

NEW SOUTH WALES REGIONS AND GLOBALISATION - A CONCEPTUAL ANALYSIS OF INNOVATION DRIVEN NETWORK STRUCTURES

Paul McPhee

School of Economics and Information Systems, University of Wollongong, Northfields Avenue, Wollongong, NSW, 2522, Australia.

Ann Hodgkinson

School of Economics and Information Systems, University of Wollongong, Northfields Avenue, Wollongong, NSW, 2522, Australia.

ABSTRACT: Using the results from a survey of 146 regional exporters, this paper presents an analysis of variations in the behaviour of small, medium and large firms within local and external information networks. It tests the extent to which new concepts in regional development commonly identified as learning regions are found in New South Wales. The analysis provides little evidence for the existence of SME-innovative milieu type networks. However, it does indicate a predominant structure of small (SME), specialized, independent firms. Although some collaboration and local networking was found, it falls well short of that associated with learning regions. Local client-supplier relationships were limited which prevented closer collaboration between the regional firms. It is argued that regional development agencies should utilise local networks (particularly for SMEs) to encourage more interaction in order to reach higher levels of knowledge sharing.

1. INTRODUCTION

A number of European studies over the past two decades, particularly from Italy, the U.K., and France, have highlighted the unexpected result that the process of globalisation in developed economies has benefited particular regional economies which were based on horizontally integrated small and medium enterprises (SME). It was further observed that these regional firms, which had developed leading export industries, relied heavily on local networks as their sources of innovation and market knowledge. This work draws upon the theories of industrial districts, innovative milieu, and territorial production systems, all of which are at times referred to as learning regions. The manifestation of horizontally integrated global regions contrasts with the previously expected vertically integrated regional structure dominated by large hierarchical or multinational firms (MNC), surrounded by small dependent, sub-contracted suppliers. These large firms were expected to source technological and market information either internally or from external sources and influence regional development through a trickle-down of this information to their local suppliers.

This paper uses data from a recent survey of New South Wales regional exporters to identify whether these new regional constructions can be found in regional Australia. The analysis investigates the level and type of innovation

undertaken by firms in different employment size categories (small, medium, large), the extent to which they source new technologies through self-development or via collaborations with other firms and institutions, their pattern of sourcing new market information from local regional or external networks and the extent of local supply or horizontal integration among regional firms. From this, some conclusions are drawn regarding the extent to which regional exporters are integrated or embedded in their local networks. Some policy recommendations as to how regional exporters can be better leveraged to support regional development are made.

2. THEORETICAL BACKGROUND

The increased globalisation of developed economies has been accompanied by an increase in the horizontal integration of internationally active regional firms over the past two decades. This observation is in contrast to the expected increase in vertically integrated firms in global markets and the expectation that larger firms will be the main contributors to regional development (Acs and Audretsch, 1993; Loveman and Sengenberger, 1991; Sylos-labini, 1986). It is also surprising considering that larger firms would be expected to have advantages in sourcing of information from other regions and global networks, and that their higher research and development (R&D) would result in greater innovation outputs than smaller firms (Scherer, 1991).

The role of small firms as innovators derives from the Schumpeter I model which argues that innovation is mainly undertaken by creative risk-taking entrepreneurs who convert inventions into commercial innovations (Schumpeter, 1939). Hence, small and medium enterprises, rather than conducting their own research and development (Simmie 2001), were viewed as sourcing their new products from third parties such as other firms or local research institutions. In contrast, the Schumpeter II model emphasized the role of the large oligopolistic firms in the development of endogenous research, and thus provides the basic model of large firm or MNC behaviour within a globalized economy (Schumpeter, 1942). It views continuing investment and the development of new ideas as producing commercially successful innovation streams, which stimulates further investment in research and development. Consequently, it links successful innovations to increased R&D and further innovation and capital concentration (Freeman *et al.*, 1982).

The networking behaviour of small, medium and large firms when sourcing technological information is determined by their respective resource constraints. For example, the information sources of the more regionally based SMEs are considered limited to personal exchanges, collective learning, trust, cooperation and a trickling of information from MNCs operating within a region via transactions in local user-supplier relationships (Amin and Robins, 1990; Amin, 1991; Pratt, 1991; Vernon, 1979). Alternatively, the more abundant resources of MNCs may allow for global information and invention searching, and innovation activities may occur in any region regarded as suitable. Consequently MNCs often locate their head offices, research sections and financing centres within large international cities, which in-turn contribute to increased urban growth and

innovation. In such a scenario, non-metropolitan regions are consigned to a peripheral role; for example, manufacture of products in which they can offer cost advantages in terms of labour, land or raw materials.

Several theories have attempted to explain this increased horizontal integration of regional firms associated with globalisation. For example, *The Product Life-Cycle Theory* (Hoover and Vernon, 1959) argues that upswings in the economic cycle during the early stages of innovation increases local interactions, resulting in new input combinations and increased cluster sizes (Simmie, 1997). Consequently, the low price elasticity of demand for new products causes a lower sensitivity to input prices, and the frequent changing of inputs combined with the higher technology turnover in the product development stage results in the development of many differentiated products. Alternatively, *Institutional Analysts* (Williamson, 1975, 1985) argue that as economic relations are controlled either within the hierarchies of large companies or by market relations between them, and as the large firms manoeuvre to reduce their transaction costs, vertical hierarchies are replaced by collaborative networked forms of production, and, as the innovator's network or capacity to network changes, the regional distribution of innovation also changes. Finally, the *Flexible Specialization Thesis* predicts a similar outcome, but attributes the vertical disintegration of large firms to product life-cycle shortening and the evolution of highly specialized production units horizontally linked within a more flexible production regime (Piore and Sabel, 1984). Regardless of these micro-theoretical variations, the underpinning theme is the extraction of information from either a local or global environment in order to move product prices and style and production processes towards international best practice. The development of horizontal production systems allows the sharing of information among local firms within regions.

3. ANALYTICAL TYPOLOGIES OF REGIONAL CONTEXT

Two main typologies have been developed to analyse the interaction of global processes and regional context. These are Porter's territorial production systems (Porter, 1993), and the innovative milieu theory (Crevoisier and Maillat¹, 1989). In each theory, regional context is considered as a geographical area with a common sense of community, culture and values which incorporates the concepts of regional historical background, local business practices, attitudes towards risk, cooperation, trust and social and economic transparency. Both typologies assume that changes in regional context (or culture) arise from global interaction and facilitate the regional adoption (or embeddedness) of world best practice solutions in the development of products, production processes and pricing strategies, which in the long term enhances their competitive export advantages.

¹ These authors are leaders of GREMI or Groupe de Recherche Européen sur les Milieux Innovateurs (European Innovative Milieu Research Group), who are a body of European academics researching the concept of the Innovative Milieu and developing an ongoing theory regarding its function within the territorial production system (regional economy).

Within Porter's typology, vertically integrated regional firms are of two types. First, those where the central management undertakes most of the innovation and other decision making functions, thereby restricting intra and inter-regional exchange relationships across small isolated firms (or SMEs) or branches of larger firms. The second type are regions consisting of large firms who internalize all their value-adding functions and therefore restrict the externalization of knowledge. As most functions within these regions are concentrated within a central vertical bureaucracy, they are referred to as having 'functional logic'. Alternatively, systems of horizontal integration consist of small independent and specialized firms, each cultivating numerous relations across the region as a part or the whole of their production chain in a horizontally integrated manner. With these systems, a flexible balance of competitive and cooperative forces (inter-firm complementarities) rather than the dominance of a single player coordinates the various production stages. Hence their development rests exclusively with the regional firm itself and can be hindered by gaps in the value-added chain, i.e. lack of relations with the market or gaps in research etc. (Maillat, 1998). These systems are referred to as having 'territorial logic'.

Falling between the vertical and horizontally integrated systems are those that demonstrate a combined functional and territorial logic. This occurs when a large dominant regional firm controls the whole value-added production chain but outsources some activities to other local firms hence maintaining relationships with suppliers, sub-contractors, research and training centers and thereby ensuring that some exchange of knowledge does occur within the region.

The innovative milieu typology (Crevoisier and Maillat, 1989) further utilizes and expands upon Porter's typology but stresses a cooperative learning capacity and the exchange of shared information via network linkages, which assist in reducing information uncertainty. The innovative milieu is considered a subset of the 'territorial logic' production system which highlights its cooperative learning elements and the capacity to collect information from the global economy and distributes it to regional players such as research institutions, universities, colleges, MNCs, SMEs, consumers, suppliers and competitors (Nelson and Winter, 1982; Dosi *et al.*, 1988). The innovative milieu is not found in all regions and its presence is identified by a greater number of network connections to research institutions, increased knowledge flows from them to local businesses and a balance in the information distribution channels between the vertical-hierarchical firms and those that are more horizontally integrated.

4. PREVIOUS EMPIRICAL STUDIES

The concepts developed above have been identified in a number of empirical studies. Mensch (1979) and Massey (1984) found SMEs imported externally produced inventions in the manner predicated by the Schumpeter I model. They also found that this activity was associated with higher levels of clustering and SME start-ups in international cities. Marshall (1987) found a multiplier effect that not only resulted in an increased number of SME innovations, but also reduced the time needed to develop commercial products. Alternatively, empirical studies by Vernon (1979) argue that MNCs can split their production

activities into many production units and relocate them in cities that demonstrate the most agreeable work and industrial cultures, thereby creating spatial divisions of labour, production and innovation. However, Dosi *et al.*, (1988) have found support for the importance of large oligopolies in undertaking systematic research and development within international cities in accordance with the Schumpeter II model.

Evidence of milieu structures was found in a study of the Mittelland region of Switzerland by Maillat and Grosjean (1999). They used survey data from fifty firms regarding regional and extra-regional networking relationships to analyse the level of value-added production integration and partnership activity (with customers, suppliers, competitors, research centres, etc.) within the regions. Using Porter's typology, firms of functional logic and territorial logic were identified as contributing to 40 and 60 percent of employment respectively. The milieu effects were identified using three measures of complementary-partnership type working modes, innovation network presence and significant links with research centres. The recognition of the milieu contribution allowed authorities greater leeway in stimulating specific resource developments such as the technical knowledge and experience needed to stimulate the firm and research centre interface or pursue a specific technological policy.

In contrast, Davelaar (1991) found little empirical evidence in support of a milieu structure influencing the innovative intensity of firms in the Netherlands and studies by Todtling (1990) obtained similar results for Austria. However, Todtling (1994) identified the greater Boston region as having significant research linkages between universities, hospitals and biotechnological suppliers in the early stages of innovation. However, such linkages were not as strong between universities and the computer industry, which were found to rely more upon interfirm linkages, particularly among suppliers of electronic and mechanical components and software. These linkages often included a collaborative component.

Storper (1997) has criticized the milieu theory as inadequate on several accounts. In summary, he argues that the milieu theory avoids considering the very characteristics of innovation that are essential for regional economic growth. That is, it fails to explain why innovative activities cluster, what turns a non-innovative region into an innovative region and the causal relation between innovation and its localization.

With regard to global versus regional networks as a source of innovation information, Krugman (1991) found international trade networks rather than local networks to be more significant in determining innovation cluster growth within the Silicon Valley regions. This implies that cluster formations were driven by the combined endogenous and exogenous factors arising out of such networks, which include spatial variations in technologies, markets, capital, know-how, technical culture and representation (Crevoisier and Maillat, 1989). Simultaneously the research, knowledge and production capacities were located at the intersection of such networks and were intensified by increased global competition, accompanied by the reduced transport and communication costs (Veltz, 1996).

Previous research thus suggests that both horizontally and vertically integrated production systems are developing as an adjustment to globalisation. These phenomena tend to be found in different regions and so offer alternative development paths for regional economies. The horizontal systems provide more scope for smaller firms to participate directly in international markets. Increased regional learning also appears to be associated with the increasing presence of horizontally integrated structures. In the next part of this paper, the extent to which these processes can be found within New South Wales regions is examined.

5. RESEARCH FRAMEWORK

The method used in this analysis is derived from Tiberi-Vipraio and Hodgkinson (2000), which uses a survey-based typology that expands upon Porter (1993). The firm was positioned along the value-added production chain in terms of being process or product orientated, and whether the design of its products was standardised or flexible. Firms were further positioned in terms of whether they operated in local or international environments. To this end, a series of questions were asked regarding each firm's strategies. Of particular relevance here are the firm's strategies regarding the use of international and local networks to obtain information on overseas markets, the extent to which it used internal or external information to develop innovations and its pattern of sourcing production inputs from other regional or external firms. It is argued that for a regional firm to be both a successful exporter and make a significant contribution to regional development, it must operate effectively in both the external and regional environment. External networking allows the firm to access the information required to maintain its product at international best practice and sustain export growth over time. Participation in regional networks ensures that this 'best practice' information is injected into the base of local knowledge on markets, innovation and production requirements where it can help leverage the export performance of other local firms. Provided a region hosts a number of 'market leading' exporters, participation in local networks provides reciprocal benefits to all exporters and becomes self-perpetuating.

The survey included 146 exporters located in seven rural NSW regions: Wingecarribee (Southern Highlands), Shoalhaven (South Coast), Far North Coast (Coffs Harbour, Byron Bay, Lismore), Northern Region (Armidale, Tamworth), Murrumbidgee (Griffith, Leeton), Central West (Dubbo, Orange, Bathurst) and Hunter (Cessnock, Maitland, Singleton). They were selected as areas where concentrations of exporters were known to exist and hence do not strictly conform to the standard administrative NSW regions. It involved a structured questionnaire, which was administered by face-to-face interviews with a senior manager of that firm. Where this was not possible, a telephone interview was conducted. All value-added exporters in the selected regions were included in the survey and were identified with the help of export advisors in each region. Only standard primary producers, fishers and miners were thus deliberately excluded. While these operations obviously make a substantial contribution to regional exports, the objective of the study was to identify strategies which

regional firms use to position themselves within global markets. Commodities sold primarily on the basis of a market determined price were excluded, although wholesalers and freight forwarders which sold on their behalf were included. The 146 interviewed firms represent well over 90 percent of value-added exporters in these regions. Only a small number of firms which refused interview or were unknown to local advisors are excluded (the exception being that only a sample of 10 of the 52 export wineries in the Hunter were interviewed). The results can thus be taken as reflecting the behaviour of the population of this type of exporter.

The analysis below presents some of the results on the use of regional and international networks by size of firm in order to determine whether different support programs are required for smaller regional exporters. It also identifies areas where regional development agencies could usefully develop programs to improve the contribution of local exporting firms to their regional economies. While significant differences in behaviour did occur by size, factors such as geographical region and industry sector did not yield any significant variations (see Hodgkinson and Iredale, 2003, Hodgkinson, *et al.*, 2003). Seventy-six (52%) of the surveyed firms were small (1 to 19 employees), 58 (40%) were medium-sized (20 to 199 employees) and eight (5%) were large (200 plus employees). While only a very few large firms were identified, the high proportion of relevant firms included in this study means that these results can be taken as a valid representation of the behaviour of large value-added regional firms. The firms came from a wide range of sectors: predominantly manufacturing but some value-added agriculture, wholesaling, information technology and consulting were included. Over 60 percent of the firms were in three manufacturing sectors: food processing and beverages, petroleum or coal based, chemical or associated products and machinery and equipment.

Three propositions arise from the academic literature on regional development reviewed above, which are examined below using the data generated from the survey of regional exporters. From this, some policy recommendations are developed. First, significant differences in the way small, medium and large firms undertake research and development, source new technology and access market information are tested. Second, the extent to which small firms are more reliant on the regional context (i.e. local networks) as a source of market and technological information is examined. Third, evidence of 'learning region' or 'innovative milieu' concepts in regional New South Wales is sort, together with whether firms' participation in these activities varies with size of firm.

6. THE RESULTS

6.1 Innovation and Networking by Firm Size

Tables 1 and 2 provide a general picture of the types of innovation activities undertaken by NSW regional exporters by firm size. From Table 1, it can be seen that significant differences in research and development (R & D) activities occur by size of firm for all activities except making continuous improvements to

production processes. Further, the proportion of small firms that undertake these three activities is significantly less than those for medium and large sized firms. Ninety percent of medium firms undertake new product development compared with 73 percent of small firms. Eight-eight percent of large firms and 75 percent of medium firms undertake development of their product range compared with only 58 percent of small firms. As small firms often rely on a unique product to achieve export sales (Hodgkinson, *et al.*, 2003), this lack of product development may mean that once their initial product is superceded by rivals, these firms will have nothing with which to replace it and will cease exporting.

There were no significant differences in the way firms source new technologies by size. However, due to the high representation of this survey, the frequency values in themselves do offer some insights. The proportion of small firms which self-developed new technologies was below average while a higher proportion adapted products observed in the market, implying they may be market followers. Taken together with the above results on product R & D, small firms are clearly disadvantaged in terms of innovation compared with medium-sized firms. R & D is expensive and small firms will have difficulty in finding the resources needed for effective innovation. However, exporting and innovation are clearly related (Hodgkinson, 1998, Hodgkinson & Iredale, 2003) and this lack of activity will impact on the long term export performance of these firms.

It can be argued that small firms could supplement their own R & D efforts through collaborations with external partners (Vernon, 1966). As shown in the second part of Table 1, they had less than average levels of these activities. However, for most activities, the proportion of small firms using these external sources of technology was similar to that of medium-sized firms. Large firms were the heavier users of technology partnerships, transfers from parents and collaborations with public research institutions (including Universities).

Thus, in terms of internal innovation capacity, small firms are disadvantaged compared with medium-sized firms. The general implication from this is that small exporters must grow in order to develop the resource base needed to support the innovation activity required to maintain exports. However, large firms are the main users of the more collaborative forms of innovation and thus have the stronger linkages into the external knowledge base. Nevertheless, it can be seen that regional exporters as a whole do utilize external linkages as a means of accessing new technologies in order to enhance their own innovation programs. A significant number of these relationships involved overseas firms particularly from the USA and Western Europe. While a few of the research collaborations were with local regional universities, the majority involved universities or public sector research institutions elsewhere in Australia and occasionally overseas.

Table 1. R&D and Technology by Firm Size.

R&D Activity	% of Firms			
	Small	Medium	Large	All
New Product Development**	72.7	90.0	87.5	80.7
Substantial Changes to Production Process***	75.0	40.7	27.3	53.3
Development of Product Range**	58.4	75.0	87.5	66.9
Continuous Production Improvements	72.7	73.3	100.0	74.5
Source of New Technology				
Self-developed Within Firm	77.9	90.0	87.5	83.4
Adapted from Market	46.8	41.7	35.7	44.1
Partnerships with Other Firms	26.0	26.7	37.5	26.9
Licensed from Other Firms	5.2	13.3	12.5	9.0
Transferred from Parent	7.8	8.3	12.5	8.3
Cooperation with Public Research Institutions	11.7	13.3	37.5	13.8
Do not Source New Technologies	3.9	1.7	-	2.8

Notes: * Significant at 90% confidence level
 ** Significant at 95% confidence level
 *** Significant at 99% confidence level.

Table 2. Sources of Market Information and Networking by Firm Size.

R&D Activity	% of Firms			
	Small	Medium	Large	All
Local Networks				
Industrial Development Officers	29.5	28.3	12.5	28.1
Meetings of Local Organisations***	37.2	56.7	0.0	43.2
Networking with Local Business People*	28.2	43.3	12.5	33.6
Local Service Providers	28.2	21.7	0.0	24.0
Informal and Recreational Activities	15.4	10.0	12.5	13.0
External Networks				
Visits from Service Providers	30.8	46.7	50.0	38.4
Industry Publications/Newsletters	62.8	73.3	87.5	68.5
Internet/www	57.7	58.3	75.0	58.9
Individual Travel to Clients, Agents, etc.**	74.4	90.0	100.0	82.2
Meetings of External Organisations**	52.6	73.3	87.5	63.0
Trade & Business Magazines	71.8	80.0	75.0	75.3
Equipment & Other Suppliers	39.0	39.0	57.1	39.9
Information Adequate	66.7	70.0	62.5	67.8

Notes: * Significant at 90% confidence level
 ** Significant at 95% confidence level
 *** Significant at 99% confidence level.

In Table 2, the use of local and external networks by sources of market information and firm size is shown. Comparing the two types of networks, it can be seen that small firms are relatively more dependent on local networks than are medium or large firms. Nevertheless, the two main local networks, meetings of local organisations and networking with other local business people, are used by significantly fewer operators of small firms than those of medium-sized firms. Thus, again, in one of the essential requirements for sustaining export growth, small firms are disadvantaged. Again, there is probably a resource problem behind this finding. Management of small exporter firms involves a limited number of people doing a multitude of tasks and they often lack the time to participate in information sharing activities.

Small firms also made lower use of most external sources of market information, although this difference was only significant in two areas: individual travel to visit clients, agents, etc. and attending meetings of external organisations. It was found elsewhere (Hodgkinson, *et al.*, 2003) that this type of individual travel was strongly positively correlated with rates of export growth. Lower participation in external networks will disadvantage small firms in terms of access to updated market information, which can be expected to have a negative impact on future export growth. Again, this pattern probably reflects the limited resources available to small firms and the high demands made on their managers' time. The general implication is that they need to grow to support the resource base and more specialised management team needed to operate in international markets.

Large firms again had the strongest linkages into most external information sources, which means that they will be best placed to take advantage of new market developments. Their lack of participation in local information networks is thus of particular concern. Large regional firms, as would be expected from the literature, have the stronger linkages into external sources of both new technological and market information. However, little of this information appears to be being disseminated through local information networks where it could benefit small and medium-sized exporters.

Nevertheless, regional exporters of all sizes were linked into external market information sources and hence they had good access to information on developments in their product market. As shown on Table 2, 68 percent of regional exporters regarded their current market information sources as adequate. There was no significant variation by firm size, although satisfaction was highest among the medium-sized firms.

6.2 Participation in Overseas Markets

Table 3 indicates that a significant proportion of regional exporters regarded themselves as world leaders in their particular product market and this tended to increase with firm size. It is interesting to note that relatively few regional firms categorised themselves as Asia-Pacific leaders, and these were predominantly large firms. Leadership positions in world markets are not achieved using

Table 3. Perceived Position in Market by Firm Size.

Position/Firm Size***	% of Firms			
	Small	Medium	Large	All
World Leader (N = 61)	33.3	50.0	62.5	41.8
Asia-Pacific Leader (N = 12)	6.4	8.3	25.0	8.2
National Leader (N = 33)	20.5	26.7	12.5	22.6
Other (N = 40)	39.7	15.0	-	27.4

Note: *** Significant differences in perceived position by firm size at 99% confidence level.

‘follower’ or imitator innovation strategies. More regional exporters in each size category nominated themselves as ‘world leaders’ than as national leaders, again testifying to the world view held by regional exporters. However, a significant proportion of the small firms did not perceive themselves as playing a market leadership role, generally indicating that they saw themselves a ‘niche’ producers or market followers.

Thus in some ways, NSW regional exporters have the characteristics of Schumpeter I type firms being small firms focused on developing and commercializing a superior product or design which provides them with market leadership for a period of time. However, they differ from the early model discussed above in that these firms are both the inventor and innovator of the new product or design variation. The majority of the regional exporters are involved in product developments, which are predominantly self-developed within their own firms. Regional exporters were also predominantly innovators who regarded themselves as world leaders in their product markets.

Further, firms’ characteristics change as size increases and they move towards Vernon’s concept of a global competitor. Larger firms place more importance on improvements to their production process as they must now compete in larger scale price competitive markets whereas small firms focus on ‘niche’ markets where they have a unique product. Firms with over 50 employees were more conscious of competitors’ products placing greater emphasis on adapting products observed in the market than did small firms.

Vernon (1966) also argued that MNCs / large firms prefer city locations. The small number of large firms found in our regions offers support to this proposition, at least in the negative. Indeed, most of the foreign owned regional exporters had originally been local firms that had been acquired by a multinational. Table 4 below further illustrates the degree to which the NSW regional exporters have established a level of overseas presence. Fifty-six percent of regional firms exported through agency arrangements with overseas firms, while 41 percent had more extensive partnerships or collaborations. There were no significant differences in the use of these arrangements by firm size.

Very few of the regional exporters had a direct overseas presence in the form of an overseas sales office (6%) or manufacturing subsidiary (3%). There were

Table 4. Co-operation with Overseas Firms by Firm Size.

R&D Activity	% of Firms			
	Small	Medium	Large	All
Partnership or Collaboration (N = 59)	39.7	40.7	50.0	40.7
Investment in Overseas Facilities (N = 8)**	1.3	10.2	12.5	5.5
Agency Arrangement Overseas (N = 81)	60.3	47.5	75.0	55.9
Imports Inputs from Overseas (N = 92)	57.7	66.7	87.5	63.0
Manufactures in Overseas Subsidiary (N= 3)**	-	6.8	-	2.8
Manufactures in Joint Venture Overseas (N = 15)	7.7	13.8	12.5	10.4
Product Licensed Overseas (N = 11)	10.9	9.3	-	9.7

Notes: * Significant at 90% confidence level,

** Significant differences by firm size at 95% confidence level.

significant differences in the extent of direct foreign investment by firm size with overseas sales offices established predominantly by medium and large firms. However, only medium-sized firms manufactured overseas in fully owned subsidiaries. Ten percent of regional exporters manufactured overseas in a joint venture arrangement and / or licensed their product for overseas manufacture, although there were no significant variations by size. While large firms might be expected to have a stronger overseas presence, the data in Table 4 do not support that proposition. Medium-sized firms appear overall more likely than large ones to invest and produce overseas. A higher proportion of large firms, on the other hand, imported inputs than did medium or small firms.

It was argued above that small exporters needed to become larger to support the necessary research and development and to access market information to sustain exports over time. While large size in itself does not appear necessary in order to consolidate an overseas presence, a more detailed analysis by size indicated that firms with 100 to 199 employees had considerably higher partnerships and collaborations (62%), investments in overseas facilities (31%) and manufacturing in both overseas subsidiaries (23%) and joint ventures (33%) than did firms with either less or more employees. This indicates that growth to large-medium size may best place firms in overseas markets.

6.3 Level of Regional Integration and Knowledge Creation

The earlier analysis in this paper identified four types of territorial production systems. NSW regional exporters appear to fall into a hybrid system. To some extent they represent the third type or a horizontal production system of numerous small specialised and independent firms. This system should facilitate interaction and cooperation among firms resulting in the spread of knowledge throughout the region. However, as discussed above, the degree of interaction among regional exporters, while present, is limited. Thus they also exhibit

Table 5. Regional Supply of Production Inputs.

R&D Activity	Average Percentage of Input Requirements Met in Local Region			
	Small	Medium	Large	All
Transport	49.8	48.6	43.1	48.9
Outsourcing Main Product	12.3	10.1	0.0	10.8
Production Inputs and Services	34.4	24.7	30.6	30.1
Sales, Marketing, Client Service	2.1	5.6	0.0	3.4
Quality Control***	0.8	2.2	2.5	1.5
Ancillary Production	16.6	11.4	25.0	14.9
Capital Equipment and Tools	24.7	21.7	8.8	22.6

Note: *** Significant differences at 99% level of confidence using chi-square analysis.

aspects of the first type or a production system organised into isolated, centrally controlled firms that have their major linkages to external organisations, and with few inter-firm linkages with local institutions.

The learning region concept suggests that the intensity of knowledge accumulation within a region will be increased if there are strong trading relationships within a region relative to those outside the region. Regional trading relationships will be more intensive the more the regional structure consists of small, independent specialised firms within a production chain. This structure enhances both the innovative milieu effect and the endogenous development capabilities of the region.

As shown in Table 5, the main inputs sourced from the local regions by NSW exporters consisted of transport services, production inputs and services, ancillary production and capital equipment. The proportion of these inputs and services sourced from the local region did not vary significantly by firm size, although larger firms (over 100 employees) appeared to obtain a lower proportion of their capital equipment and tools and have a higher proportion of ancillary production undertaken locally than did smaller firms. Sales, marketing and client services and quality control were normally undertaken internally. These factors are crucial to export strategies based on product quality and hence are kept under internal control by most exporters. However, medium and large firms did make significantly higher (although still minimal) use of other local firms for quality control than did small firms. There was a relatively low degree of outsourcing among regional exporters and, of this, only a small amount occurred in the local region. Small and medium firms were more likely to outsource within their local region than were large firms. Outsourcing and ancillary production are the major areas where knowledge transfer is likely to occur as both activities require compatibility between the services supplied and the exporters requirements to meet international cost and quality standards.

Table 6. Type of Arrangement Between Regional Exporters and Suppliers.

Input	% All Firms			
	Fee for Service	Long-term Partnership	Informal Contact	Agreement
Transport	47.5	18.0	4.1	42.6
Outsourcing Main Production	22.2	37.8	15.6	24.4
Production Inputs & Services	43.4	21.3	5.7	36.9
Ancillary Production	40.0	10.9	3.6	45.5
Capital Equipment & Tools	67.2	7.4	4.1	16.4

The innovative milieu, or learning region concept, argues that enhanced regional growth arises from cooperative activities between local firms. The data in Table 5 indicate that the level of inter-dependence, and hence knowledge transfer regarding international production standards between regional exporters and their suppliers, is relatively low. If NSW regions were to move towards a horizontally-integrated production system, the extent of mutually beneficial joint production and information sharing in the region would be enhanced. This should result in increased regional economic development in that region.

Some idea of whether there is potential to develop more integrated relationships among regional firms can be derived from Tables 6 and 7 below. It can be argued that firms which use external suppliers simply through market transactions and purely for cost reduction purposes are less likely to be interested in the benefits of closer integration with their suppliers. By contrast, those that have close supplier relationships and use external supply as a means of enhancing their business performance would have more potential for undertaking joint activities.

Table 6 indicates that integration between exporters and suppliers is assumed to be higher if they use partnerships or long-term contracts. Informal agreements where there is an implicit understanding from the exporters regarding on-going supply arrangements also suggests some potential for a higher degree of regional integration. From this data, the majority of regional supply arrangements are at the less integrated end of this range of options except, as might be expected, for outsourcing where long-term contracts predominate. However, there is quite high usage of informal agreements which serve to build trust between the parties and so have some potential to develop into more integrated relationships.

A somewhat more optimistic scene is presented in Table 7. This shows that external suppliers are less used for financial reasons (lower cost and reduced need for investment) than for business development reasons such as to provide flexibility or gain access to external expertise for all inputs. Thus exporters see their external suppliers as making a positive contribution to their operations. It suggests that if they can also be convinced that mutual development with their suppliers based on more permanent relationships (partnerships, long-term

Table 7. Reason for Using External Suppliers.

Input	% All Firms			
	Lower Price or Cost	Reduced Need for Investment	Informal Contact	Flexibility Access / Expertise
Transport	39.2	13.3	49.2	23.3
Outsourcing Main Production	19.6	23.9	28.3	28.3
Production Inputs & Services	31.7	11.7	32.5	31.7
Ancillary Production	21.6	15.0	18.3	45.0
Capital Equipment & Tools	32.5	9.2	15.0	40.8

contracts) will also contribute to their future operations, thus the potential for regional development inherent in this form of production system may be achieved.

7. CONCLUSIONS AND POLICY RECOMMENDATIONS

The empirical results presented above confirm the conceptual analysis from the international literature that New South Wales regional areas are developing their own linkages into the global economy. It shows that these regions are adapting to global market forces by generating a body of local exporters which have strong external technological and information linkages and are able to successfully compete in international markets. The literature does not as yet provide clear evidence as to which types of production systems are likely to dominate in this process. The survey indicates that, at least in rural NSW, that the process involves smaller (SME), specialised and independent firms associated with horizontal structures rather than systems dominated by large, vertically integrated firms. However, the study regions do not fall clearly into any of Porter’s four identified typologies, but rather appear to be a hybrid of types as discussed further below. There is evidence of some local collaboration and knowledge sharing but this has insufficient mass to be able to refer to these activities as constituting an innovative milieu or learning region.

Regional exporters tended to rely on their own internal technological capacities to develop new product and process innovations. While some firms had good linkages into the external knowledge base through partnerships, collaborations with public research institutions, licensing, etc., little of this occurred within their local region. Thus, in terms of sourcing technical knowledge, regional exporters are best categorised as the first of Porter’s types, i.e. centrally controlled, isolated firms and branches with restricted intra-regional exchange relationships. Small and medium firms made good use of local networks as a source of new market knowledge. Small firms were more dependent on local networks yet made less use of them than did medium sized firms. Large firms were not generally found in local networks. Thus, in terms of sourcing market knowledge, SMEs can be categorised as Porter’s third type, i.e. small, independent firms with horizontal regional relationships, where this was

stronger for medium-sized than small firms. Large regional firms, however, are better categorised as type two firms, i.e. with predominantly internalised functions independent of their local region.

Regional exporters as a whole are heavily involved in research and development, actively source new technologies and have strong linkages into external information networks. This has resulted in many seeing themselves as being leading firms in world markets. However, there is also clear evidence that small, medium and large regional exporters behave differently within these technological and market information networks. Small exporters undertake less research and development, particularly product development, than do medium or large firms. This is likely to affect their long-term viability in export markets, unless they can use their exports to grow over time to support future research efforts. Neither small or medium firms were heavily involved in collaborative technology development, which tended to be the providence of large firms in these regions. Managers of small firms were also less likely to undertake regular international travel to visit clients, agents, etc. which appears to be one of the most effective means of expanding exports. They were also less likely to see themselves as world leaders than were larger firms. Medium-sized firms were most likely to be involved in overseas manufacturing either in subsidiaries or joint ventures. These results generally indicate that small firms need to grow in order to support the innovation and market information activities required to support sustained export activity. While large size in itself is not essential for successful exporting, firms with over 100 employees tended to be more involved in collaborations and overseas investment than did smaller ones. This variation in behaviour by size supports an argument for different support programs, particularly for small firms, within regional development policies.

As discussed above, innovative milieu characteristics are not found in all regions, nor should attempts be made to artificially create them. However, the horizontal structure found in NSW rural regions does lend itself to activities which may develop more general 'learning region' features which would support the long term sustainability of regional exporters in global markets. Three areas where regional development agencies could encourage more integration of activities among exporters and between exporters and other local firms are suggested by this analysis.

First, there is a need to encourage large firms and the more successful exporters, which have the strongest links into external knowledge networks, to become more involved in their local networks. One way of doing this is through local recognition awards as leading firms, where the presentation could be accompanied by recipients leading seminars on elements in their success which would help impart 'best practice' knowledge to smaller regional firms. As most exporters in each region are not in the same sectors, the issue of providing commercial knowledge to competitors is less relevant for these firms than may be the case elsewhere.

Second, regional NSW faces the perennial problem of having an export structure heavily comprised of small firms where many of these firms do not have the resources to support the type of R&D and information gathering

activities needed to sustain exports. Local development agencies need to persist in reinforcing the need for continuous product development, technology upgrading and development of external market links, and that this implies increasing size over time, throughout their networks. It has also been suggested that information technology channels could be better utilized to bring these messages and specialised information to busy managers who do not have the capacity to spend large amounts of time outside their region.

Third, deliberate actions can be taken to encourage successful regional exporters to utilize local firms as suppliers even when this means they need to provide technological support to bring these firms up to world quality and cost standards. The benefits of using more collaborative supply relationships need to be emphasised. While more integrated relationships take time and effort to establish, they provide longer term benefits to exporters in terms of cost and capital expenditure savings while allowing them to benefit from the growing independent expertise of their suppliers. Regions also benefit as these suppliers grow and can develop further national and international markets as their competitiveness improves.

BIBLIOGRAPHY

- Acs, Z. and Audretsch, D. (eds.) (1993) *Small Firms and Entrepreneurship: An East-West Perspective*. Cambridge University Press: Cambridge.
- Amin, A. and Robins, K. (1991) These are not Marshallian times. In R. Camagni (ed.), *Innovation Networks: Spatial Perspectives*. Belhaven Press: GREMI, London.
- Amin, A. (1991) Giant shapers and shakers of the world economy leave British hopes behind as wishful thinking. *The Guardian*, 7 January, p. 9.
- Coase, R. H. (1993) The nature of the firm (1937). In O.E. Williamson and S. G. Winter (eds), *The Nature of the Firm: Origins, Evolution and Development*. Oxford University Press: New York, pp.18-33.
- Crevoisier, O. and Maillat, D. (1989) *Milieu, Organisation et Systeme de Production Territorial: Vers une Nouvelle Theorie du Developpement Spatial*. Dossier de PIRER No. 24, University of Neuchatel.
- Davelaar, E. J. (1991) *Regional Economic Analysis of Innovation and Incubation*. Aldershot: Avebury, U.K.
- Dosi, G., Freeman, C., Nelson, R., Silverberg, G. and Soete, L (eds.) (1988) *Technical Change and Economic Theory*. Pinter Publishers: London.
- Fischer, M., Suarez-Villa, M. and Steiner, L. (eds.) (1999), *Innovation Networks and Localities*, Springer-Verlag, Berlin.
- Freeman, C., Soete, L., and Clark, J (1982) *Unemployment and Technical Innovation: A Study of Long Waves and Economic Development* Francis Pinter: London.
- Grosjean, N. and Crevoisier, O. (1999) Territorial Production Systems: Towards a Systematic Diagnostic Method. GREMI website.
- Hodgkinson, A. (1998) *Innovation in the Illawarra. Labour Market and Regional Studies Centre: University of Wollongong.*

- Hodgkinson, A. and Iredale, R. (2003) Internationalisation, Information Flows and Networking in Rural and Regional Firm. A Comparative Analysis of Seven NSW Regions. Human Resource Centre: University of Wollongong.
- Hodgkinson, A., Iredale, R., McPhee, P., Tiberi-Vipario, P. and Aylward, D. (2003) *Internationalisation, Information Flows and Networking in Rural and Regional Firms, Final Report and Policy Recommendations*. Human Resource Centre: University of Wollongong.
- Hoover, E.M. and Vernon, R. (1959) *Anatomy of a Metropolis*. MIT Press: Cambridge, MA.
- Krugman, P. (1991) Increasing returns and economic geography. *Journal of Political Economy*, 99, pp. 483-99.
- Loveman, G. and Sengenberger, W. (1991) The re-emergence of small-scale production: An international perspective. *Small Business Economics* (3), pp. 1-38.
- Maillat, D. (1997) *Interactions Between Urban System and Localized Productive System: An Approach to Endogenous Regional Development in Terms of Innovative Milieu*. GREMI-website.
- Maillat, D. (1998) From the industrial district to the innovative milieu: Contribution to an analysis of territorialised productive organizations. *Recherches Economiques de Louvain*, 64 (1), pp. 111-126.
- Maillat, D., Crevoisier, O. and Lecoq, B., (1994) Innovation networks and territorial dynamics: A tentative typology. In: B Johansson., C. Karlsson and L Westin (eds.), *Patterns of a Network Economy*, Springer-Verlag: Berlin, pp. 33-52.
- Maillat, D. and Grosjean, N (1999) Globalisation and territorial production systems. In: M.M Fischer, L. Suarez-Villa. and M. Steiner, (eds.), *Innovation Networks and Localities*, Springer-Verlag: Berlin.
- Marshall, M. (1987) *Long Waves of Regional Development*. Macmillan: London.
- Massey, D. (1984) *Spatial Divisions of Labour*. Macmillan: London.
- Mensch, G. (1979) *Stalemate in Technology: Innovations Overcome the Depression*. Ballinger: New York.
- Nelson, R. and Winter, S (1982) *An Evolutionary Theory of Economic Change*. Harvard University Press: Cambridge, Mass.
- Piore, M. and Sabel, C. (1984) *The Second Industrial Divide: Possibilities for Prosperity*. Basic Books: New York.
- Porter, M. (1993) *The Competitive Advantage of Nations*. InterEditions: Paris.
- Pratt, A. (1991) The principles of networking. In M. Schmidt and E. Wever (eds), *Complexes, Formations and Networks*. Nijmegen: Utrecht.
- Simmie, J. (ed.) (1997) *Innovation Networks and Learning Regions*. Regional Studies Association: London.
- Scherer, F. M. (1991) Changing perspectives on the firms size problem. In Z. Acs and D. Audretsch, (eds), *Innovation and Technological Change: An International Comparison*. University of Michigan Press: Ann Arbor, pp. 24-38.
- Schumpeter, J.A. (1934) *The Theory of Economic Development*. Harvard University Press: Cambridge, Mass.

- Schumpeter, J.A. (1939) *Business Cycles: A Theoretical, Historical and Statistical Analysis, Volumes I and II*. McGraw-Hill: New York.
- Schumpeter, J.A. (1942) *Capitalism, Socialism and Democracy*. Allen and Unwin: London.
- Simmie, J. (2001) *Innovative Cities*. Spon Press: London.
- Storper, M. (1997) *The Regional World: Territorial Development in a Global World*. The Guilford Press: London.
- Sylos-labini, P. (1986) *Le Classi Sociali negli Anni Ottant*. Laterza: Rome.
- Tiberi-Vipraio, P and Hodgkinson, A. (2000) Globalisation within a local context: Methodology and pilot study. *Journal of International Marketing and Exporting*, 5(1), pp. 25-43.
- Todtling, F. (1990) Regional differences as determinants of entrepreneurial innovation – empirical results of an Austrian case study. In E. Ciciotti, N. Alderman and A. Thwaites (eds), *Technological Change in a Spatial Context*. Springer-Verlag: Berlin.
- Todtling, F. (1994) Regional networks of high technology firms: The case of the Greater Boston Region. *Technovation*, 14(5), pp. 323-343.
- Veltz, P. (1996) *Mondialisation, Villes et Territoires: L'Economie d'Archipel*. Presses Universitaires de France: Paris.
- Vernon, R. (1966) International investment and international trade in the products life cycle. *Quarterly Journal of Economics*, 80, pp. 190-207.
- Vernon, R. (1979) The product life-cycle hypothesis in a new international environment. *Oxford Bulletin of Economics and Statistics*, 41, pp. 255-267.
- Williamson, O.E. (1975) *Markets and Hierarchies*. Free Press: New York.
- Williamson, O.E. (1985) *The Economic Institutions of Capitalism: Firms, Markets and Relational Contracting*. Free Press: New York.

