houghton, 2000). Figure 1 shows a schematic of a 'product system' for the electronics industry. There are five major elements and linkages shown that assist in the creation, production and distribution of goods and services.

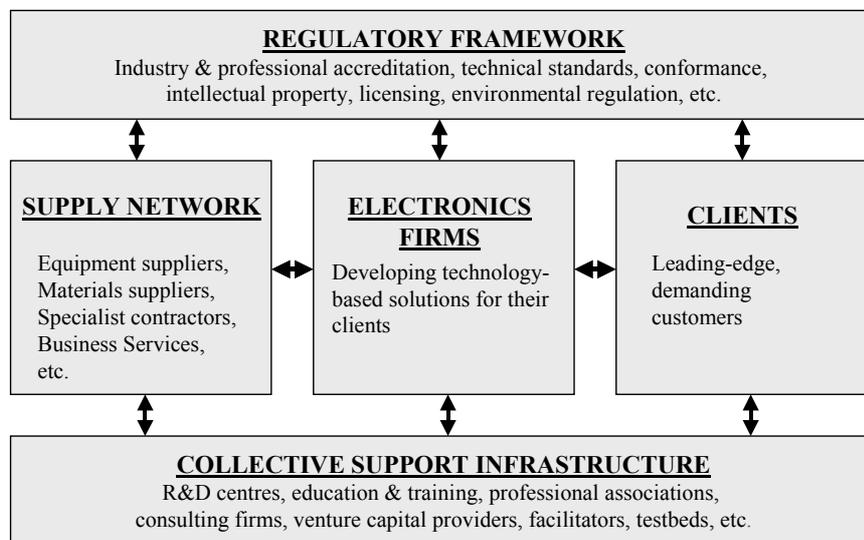


Figure 1: Product System Cluster Mapping framework of the Electronics Industry, (AEEMA, 2002:10)

Once the cluster has been mapped, the AEEMA clusters follow the four phases of a 'Cluster Development Life Cycle'. This model represents the dynamic nature of clusters. An approximate time scale is indicated, but this can vary greatly.

1. During Phase 1 a common interest group or network is formed. Administration and support systems are initiated as the relationships between individual companies begin to develop. Government seed funding may be useful during this phase (6-12 months).
2. Phase 2 is a growth phase – the simple network becomes multi-dimensional, and the essential trust begins to grow (12-18 months).
3. As the cluster grows further during Phase 3, there may be opportunities to 'Spin off' special interest groups or to 'Spin on' entities to introduce missing elements or fill gaps. Some clusters may define a division between 'core' and non-core participants. (18-24 months).
4. By Phase 4 the cluster is mature with a solid engaged core achieving commercial results through real projects. The legal and contractual framework is established, and external links are developed (24-36 months) (Humphreys, 2003).

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The AEEMA cluster development process is project and commercially focused and requires organisations to become members of AEEMA as well as the particular cluster. According to Rosenfeld (1997) the AEEMA cluster policy may better fit the definition of a network than a cluster. Rosenfeld's definition of a cluster requires that membership is 'open'. In addition AEEMA clusters will operate more like a network according to Nolan's (2003) definition because they aim to enable firms to engage in complex production by linking companies and capabilities to attract large customers and this will involve contractual arrangements between participating firms. Terminology and definitions vary, and whether described as a cluster or a network (perhaps the AEEMA model is between the two) the common theme is the facilitation of the flow of ideas, knowledge and people for increased competitive advantage (Australian Business Forum, 2003).

2.6 SUCCESS MEASURES

The AEEMA assisted clusters are developing well, but none have reached the mature stage yet. The South Australia and Queensland clusters are seen as successful, but it is too early to evaluate sustainable success, and the New South Wales cluster is only just beginning. AEEMA recognises that it is important to determine the success of the cluster development effort and to continue to improve the cluster development process. Although some benefits will be difficult to quantify, the following measurements are expected to provide some indication of the level of success: Level of skilled employment generated in the cluster; Number of new firms; Value of turnover; Value of exports; Value of venture capital attracted; Amount invested in research and development activities; Number of new patents and other R&D measures; Extent of attraction of government grants by cluster participants. (AEEMA, 2002)

3. SUMMARY

SMEs are responsible for a large share of the innovative activity and economic growth in Australia. Cooperation among SMEs can provide some of the benefits of a large organisation while retaining the agility, specialisation and responsiveness of a smaller entity. A well-functioning cluster of competing and complementary businesses has the potential to improve competitiveness for all participants. The AEEMA initiatives under the EIAA illustrate an industry-led and government supported approach to defining, nurturing and growing strategic clusters for sustainable global competitive advantage. While it is too early to make definitive conclusions about the long-term success of these initiatives, success measures have been proposed, and early indications are positive.

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REFERENCE

- AEEMA, (2002) Draft, Cluster Mapping methodology, Electronics Industry Action Agenda. (internal AEEMA reference document)
- AEEMA, (2003) New Approach to Clusters. Media release, Australian Electrical and Electronic Manufacturers' Association, Brisbane, September 3.

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- AEEMA, (2004) Australian Electrical and Electronics Manufacturers' Association website. [January 8 2004, <http://www.aeema.asn.au/>]
- AusIndustry, (1997) *Links to Success: Business Links and Networks in Australia*, Department of Industry, Science and Tourism, Commonwealth of Australia, Canberra.
- Australian Business Forum, (2003) Collaboration – The Oxygen for Innovation. [4 Oct 2003 <http://www.abfoundation.com.au>]
- Brown, J. S., and Duguid, P., (2000) *The Social Life of Information*. Harvard Business School Press, Boston
- Commonwealth of Australia, (2003a) *Backing Australia's Ability: The Australian Government's Innovation Report 2003-04*. [6 January 2004 <http://backingaus.innovation.gov.au/docs/BAA03-04.pdf>]
- Commonwealth of Australia, (2003b) *Electronics Industry Action Agenda*, [March 6 2003 <http://www.industry.gov.au/assets/documents/itrinternet/ElectronicsIndustryAA2003.pdf>]
- Ghassemi, K., 2001, From Stragglers to Early Adopters of Technology: Australian Small Business Cluster Analysis, 2001 IDC Australia Small Business Market Report, Volume 1, May 2001, Document #AU21510H, accessed Jan 10 2004, http://www.idc.com.au/small_business/pdf_files/AU21510H_Srn SBM_Aust Small Business Cluster Analysis.pdf
- Houghton, J., (2000) Innovation and Product Systems. Presentation, Australian ICT Industry Cluster Studies Design Workshop, Centre for Strategic Economic Studies, Victoria University, Melbourne, 16 October.
- Humphreys, J., (2003) AEEMA Innovation Access Program - Enhancing National Economic Benefits Through a new Cluster Paradigm. *AEEMA Draft Report*, December.
- Killen, C. P., Hunt, R.A., Janssen C., Ayers, B., (1998) Strategic Alliances for World Competitiveness. In: *Proceedings of the World Innovation and Strategy Conference (R Chapman and R A Hunt, eds.)* pp 366-373, InCITe Research Centre, Campbelltown.
- Livingstone, C., (2003) Australia as a Technology Integrator: People, Institutions and Structural Serendipity. Chairman of CSIRO board, UTS annual Zunz lecture, 23 October.
- Marshall, A., (1920) *Principles of Economics*, Macmillan and Co., Limited, London.
- McPherson, L., (2002) Clusters policy: A future strategy for Australia. *Innovation: management policy and practice*, Volume 4, Issue 1-3, Dec, 54-69.
- Mytelka, L.K., (2000) Local Systems of Innovation in a Globalized World Economy, *Industry and Innovation*, Volume 7, Number 1, 15-32, June 2000.
- Nolan, A., (2003) Collaboration or Competition?: Public Policy on Enterprise Clusters and Networks, Forum presented by the Australian Business Foundation, 9 Sept, N Sydney.
- OECD, (2000a) The Bologna Charter On SME Policies (Adopted On 15 June 2000), [15 Dec 2003 http://www.oecd.org/document/17/0,2340,en_2649_34197_1809105_1_1_1_1,00.html]
- OECD, (2000b) Policy Brief: Small and Medium-sized Enterprises: Local Strength, Global Reach. *OECD Observer* [6 Jan 2004 <http://www.oecd.org/dataoecd/3/30/1918307.pdf>]
- Porter, M.E., (1990) *The Competitive Advantage of Nations*. Macmillan press, London.
- Porter, M.E., (1998) Clusters and the New Economics of Competition. *Harvard Business Review*, November-December, 77-90
- Robinson, A. M. (2002) Building Industry Clusters – Electronics Industry Action Agenda. Presentation, Knowledge Economy Conference, 11-12 November, Sydney Olympic Park.
- Robinson, A. M., (2003a) Industry Clusters – The Way of the Future. *ICT Solutions*, June.
- Robinson, A. M., (2003b) NSW Electronics Cluster & the Electronics Industry Action Agenda, Presentation, AEEMA cluster workshop, Australian Technology Park, 17 July.
- Rosenfeld, S. A., (1997) Bringing Business Clusters into the Mainstream of Economic Development. *European Planning Studies*, February, Vol 5 Issue1, 3-23.