

The Spatial Expression of Complex Linkages in the  
Machinery & Equipment Manufacturing Cluster in  
Southeast Melbourne

Authors:

Andrew McDougall  
SGS Economic & Planning Pty Ltd

and

Kevin O'Connor  
Faculty of Architecture, Building & Planning  
University of Melbourne

Contact Details:

Andrew McDougall  
C/- SGS Economics & Planning Pty Ltd  
Level 6, 313 Latrobe St  
Melbourne VIC 3000  
Phone: +61 3 9606 0994  
Fax: +61 3 9606 0995  
[Andrew@sgs-pl.com.au](mailto:Andrew@sgs-pl.com.au)

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

**Andrew McDougall** is an Associate Director of SGS Economics & Planning (SGS). Since joining the firm, Andrew has been involved in a variety of consultancy-based projects, including:

- Cost benefit economic impact assessments, usually for proposed infrastructure projects or programs;
- Financial and economic feasibility studies, often within wider business or corporate planning exercises; and
- Specialised research and planning studies, focussing on economic competitiveness and competency development, and including strategies to maximise economic development potential of cities and regions.

**Professor Kevin O'Connor** is Professor of Urban Planning at the University of Melbourne.

His teaching and research explores the links between the economic system (particularly focussing upon the service sector and air transport ) and the growth and internal structure of cities (using Australia and Melbourne as case studies). Over the past decade a major emphasis has been on recent changes in Australian economic activity. The results of which are outlined in *The New Economic Geography of Australia: A Society Dividing* published by Oxford University Press in 2001.

Professor O'Connor graduated from the University of Melbourne in 1970, with a Master of Commerce awarded for a thesis on *Regional Development in the Latrobe Valley*. That was followed by a PhD at McMaster University in Canada in 1974, with research into the national and regional influences on the growth of Canadian cities.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

**Abstract:**

**The spatial expression of complex linkages in the machinery & equipment manufacturing cluster in southeast Melbourne**

Economic development practitioners have embraced industry clusters, as they transfer theory to policy and development initiatives. Much of the policy application assumes economic competitiveness enhancements will accrue if local inter-firm linkages between cluster members are strengthened.

This research explores multi-dimensional nature of inter-firm linkages in terms of their geographic coverage, complexity, effectual means and evolutionary period. It then attempts to measure inter-firm linkages with respect to one of these dimensions, i.e. 'complexity' of inter-firm links. It does this by applying the Waits and Howard (1996) cooperation continuum, which targets actual participation in cooperative activities to the Machinery & Equipment manufacturing cluster in southeast Melbourne.

The basic hypothesis is that if proximity influences inter-firm linkage complexity, then complex linkages will be focused at the local level rather than regionally, nationally or internationally.

The research found that few of the cluster members maintained linkages that could be regarded as complex. Indeed, a dearth of complex linkages was found and, where they existed, the importance of proximity is questionable.

While the research suffered from limitations, such as constrained sample sizes and perhaps an undue focus on export oriented firms, the results suggest that the Waits & Howard framework is better positioned to describe 'horizontal' relationships between similar firms than 'vertical' relationships. More importantly, the results suggest that cluster development initiatives that focus on developing local linkages between firms might be misplaced and that a broader geographic perspective may be warranted.

*Key words: Inter-firm linkages, collaboration, cluster dynamics, cluster measurement, cluster development, economic development.*

## **The importance of proximity in economic competitiveness**

There is a broad consensus amongst economists that knowledge and inter-firm relationships play an important role in determining economic growth. This understanding of growth incorporates geographic perspectives, as geography is recognised as a key influence on the use and diffusion of knowledge, and the structure and intensity of inter-firm linkages. Such thinking has been embraced by economic development practitioners, leading to policies designed to encourage industry clusters.

Attempts to explain the role that industry clustering plays in economic growth traces back to Marshall's (1920) concept of industrial districts and have re-emerged under various guises since then, such as in agglomeration economies (Scitovsky, 1963; Blair, 1991), industrial complexes (Piore and Sabel, 1984; Granovetter, 1985), creative milieus (Maillat, 1998) and growth poles (Perroux, 1955).

Lloyd and Dicken (1990) summarise this literature by suggesting that the basic idea is that linkages between firms, institutions and other economic agents, located in geographic proximity, generate advantages of scale and scope. Furthermore, as firms recognise the benefit of these linkages, they may attempt to minimise distance between themselves and their trading partners, thereby facilitating communication between themselves and customers and suppliers. In that attempt greater clustering will result.

### **Toward cluster policy**

The common thread in the substantial literature on this perspective is that proximate firms are likely to be more competitive. That logic is reinforced by the raft of case-oriented literature which explained the success of certain regions in Europe and North America (e.g. Signorini, 1994; Saxenian, 1994). Applications to Third World and Asian economies have also been produced (Markusen & Park, 1993; Meyer-Stamer, 1995). These success stories have generated much interest among development practitioners to find ways to replicate and promote similar synergies.

Feser and Bergman (2000 p.4) highlight that "a specific area of application interesting to policy makers has developed from these ideas: the identification and nurturing of industry clusters. This is a concept popularised by Porter (1990), in his efforts to stimulate a new approach to corporate strategy that is itself based heavily on the industrial district model at the regional level".

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

Doeringer and Terkla (1995) however suggest that, at least in recent years, industry clusters have become a development policy fad. They argue that cities, states and regions in the US and Europe have developed cluster-based strategies, though the logic behind these is often poorly specified. Their review of practitioner journals suggests that, at least at the local level in the US, the approach frequently involves little more than the identification of current regional specialisations as targets for traditional development initiatives. This perspective has been enhanced by the work of Tremblay, 1993; Anderson, 1994; and Morfessis, 1994.

It is clear that a better understanding of the clustering process is needed. That provides the broad context for this paper.

Cluster-based development policy has been embraced in Australia. Some of the most high profile examples include those embarked on by the Adelaide MFP Corporation Ltd, Cairns Regional Economic Development Corporation, Hunter Valley Economic Development Board, the Queensland Government, in the SEQ Economic Development Strategy, and more recently the Office of Western Sydney.

Each of these initiatives followed a similar path. Regional concentrations of industries were identified, usually through a combination of quantitative and qualitative processes, before cluster 'maps' were constructed. A cluster working group was created and a collective action plan developed to address common opportunities and problems. Ongoing engagement with the working group was maintained to ensure ongoing efforts were led and refined.

It is implicitly assumed in each of these developments that the cluster constituents have functional linkages between them, i.e. links that were more than simple buyer-supplier transactions were naturally associated with co-location. While agglomeration theory establishes that competitive advantage may arise from these simple buyer transactions and transaction cost economics suggests that co-location of buyers, sellers and relevant others will minimise operating cost structures, neither theory argues that co-located firms will necessarily band together to collectively capture common opportunities and ameliorate common problems. It is this step from the broad theory to implied local action that constitutes a major weakness in the use of cluster theory in policy applications.

This paper explores that step by analysing the nature of the relationships between co-located firms within southeast Melbourne, and so provides insight regarding the level of collaboration that actually exists. The core idea is that geographic co-location or apparent clustering does not necessarily infer the existence of inter-firm linkages that deliver the assumed benefits of cluster theory.

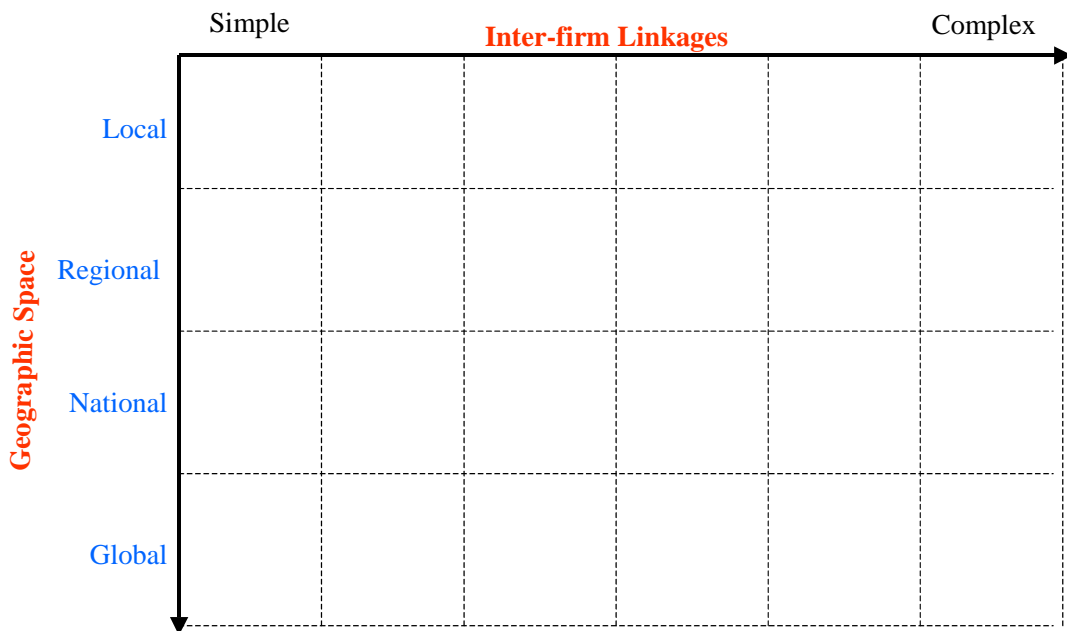
Figure 1 depicts the task at hand. It highlights that we need to better understand the character of the inter-firm linkages that actually exist in clusters and,

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

same time, the geographic scope of these linkages. The cells of Figure 1 provide an array of alternative patterns of linkages between firms. In the top right hand corner is the implied outcome of industrial district theory, where complex links are expressed locally; in contrast is the bottom left hand corner, where even simple connections are made with global rather than local partners.

For clusters to have a major regional impact, the behaviour of firms needs to be more toward the top of this table than the bottom, and more toward the right than the left. In essence, the desired outcome is that complex links have local expressions.

**Figure 1: The general research framework**



**Differentiating simple vs. complex inter-firm linkages**

Approaches that differentiate between the types of inter-firm linkages are few. In fact, a search uncovers only three, and each of these is qualitative in nature. These have been developed by Maillat (1998), the Bureau of Industry Economics (BIE) (1995) and by Waits and Howard (1996).

Maillat differentiates between trivial (simple) links and determining (complex) links in the innovation process, arguing that collaborative links with research institutes and other firms form determining links, whereas customer contacts and other rudimentary relationships with service providers, equipment suppliers, etc. form trivial links. While Maillat’s framework is useful in conceptualising the

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

varying complexity of linkages between firms, it requires substantial qualitative data assembly from a broad array of firms in many sectors within a region.

The BIE (1995) framework uses a continuum-based description of the nature of customers, sellers, products/ services, transactions and social norms to describe arm's length (simple) and cooperative (complex) transactions between firms. While the BIE's framework both supports and adds to the theory of clustering, especially transaction cost theory, it too would be difficult to utilise because of its complexity.

The Waits and Howard (1996) framework developed for cluster research in Arizona, USA, describes thresholds of cooperative activity, as well as providing descriptions of the types of cooperative activities that cluster-based firms undertake.

An attraction of the Waits and Howard framework is that it does not account for all of the functional relationships between firms. It excludes buyer-supplier linkages and other simple linkages. Instead, detailed descriptions of relatively complex linkages are provided, ranging from 'informal network' activities to true 'partnership-based' activities. These more complex linkages are labelled as co-informing activities, co-learning activities, co-marketing activities, co-purchasing activities, co-production activities and co-building activities (see Figure 2); these are ascending in order of complexity, and provide a way to explore the significance of the complex links between firms within a cluster.

Figure 3 depicts how the Waits and Howard framework sits over the task at hand specified previously. If the basic ideas of cluster theory hold, the linkage pattern for a firm should appear as displayed in this figure.

The figures displayed in the results map out the inter-firm linkages. The location of the linkage partner is shown vertically. The complexity of the linkage, using the Waits and Howard (1996) continuum, is shown horizontally across the page from 'simple' to 'complex' linkages. While the figures are not precisely to scale, the size of the oval representing the level of cooperative activity within each linkage type (e.g. co-informing) indicates the proportion of firms within each segment that had that type of inter-firm linkage. Similarly, the shading of each oval represents the perceived importance of the linkage type to business operation, as reported by the segment interviewees. In short, the bigger the oval, the greater the proportion of interviewees participating in the linkage type and the darker the oval, the greater the perceived importance of the inter-firm linkage.

**Figure 2: Wait's & Howard's (1996) 'Cooperation Continuum'**

---

**INFORMAL NETWORKS**



**Co-informing activities**

*Preparation of, contributions to or subscription to industry newsletters, electronic bulletin boards, shared data bases, industry surveys, business directories and any other initiative designed to improve communications between your firm and related firms.*



**Co-learning activities**

*Participation in industry seminars and conferences to learn better business practices and where and how to acquire resources and services.*



**Co-marketing activities**

*Participation in joint trade missions, trade shows, industry brochures and advertising campaigns designed to promote sales for your firm and the collaborating firms.*



**Co-purchasing activities**

*Buying equipment jointly with other firms and institutions, engaging in joint outsourcing plans, jointly undertaking training & quality enhancement programs for suppliers and jointly purchasing training programs for staff.*



**Co-producing activities**

*Undertaking R&D in collaboration with other firms and institutions and jointly manufacturing product.*



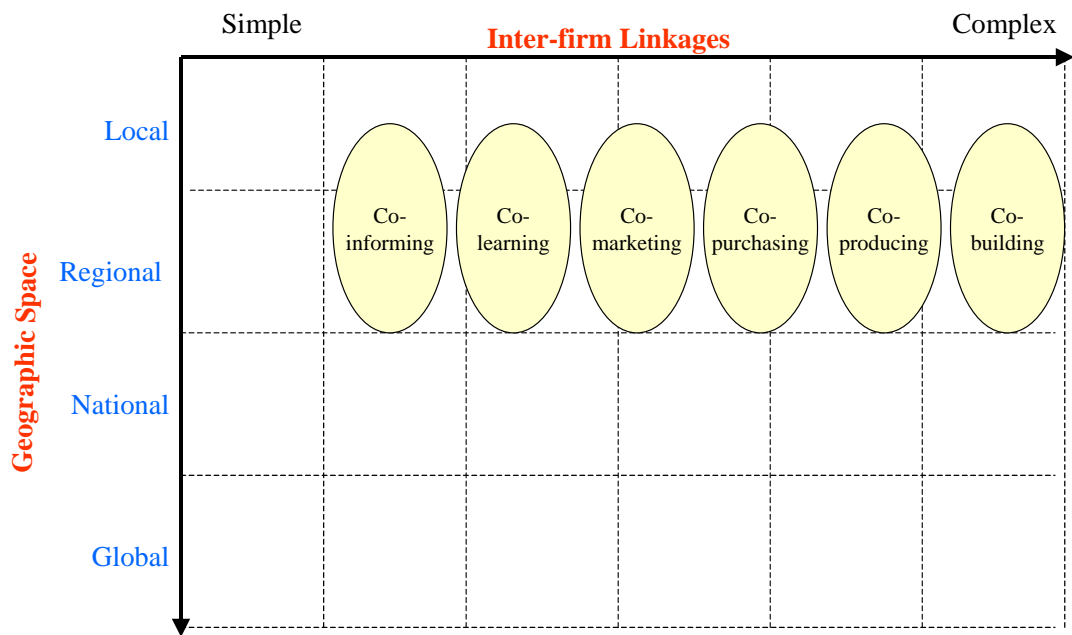
**Co-building activities**

*Working with other firms to build better links with government and educational institutions, preparation of joint submissions to government and undertaking lobbying on a collective basis.*



**PARTNERSHIPS**

---

**Figure 3: The modified research framework**

### Identifying industry clusters: industry selection

The Machinery and Equipment (M&E) manufacturing industries in Melbourne's southeast were chosen after a quantitative analysis indicated geographic clustering and after discussions with economic development practitioners in the region confirmed the local significance of the industries.

The quantitative analysis employed job estimates from journey to work data to quantify the significance of employment within the industries within the region, using Location Quotients. The approach assumed that a significant concentration, which could be interpreted as a cluster, exists when LQs were  $> 1$  (i.e. the industries were over represented).

Results showed the several of the M&E manufacturing industries were over-represented as regional employers compared to their significance in the national economy. Table 1 details the LQ results for all of the ANZSIC industries within the M&E manufacturing realm that are over represented in the region.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

**Table 1: Machinery & Equipment (M&E) Manufacturing LQ Statistics**

<i>ANZSIC</i>	<i>Location Quotient</i>
<b>28 Machinery and Equipment Manufacturing</b>	
2820 Other Transport Equip Mfg, undef	8.75
2810 Motor Vehicle, Part Mfg, undef	6.77
2812 Motor Vehicle Body Manufacturing	6.68
2866 Pump & Compressor Mfg	4.38
2839 Profsnl, Scientfc Equip Mfg nec	4.28
2813 Autmotive Elctrcl, Instrmnt Mfg	3.65
2864 Machine Tool & Part Mfg	3.25
2819 Automotive Component Mfg, nec	3.10
2850 Electrcl Equip Aplnce Mfg undef	2.96
2842 Telecmn Brdcstng Trnscvg Eqp	2.81
2829 Transport Equipment Mfg, nec	2.80
2830 Phtgphc Scientfc Eqp Mfg undef	2.50
2823 Railway Equipment Manufacturing	2.21
2859 Electrical Equipment Mfg nec	2.16
2851 Household Appliance Mfg	1.99
2841 Computer, Business Machine Mfg	1.89
2852 Electric Cable & Wire Mfg	1.71
2800 Machinery, Equipmnt Mfg, undef	1.66
2869 Industl Machnry, Equip Mfg nec	1.60
2840 Electronic Equip Mfg undef	1.58
2811 Motor Vehicle Manufacturing	1.37
2865 Lftng, Matral Hndng Equip Mfg	1.33
2860 Indstl Machnry Equip Mfg undef	1.17

Derived from ABS Census of Housing & Population 1996, Workplace Destinations.

### **Identification of firms**

Yellow Pages data was then used to identify firms within the M&E manufacturing industries with locations in southeast Melbourne. A lengthy list of firms resulted.

### **Export confirmation**

To focus the research, the lengthy list drawn from the Yellow Pages was sieved so that only exporters remained. This was achieved by telephoning each of the companies and asking:

- Did they make regular sales to overseas customers?
- What was the approximate annual value of overseas sales?

The location, main business activity and main export activity of each exporter was also confirmed in this initial contact.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

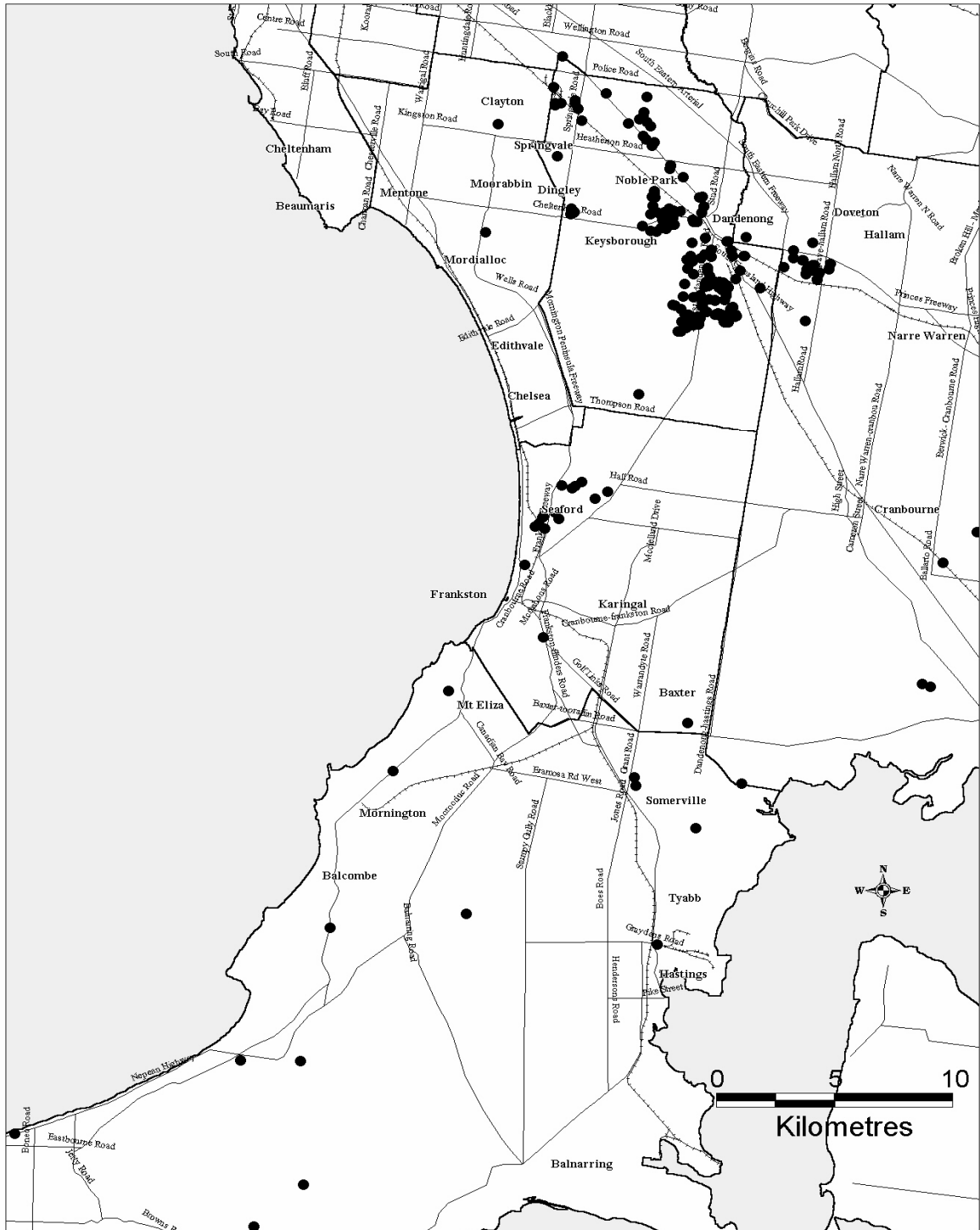
The decision to focus the research on export oriented firms was taken, as it was assumed that exporters would be more prone to cooperative behaviour with their regional counterparts, i.e. as direct local competition may be less constraining to linkage development.

Fifty M&E manufacturers were identified as exporters.

### **Confirming geographic clustering**

The location of each of the M&E manufacturing firms within southeast Melbourne is depicted in Figure 4. A high degree of geographic clustering around Dandenong and its immediate surrounds is evident. Some firms are obviously adjacent. Consequently, the M&E manufacturing industries were confirmed as good candidates for exploring complex inter-firm linkages in a geographic cluster of firms.

Figure 4: Location of machinery & equipment manufacturers



CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

## **Firm linkage behaviours**

Twenty-two M&E manufacturers were contacted for detailed interviewing. This represents 44% of the M&E exporters identified in the telephone screening survey.

The structured interview had two basic steps. The first was to identify the identity and location of entities involved with the firms, called their linkage partners. This step in effect describes the cluster of activities within which the selected firms fit. This involves the firms and suppliers, customers, competitors, research institutes and industry associations with which the interviewee firm had established links. The second was to explore the complexity of these linkages using the Waits and Howard framework as displayed in Figure 3.

The interview was structured around 10 questions (Appendix A). One of the questions (Q9) restated the Waits and Howard framework in terms of actual participation in co-operative activities (complex linkages). This was followed by an attempt to gauge the value each firm placed on these complex linkages.

Interviewee participation in simple to complex linkages with their linkage partners is detailed in the tables that follow (1 = participation, 0 = no participation), as is the perceived importance of these linkages, measured via a Likert scale from 1 to 5, with 1 representing 'not useful' increasing in importance to 5 - 'very important/indispensable'.

## **Segmentation of respondent firms**

Two basic types of operation immediately emerged within the M&E manufacturing firms interviewed. These were Original Equipment Manufacturers (OEMs) of Client Specific Solutions and Assemblers of Finished Components. The higher value adding 'OEMs' were distinguished from 'Assemblers' through the special relationship assemblers had with offshore manufacturers and their reduced propensity to deal directly with end customers. Indeed, while the linkage partners of the OEMs and the Assemblers were largely common, the complexity of relationships differed markedly. The authors believe that the accurate reporting the results demands this segmentation. For a more detailed discussion of the merits of this segmentation, readers are referred to McDougall (2004).

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

**Assemblers of finished components: linkage complexity**

Table 2 details the participation rates of six Assemblers interviewed in complex linkages and the perceived importance of these linkages to business operation. It shows that participation is low but the perceived importance of these linkages by the participant is high. More detailed discussion follows under the respective headings of the cooperative thresholds.

**Table 2: Linkage complexity in the assemblers of finished components segment**

		Co-inform	Co-learn	Co-market	Co-purchase	Co-produce	Co-build
<b>Machinery Assemblers</b>							
Champion Compressors	Participate?	0	0	0	0	0	0
	Importance?	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Daloz Safety	Participate?	0	1	0	0	0	1
	Importance?	n.a.	5	n.a.	n.a.	n.a.	5
Energy Power Systems	Participate?	0	0	0	0	0	0
	Importance?	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Outdoor power products	Participate?	0	0	0	0	0	0
	Importance?	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
TSS	Participate?	0	0	0	0	0	0
	Importance?	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
WG&B Manufacturing	Participate?	1	0	0	0	0	0
	Importance?	4	n.a.	n.a.	n.a.	n.a.	n.a.
<b>No. of Participating Firms</b>		1	1	0	0	0	1
<b>Average Importance of Participation to Business Operation</b>		4	5	n.a.	n.a.	n.a.	5

**Co-informing activities**

Only one respondent undertook co-informing activities locally. This was limited to attending the monthly breakfast meetings of a group called Southeast Networks. This is a network of local manufacturing firms who meet to share experience, discuss best practice and build local relationships. In essence, the respondent firm attended because “it is one of the few occasions where local manufacturers can sit down together and see how they can help each other out”.

What is not recorded in Table 2 is the relationship that these Assemblers had with their international suppliers - be that through common ownership, exclusive distribution rights or manufacturing under license arrangements (which was the case for 4 of the 6 firms interviewed). Table 2 is presented this way because these contractual relationships blurred the ‘other firms’ component of the questions CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies Ballarat, June 30-July 1, 2005

used to identify complex linkages, i.e. the linkage was considered to be ‘in-house’ whether that was legally the case or not, as the interviewees were effectively a representative of the offshore supplier.

If this position is not taken, then Table 2 would read markedly different because the market intelligence, research outcomes, product knowledge, etc. disseminated by offshore finished component supplier would be taken into consideration. All respondent firms benefited from this contact and would undoubtedly rate the linkage as indispensable.

Importantly, this type of linkage occurred only with the ‘related’ international supplier and did not spill over into more collaborative relationships with other firms.

### **Co-learning activities**

Only one firm participated in co-learning activities. This related to attending conferences sponsored by industry and professional organisations, which were organised at a state or national level. A high importance was placed on this participation.

The comments made under Co-informing Activities above about the relationship with international finished component suppliers also apply here. That is, ‘related’ supplier sponsored events have been excluded from Table 2. The activities of relevance would be systematic arrangements for delivering market intelligence, research outcomes and product knowledge, i.e. through supplier sponsored conferences etc.

### **Co-marketing and co-purchasing activities**

The survey found no evidence of engagement in these types of linkages.

### **Co-producing activities**

This type of linkage was not evident in the stated activities of interviewees. This of course excludes the relationship local Assemblers had with ‘related’ international suppliers of finished components, which were either ‘in-house’ operations or governed by a binding legal contract that assured the local assemblers of supply.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

### Co-building activities

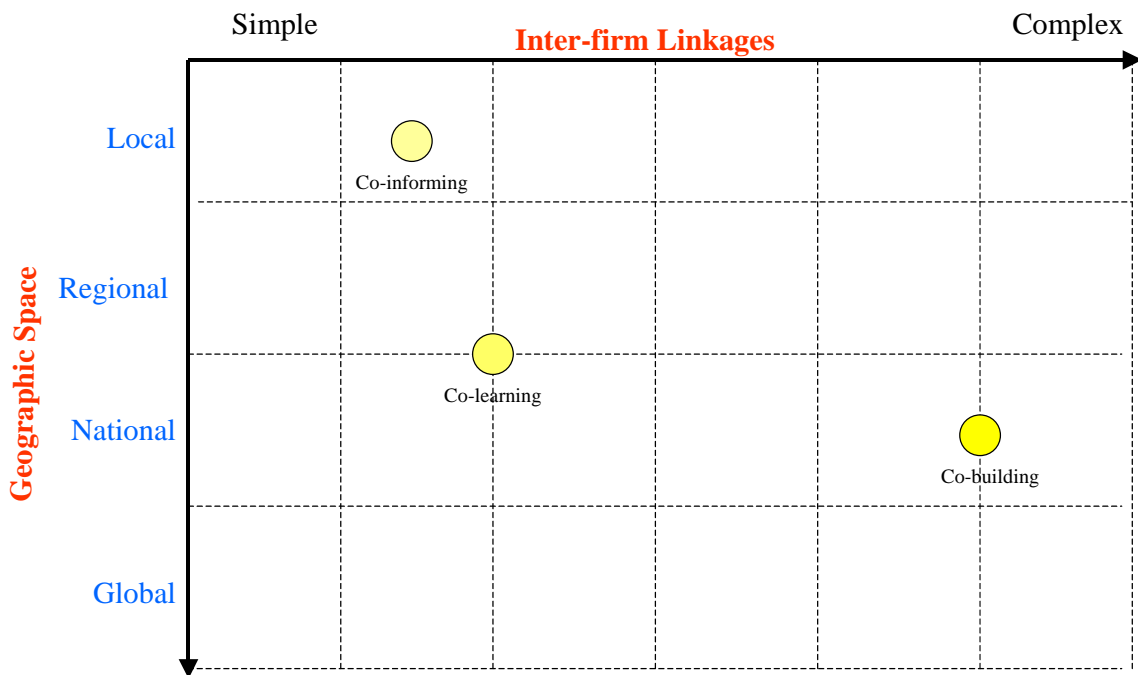
Only one firm participated in this linkage form. This involved participating in advisory groups used by government agencies to inform the Australian Standards for manufactured goods. This activity was rated highly in terms of its importance to business operation, as it directly affected decisions that would eventual influence the future operating costs.

### Assessment of co-operative activity

Co-operative activity was limited in this segment of the M&E manufacturers (if ‘related’ international supplier activities are excluded). In fact there were only three instances of cooperation and two of these were with industry associations, professional associations or regulators that were located outside the region, and were lower level activities in terms of the thresholds of cooperative intensity. In summary, complex linkages were virtually non-existent at the local level.

Figure 5 details the linkages found as well as their geographic context. The depiction is hardly what one would expect if the basic ideas of cluster theory operated.

**Figure 5: Assembler of finished components: linkage complexity/ geographic spread**



CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

When the relationships with ‘related’ international suppliers are considered, it is arguable that the co-operation evident is really only a traditional customer servicing activity. That is, the international suppliers are really only giving their ‘distributors’ better information so that they are equipped to sell more of their own products. While these are cooperative relationships *prima facie*, it is arguable that they really fall within the gamut of ‘arm’s length’ commercial transactions, as they are linkages that are both necessary and expected by domestic Assemblers.

### **OEM of client specific solutions: linkage complexity**

The Original Equipment Manufacturers (OEM) caused two more adjustments to be made regarding survey interpretation. Firstly, the industry is geared towards working extensively with customers to meet their needs through appropriate equipment design. This promotes extensive cooperation with customers in the design stage. Here firm size appears to be related to the geographic space in which the linkage occurs. That is, small firms cannot afford to have technical staff off site for extensive periods of time and, as a result, appear to be located close to their regular/ primary customers. On the other hand, medium and larger sized firms can service interstate and international clients effectively from their location, as the off site project design costs are less significant when compared to the production costs proper.

Secondly, the outsourcing of production via subcontracting relationships is prolific within the industry. Although this might suggest a special relationship between manufacturers and sub-contractors, the survey respondents indicated that specialist services (e.g. CNC machining, heat treaters) were abundant in the region and therefore these relationships were generally driven by price and convenience.

Both of these findings can be related to the abundance of ‘engineering’ skills in the region. This labour force quality, which reflects southeast Melbourne’s role as a manufacturing hub, appears to provide a significant locational advantage.

These linkage types have not been included in the following results, as they would potentially blur the picture of truly cooperative activities within the supply chain. The decision to present the data this way accords with the treatment of customer servicing activities undertaken by the offshore suppliers of finished components in the previous section. That is, the design phase of production, which is undoubtedly collaborative, has been grouped within ‘arm’s length’ commercial relationships.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

Table 3 outlines the actual participation in inter-firm linkages and the perceived importance of these linkages to business operation of the 16 OEM respondent firms.

**Table 3: Linkage complexity in the Original Equipment Manufacturers Segment**

			Co-inform	Co-learn	Co-market	Co-purchase	Co-produce	Co-build
<b>Original Equip. Manufacturers</b>								
ADVEM	Participate?		1	0	0	0	1	0
	Importance?		4	n.a.	n.a.	n.a.	5	n.a.
Allsteel belting	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ANSQUIP	Participate?		1	1	0	1	1	0
	Importance?		4	3	n.a.	4.5	5	n.a.
BK Sales	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bomac Engineering	Participate?		1	1	0	0	1	0
	Importance?		4	3	n.a.	n.a.	n.a.	n.a.
Frontline	Participate?		0	0	0	0	1	0
	Importance?		n.a.	n.a.	n.a.	n.a.	3	n.a.
GAP	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Globe Machines	Participate?		1	0	0	0	0	0
	Importance?		4	n.a.	n.a.	n.a.	n.a.	n.a.
GTS	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gyson	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Insul-8	Participate?		0	0	0	0	0	1
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	5
Interstar Tooling	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monarch	Participate?		0	0	0	0	0	0
	Importance?		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Oakleigh Engineering	Participate?		0	0	0	1	0	0
	Importance?		n.a.	n.a.	n.a.	1	n.a.	n.a.
ODT Engineering	Participate?		0	1	0	0	1	0
	Importance?		n.a.	5	n.a.	n.a.	5	n.a.
Tool-it	Participate?		1	0	0	0	0	0
	Importance?		2	n.a.	n.a.	n.a.	n.a.	n.a.
<b>No. of Participating Firms</b>			<b>5</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>1</b>
<b>Average Importance of Participation to Business Operation</b>			<b>3.6</b>	<b>3.7</b>	<b>n.a.</b>	<b>2.8</b>	<b>4.5</b>	<b>5.0</b>

Banarati, June 30-July 1, 2005

### **Informal networks**

The level of linkage complexity between OEMs was limited and was predominantly confined to activity associated with 'personal' networks, i.e. less complex than the thresholds utilised by the Waits & Howard framework describe.<sup>i</sup>

The activities included:

- the intense use of local sub-contractors to fulfil specific standardised production requirements (as discussed);
- the implied reliance on existing and potential sub-contracting relationships when tendering for a contractual work necessitating significant outsourcing;
- the informal swapping of potential customer leads and referrals between operators; and
- intermittent problem solving with individual non-competing firms.

### **Co-informing activities**

Co-informing activities were undertaken by five of the sixteen firms surveyed. These fell into 2 categories:

- Attending a monthly breakfast meetings of Southeast Networks. These meetings are oriented to manufacturers generally and usually include a guest speaker who outlines some regional capability or business improvement technique. The major gain associated with attendance, which is cost free, was increased awareness of what industrial support was locally available; or
- Membership of non-local industry and professional organisations. These are usually coordinated at the state level and are held in central Melbourne.

The activity was rated universally as important to business operation.

The most cooperative information trading within this context was done on an individual network basis. Here company *X*, which was involved in the same export markets as company *Y*, would trade export market intelligence and know-how with company *Y*. Notably, the first contact made between company *X* and *Y* was through SE Networks.

### **Co-learning activities**

Three firms indicated that they participated in co-learning activities. Two of these were associated with technical conference attendance. These were not locally

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

driven exercises usually and required interstate or international travel. The other instance of co-learning reported concerned the free of charge supply of staff to train client employees to better understand and therefore refer (i.e. on-sell) the original equipment manufactured. While this is recorded in Table 3, this activity could just as equally be discarded on the 'customer servicing' grounds applied elsewhere.

The technical conference attendance was rated at '5' and '3' out of 5 in terms of importance to business operation by the relevant firms. The customer sales training that should potentially be discarded was rated at '3'.

### **Co-marketing-activities**

The interviewing process uncovered no co-marketing activities.

### **Co-purchasing activities**

Two of the sixteen interviewees participated in co-purchasing. One was the shared use of trade creditor accounts between a particular OEM and his individual network of non-competing organisations. That is, when the interviewee wished to purchase a large quantity of raw material to meet an anomaly in production demand, he would utilise other firms' trade accounts in order to receive the trade discount, remunerating the actual purchasers when the debt was due (and vice versa). This activity was rated as unimportant.

The other instance of this linkage type was concerned with the development of local metal product fabricators by an individual OEM. More specifically, the manufacturer worked with the fabricators so that they could feasibly provide a 'just in time' inventory system for the manufacturer, reducing stock holding costs and improving response times. This activity was rated as important.

### **Co-producing activities<sup>ii</sup>**

A variety of co-production activity was uncovered. Five separate instances were identified and these included:

- Three instances of speculative product development with local suppliers for intended commercialisation. These activities required extensive contact and substantial in-kind resources (i.e. time), and were rated as very important to operations. Notably, the firms engaged in this were small in scale.
- The sharing of product testing facilities by a relatively large automotive component manufacturer with one of its customers. The customer was CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies Ballarat, June 30-July 1, 2005

General Motors Holden, which has no 'production' activities within the local region, but which is represented in Dandenong. This was rated as of medium importance and was offered to Holden more to consolidate the customer relationship than anything else.

- The collaborative product based R&D by a large engineering firm in conjunction with CSIRO at Clayton (local area) and the Comalco Research Institute in Thomastown (wider metropolitan area). This required the contribution of research funding and was rated as essential to product and business improvement.

### **Co-building activities**

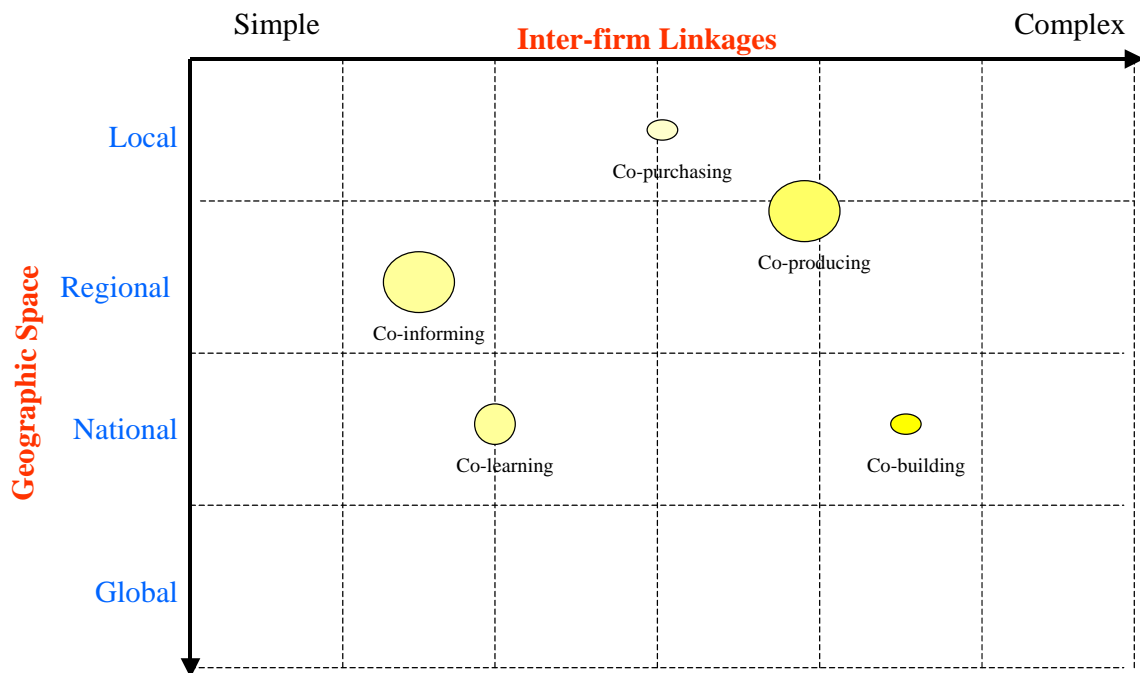
One manufacturer was a member of an advisory committee established by Standards Australia. Though that membership was coordinated by a non-local organisation, and the contact was inexpensive and infrequent, the importance of those contacts was regarded as indispensable (5), as it influenced the ongoing benchmarks required of domestic producers.

### **Assessment of co-operative activity**

Co-operative activity was limited in the OEM segment. All round participation in cooperative activity was low (maximum of 5 out of 16 firms within any of the cooperative thresholds). The co-informing activities were locally or regionally based, participated in by few firms but were rated as being of high to medium importance to business operation. Co-learning, on the other hand, was more nationally or internationally oriented. Co-purchasing, regarded as important, was undertaken by one firm and was locally focussed. Co-producing was evident to some extent and was predominantly locally based. The one instance of co-building was non-local (Figure 6).

Interestingly enough, small firms appeared to be more prone to maintaining linkages locally than the larger firms. This probably reflects the weight (in numbers) of the small to medium sized enterprises listed for interview, as well as the 'survival' mentality of this segment of the manufacturing industry, given its former reliance on the now departed automotive manufacturers.

**Figure 6: OEM segment Inter-firm linkage complexity/ geographic spread**



**Are complex linkages expressed locally?**

The central question posed was “Are complex inter-firm linkages expressed within a specific geographic region?” To answer this question the geographic spread of simple-to-complex inter-firm linkages made by firms engaged in like industrial activities and located proximately to each other was mapped (refer Figures 1 and 3).

If cluster theory is correct and inter-firm links are expressed locally, we would expect to see a high proportion of firms maintaining complex linkages with local linkage partners. Diagrammatically that would translate to significantly sized co-marketing, co-purchasing, co-producing and co-building ovals and relatively dark shading within these ovals (**with bright yellow being the darkest shading and white the lightest**), all located toward the upper right hand corner of the grid used to interpret these results.

However, what is evident in the figures is that the oval sizes are small in size and the tendency towards the top of the grid is not marked. Indeed, where complex linkages are shown, the geographic scope to this activity is often with metropolitan or interstate linkage partners (and this is before the role of related

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

'international' suppliers of finished components (re: Assemblers) or inter-regional, interstate and international clients (re: OEMs) are even accounted for).

What the research did highlight is that inter-firm linkages do exist but that they are often with partners outside the local region. By definition this is not surprising from a sales perspective, as the firms interviewed were confirmed as exporters. However, from an input perspective, important but simple linkages often spread throughout the metropolitan area or wider. This has marked ramifications for regional and local policy, as it raises questions about the viability of emphasising 'locally' based cluster initiatives.

These findings are consistent with Doeringer and Terkla's (1995) assertions that many of the efforts aimed at developing local linkages by economic development practitioners are ill conceived, as they focus on local specialisations rather than on the benefits that are linked with agglomeration economies and the social embeddedness associated with industrial districts. As a result, these findings support our opening remarks that suggest that in the application of cluster based development policies there is a leap of faith in transferring the broad theory into implied local action.

However, the research did suggest that small, single location firms may be more prone to making complex local linkages than large firms, especially those larger firms that have ownership or exclusive supplier relationships externally. While this research does not provide concrete evidence of this inference, further research could provide interesting insights for development policy.

### **Research limitations**

The conduct of the research has been subject to a number of limitations. Firstly, the exclusion of non-exporters from the firms sampled for interviewing was not conclusively supported by the literature. This culling of the interviewee options was made on the assumption that exporters competed less locally and therefore may well be more prone to local cooperation. Given the lack of cooperation found, this basic assumption may not hold true. In fact, the competitive threats implicit in a more confined market may promote close relationships between specialist but complementary firms, as such relationships might be an avenue for immunising one-self against local competitors.

Secondly, it appears as though the underpinning data analysis was framed at too high a level of aggregation, as interviewee segments within the M&E manufacturing agglomeration soon presented themselves. As a result, the survey numbers within segments has limited interpretation, as the number of respondents is not considered representative.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

The research also made some interpretative assumptions along the way when classifying complex linkages and, in doing so, excluding some linkages that are expected from linkage partners, including:

- The provision of technical information, market intelligence and other support by international suppliers to local Assemblers of finished components;
- The intensive cooperation implicit in the design of client specific solutions by OEMs; and
- The pervasive sub-contracting of standard production inputs (e.g. heat treating) by OEMs.

The weak findings of this research might reflect the exclusion of these linkage types, which have been included in studies elsewhere with differing conclusions. In short, some subjectivity has been introduced into the analysis as attempts were made to identify linkages that went over and above the industry-specific 'norm' of inter-firm linkage.

To this end, the framework used to gauge simple versus complex linkages does not adequately distinguish between cooperative activities that are standard relationships within one industry but which, in comparison to others, can be highly cooperative and complex. It appears that the framework adopted from Waits and Howard is better at distinguishing simple from complex horizontal linkages (i.e. within an industry) than it is at distinguishing simple from complex vertical relationships between suppliers and buyers.

Accounting for this shortcoming in future will not be straightforward, as business operators are very customer-oriented and it is difficult to distinguish between what is considered standard customer servicing and what is considered long term development initiatives (that build both buyer and supplier capacities to compete in future). Attempts to answer this question may well be misguided, as cooperative linkages in standard production relationships may well be more important than special but infrequent relationships.

### **How does the research inform future policy?**

Notwithstanding the limitations, the research provides the following insights for future industry/ cluster development policy.

Just because like firms are geographically concentrated does not imply that functional relationships exist between them. Rather, common factor inputs such as land, labour pools and transportation links may well be the primary reasons for

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

co-location within a region. In effect, manufacturing development policy needs to focus on broader contextual issues than on local linkage concerns.

The need to build functional relationships between like firms may not be perceived as important by the firms themselves. Indeed, if development initiatives are proposed, they may well be best directed at improving linkages between the firms and their common (and often external) markets, suppliers and supporting organisations. This of course requires some cooperation by like firms in terms of identifying their common problems and aspirations.

Hence, when conceptualising clusters and developing clusters, it is important that at least a metropolitan perspective is taken. A narrowly focussed spatial framework is likely to exclude important functional linkages that are made by firms over the entire metropolitan area.

Given the existing relationships firms have with state or nationally based industry associations and other stakeholder/ service provider groups, it may prove unwise not to involve these organisations in cluster development initiatives.

## References

Anderson G. (1994). Industry clustering for economic development, *Economic Development Review*. Spring, 26-32.

Blair, J.P. (1991). *Urban and Regional Economics*. Irwin: Homewood: IL.

Bureau of Industry Economics (1995). *Beyond the firm: an assessment of business linkages and networks in Australia*. Australian Government Publishing Service, Canberra.

Doeringer P. B. & Terkla D. G. (1995). Business strategy and cross-industry clusters. *Economic Development Quarterly* 9, 225-37.

Feser, E.J. & Bergman, E.M. (2000). National industry cluster templates: A framework for applied regional cluster analysis. *Regional Studies*, Cambridge; 34(1), 1-20.

Granovetter, M. (1985). Economic Action and Social Infrastructure: The Problem of Embeddedness. *American Journal of Sociology* 91, 481 – 510.

Lloyd P. E. and Dicken P. (1990). *Location in Space: Theoretical Perspectives in Economic Geography*. 3<sup>rd</sup> edition. Harper & Row: New York.

Maillat, Denis (1998). Local Dynamism, Milieu and Innovative Enterprises. *Cities of the 21<sup>st</sup> Century*, 265-274.

Markusen, A. and Park, S. O. (1993). The state as industrial locator and district builder: the case of Changwon. South Korea, *Economic Geography* 69, 157-81.

Marshall, A. (1920). *Principles of Economics*. Macmillan: London.

McDougall, A. (2004). *Industry Clusters: The Spatial Expression of Complex Linkages*. Faculty of Architecture, Building & Planning, University of Melbourne.

Meyer-Stamer J. (1995). Micro-level innovations and competitiveness. *World Development* 23, 143-48.

Morfessis, T. (1994). A cluster-analytic approach to identifying and developing state target industries: the case of Arizona. *Economic Development Review* Spring, 33-37.

Piore, M. & Sabel, C. E (1984). *The Second Industrial Divide*. Basic Books: New York.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

Porter, M.E. (1990). *The Competitive Advantage of Nations*. The Free Press: New York.

Saxenian A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press: Cambridge, MA.

Signorini L. E (1994). The price of Prato, or measuring the industrial district effect. *Pap. Reg. Sci.* 73, 369-92.

Tremblay G. D. (1993). Moving towards a value-added society: Quebec's new economic development strategy. *Economic Development Review* Winter, 18-20.

Waits, M.J. & Howard, G. (1996). Industry Clusters: A multipurpose tool for economic development. *Economic Development Commentary* 20 (3).

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

## **Appendix B: Interview structure**

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

- 1 Who are your major suppliers and what do you source from them?
- 2 Where are these suppliers located?
- 3 Who are your major customers, customer types?
- 4 Where are these customers located?
- 5 Are there other organisations which are important to your business (eg universities, consultants, business associations etc?)
- 6 Where are these organisations located?
- 7 Who are your major competitors?
- 8 Where are these competitors located?
- 9 We are interested in how your firm works with other firms and institutions. Does your firm engage in the following activities?

<p>(a) Preparation of, contributions to or subscription to industry newsletters, electronic bulletin boards, shared data bases, industry surveys, business directories or any other initiatives designed to improve communications between your firm and related firms?</p> <p style="text-align: center;"><input type="checkbox"/> NO</p>	<p><input type="checkbox"/> YES</p>
<p>(b) Participation in industry seminars and conferences to learn better business practices and where and how to acquire resources and services?</p> <p style="text-align: center;"><input type="checkbox"/> NO</p>	<p><input type="checkbox"/> YES</p>
<p>(c) Participation in joint trade missions, trade shows, industry brochures or advertising campaigns designed to promote sales for your firm and the collaborating firms?</p> <p style="text-align: center;"><input type="checkbox"/> NO</p>	<p><input type="checkbox"/> YES</p>
<p>(d) Buying equipment jointly with other firms and institutions, engaging in joint outsourcing plans, jointly undertaking training &amp; quality enhancement programs for suppliers or jointly purchasing training programs for staff?</p> <p style="text-align: center;"><input type="checkbox"/> NO</p>	<p><input type="checkbox"/> YES</p>
<p>(e) Undertaking R&amp;D in collaboration with other firms and institutions or jointly manufacturing product?</p> <p style="text-align: center;"><input type="checkbox"/> NO</p>	<p><input type="checkbox"/> YES</p>
<p>(f) Working with other firms to build better links with government and educational institutions, preparation of joint submissions to government or undertaking lobbying on a collaborative basis?</p>	<p><input type="checkbox"/> YES</p>

For each activity, in turn, please describe:

- > which other firms and institutions are involved;
- > their geographic distribution;
- > the main instigator or co-ordinator of the initiative;
- > the strength of the inter firm interactions involved measured by such things as frequency of contact and level of expenditure;
- > your assessment of the importance of the activity to the business, rated on a scale of 1 to 5 (1 not useful - 5 very important/indispensable)

- 10 Does your firm have any contacts with other firms in the same industry as yourselves here in South East Melbourne? If 'yes' please describe the nature of these contacts.

CRIC Cluster conference. Beyond Cluster- Current Practices & Future Strategies  
Ballarat, June 30-July 1, 2005

## Endnotes

---

<sup>i</sup> Where a specific activity identified fell within a higher threshold (e.g. co-purchasing), that specific activity has been documented under that higher threshold's heading.

<sup>ii</sup> As already discussed, subcontracting in the OEM segment is not regarded as a co-production activity.