Limitations to the use of networks and clusters as innovation in contemporary business

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Abstract

Research funded by the Orange, Cabonne, and Blayney local government areas (OCB) and the NSW Department of State and Regional Development highlighted potential for industry-based networks / clusters to promote sustainable regional development. This paper reports the results of a pilot study within the mining and engineering industry sector in the OCB region in response to the above. The literature suggests that it is difficult to initiate associations (particularly networks) between businesses without social and regional embeddedness. The responses in this study suggest that although there are acknowledged benefits to networking there is much to be done to achieve a positive networking outcome. Overall, it appears that participant expectations of 'networking' had a little more in common with the theoretical definition and characteristics of networking than with those of 'clusters'. On the other hand, participant hopes for 'networking' also lie in improved access to labour markets and suppliers, and their differing perceptions of the importance of membership are closer to expectations normally attached to clusters. Further work will need to be carried out to identify a structure of association that best meets the needs of participants.

Keywords: regional development, networks, clusters

I.   Background

In December 2001, the local government areas of Orange, Cabonne and Blayney (OCB) prepared a Local Enterprise Development Strategy, the underlying goal of which was the promotion of sustainable economic development within the OCB region through the expansion of existing business and the attraction of new businesses and investment.

In 2002/03 the OCB received funding under the Commonwealth Regional Assistance Program to undertake research on the regional economy, identify industry networks, and undertake a SWOT analysis of potential cluster models. The Western Research Institute was commissioned to undertake the study; their report was released in June 2003 and encompassed an overview of the economic performance and trends within the OCB region, and a brief macro-level analysis of the environmental services, transport and logistics, and viticulture industry networks.

Additional funding was received from the State and Regional Development Corporation in October 2003 to conduct more specific research into the mining and engineering industry network. This involved the mapping of key network participants, identifying skill strengths and gaps, examining the recruitment and retention of labour, and classifying relationships between sector participants. The report also recommended three potential 'networking' models to facilitate development in the mining and engineering industry network, namely:

- The Skills Incubator: A model where small business sector participants train personnel before moving to the larger participants in the industry, with the larger participant to provide training support or salary assistance. This model is of benefit when there is a willing dominant participant in the sector.

- Industry Network: This model establishes strong links with industry, schools, training and education providers and local government to build competitive advantage. Such collaboration would involve the sharing of new skills and expertise, develop economies of scale, undertake joint marketing initiatives, trade missions, and tendering activities. This model requires a strong industry body and / or project manager to implement the network.

- Training Brokers: This model involves dedicated case-managers working with schools to assist school leavers make informed choices about various careers. This model requires extensive support and guidance and ongoing contact with trainees and would improve the current 50% retention rate in this sector in OCB region.

In November 2003 the authors were invited to assist the OCB further investigate the various industry network models and to assist in the development and implementation of a preferred model for the OCB region.

Preliminary work by the authors included a review of literature on industry network clusters, and the preparation of a series of discussion papers on potential collaborative projects before the investigation into the viability of a cluster network within the mining and engineering industry network.

II.   Literature Review

A survey of literature on industry associations using the 'cluster model approach' included an analysis of network and cluster development in Australia (c.f. Boddy 2000; Douglas and Hill 2001; Enright and Roberts 2001; Cheers, et al. 2002), the United States (c.f. Saxenian 1994; Kotval and Mullin 1998; Porter 2001; Wolfe and Gertler 2004), Canada (Harrison et al. 2004; Wolfe and Gertler 2004), South East Asia (c.f. von and Egeraat 1999; Schmitz 2000; Van Winden et al. 2004; Tambunan 2005), China (c.f. Sonobe et al. 2002; Xiangping 2004), Brazil (c.f. Meyer-Stamer 2000), African nations (c.f. Sverrisson 1990; Bagachwa 1997; Bagella and Pietrobelli 1997), and Europe (c.f. Beaudry et al. 1998; Keeble and Wilkinson 1999; Cook et al. 2001; Atherton 2003; Pandit and Cook 2003; Leibovitz 2004).   More generic literature on cluster theory (c.f. Porter 2001; Colgan and Baker 2003; Feldman and Francis 2004; Romanelli and Khessina 2005) was also consulted.

This literature reveals the importance of distinguishing between networks and clusters when considering the value of the clusters concept to a given industry or location.

Networks can be defined as groups of companies joining together to achieve economic goals they would not otherwise be able to achieve (Rosenfeld 2005, 5). That is, they "network to produce more complex goods, extend their market outreach, acquire costly resources or services, or simply reduce costs" (Rosenfeld 2005, 5).

Networks in the US have been established to provide the social infrastructure needed to create the trust and reciprocity that enables businesses to work together (Rosenfeld 2005, 5). Membership and cooperation are key criteria for success. The most important trait of a network is a relatively homogenous system of values and views, which is an expression of an ethic of work and activity, of the family, of reciprocity and of change. The system of values that prevails in the region should develop through time. Overall, the literature suggests it is challenging to initiate network formation, especially from scratch, because the relational mix and expectations is unique for each firm. Embeddedness of social and regional values are an important feature of the formation process. It takes time to build a network from scratch because the relational mix and expectations is likely to be unique for each firm.

Overall, a successful industry network is a structured process that engages industry leaders and active industry players to the extent that they take responsibility for the future of their industry and to develop initiatives to accelerate growth.

Definitions of 'cluster' vary significantly, but can be summarised as being geographical concentrations of interconnected companies and institutions in particular fields (c.f. Porter 1990; Porter 2001) that are large enough to generate externalities (Rosenfeld 2005, 5). Within clusters, relationships can be both cooperative and competitive; agreements between participants are based on social norms and reciprocity; value adding comes from external economies, and major benefits include access to suppliers, services and labour markets (Rosenfeld 2005, 5). Location and proximity to each other is considered more critical than membership of the cluster (Rosenfeld 2005, 5).

The key aim of the collaborative nature of a cluster is the provision of greater gains and incentives than is possible for a business operating in isolation, thereby addressing market failures and/or supporting developments that build on a region's strengths and opportunities. Economies of scale are another important benefit.

Foundational to a successful cluster is a close alignment with local factors, including quick and efficient access to key inputs, lower transaction costs, more informal interactions and less protracted contract negotiations where 'chance' opportunities are

managed / shared amongst collaborating firms. Successful clusters are most likely to be built on existing strengths of the region, i.e. from the existing supply chains within the region, utilising the capacity of local universities and research institutions, and mobilising a collaborative effort of local business, education and government leaders. Often this requires identifying the key drivers of a region using an industry network cluster approach that involves tracing the supplier-buyer linkages (or value chains) within a region.

Overall the literature highlights a fundamental paradox that the enduring competitive advantages in a 'global' economy lie increasingly in the 'local' knowledge, relationships, and motivation – inputs that distant and larger rivals cannot match. Geographic, cultural and institutional proximity leads to improved access, closer relationships, better information, powerful incentives, and other advantages in productivity and innovation that are otherwise difficult to tap.

III.   The Pilot Project

3.1 Aims and objectives of the project

The primary objective of the pilot study was to conduct exploratory research in the mining and engineering sector of the OCB region to identify the existence of any economic and social clustering and to ascertain the extent to which businesses within the sector saw a need for a cluster. The research also aimed to determine the potential for a mining and engineering industry cluster, identify a preferred cluster model, and establish expectations of potential participants and their perceived drivers of success. This was achieved through the pilot study that:

- identified the key economic, social, and environmental factors that influence the development of industry networks and/or clusters,
- linked these factors with current literature on cluster development (both within Australia and internationally), and
- identified industry perceptions of participation in a potential network and/or cluster, including willingness to join a cluster.

To achieve these outcomes, the project asked four core questions:

- How far has the mining and engineering progressed in network development?

- What is their current level of interest in industry networking?

- If such network/s were to be established, what would be their preferred structure and function?

- What roles would the various participants, including the councils, local industry bodies and sector businesses, play in the establishment and ongoing growth of the networks?

3.2 Methodology

The project was necessarily of an explorative nature. There was a need to obtain an understanding of how the business was operating together with an in-depth appreciation of clusters from the perspective of the businesses involved. Moreover, there was likelihood that the information gathered would vary considerably between respondents. For a number of reasons, a survey of respondents that comprised both quantitative and qualitative questions was considered the most appropriate.

The key benefits of the proposed methodology were:
- the provision of the dual benefit of research rigour whilst delivering practical outcomes and recommendations,

- the identification of key attitudinal and skill drivers, motivators and barriers for successful implementation, and

- to enable the project team to develop a deeper understanding of the various learning styles, group dynamics, and personality types evident within a cluster that can be incorporated into the design of future network formation.

The survey comprised sections on:
1. business overview, including primary activity of business, location of business, location of greatest turn-over, sources of staff,

2. business workforce, including identification of skill gaps and reasons for skill gaps,

3. existing industry networks, including who is involved in those networks, what the networks are used for, and how frequently they are used,

4. future plans for the business, and

5. Business preferences for future networking, including potential advantages and disadvantages, and preferred structure and functioning of networks.

Based on the information gained from the existing OCB database, all businesses within the Orange, Cabonne and Blayney shires belonging to the mining and engineering sector were identified. There were 43 businesses identified and business owners/managers were forwarded a survey that comprised questions on the nature of the business, current workforce issues, existing industry networks, future plans for the business, including impediments to further growth, and perceptions of future networks, including advantages and disadvantages, preferred structure and willingness to participate.

Within two weeks of dispatch, the project officer rang the business's contact person and arranged a time to go through the survey over the phone. The project officer subsequently completed the interview, then coded and inputted the data into MSEXCEL. Completed surveys were received from 13 respondents, thereby providing a 30% response rate.

IV.   Results and Discussion

Survey results are not provided in detail due to space restrictions. The following summarises the key findings of the collated results and discusses them in light of the literature.

4.1 Overview of participation businesses

All businesses involved in this study are engaged in one or more aspects of engineering, with the vast majority located in Orange LGA, i.e. the main local regional centre. In addition to the location, sourcing of raw materials, staff, and business are also largely domiciled in this centre.

Noticeable by their absence were all mining companies contacted as potential participants, and businesses located in Blayney. The formers' absence is unfortunate as this sector are particularly vulnerable to labour shortages, are major employers of labour within the shires, and also represent a large portion of the turnover of smaller participants in the mining and engineering sector.

There is an apparent lack of direct competition between participant businesses in terms of output, but direct competition in terms of labour and resources.

With 75% of responding businesses indicating a shortage of labour, particularly skilled labour, it is apparent that this is a major problem – not unexpected given earlier research by the Western Research Institute and a key premise of the current project. The reasons for these skill gaps are many, the most common being staff moving to other jobs within the mining and engineering sector (notably to the main mining companies). Further research needs to be undertaken to explore reasons why staff move between jobs; if 'poaching' between businesses is apparent, this is likely to pose a significant threat to the establishment of trust between businesses so essential to successful networking and/or cluster development.

4.2 Future plans for business growth, and current impediments

Seventy-five percent of participating businesses are planning to expand their businesses over the next five years, within the OCB region and the wider Central West and to a lesser extent the remainder of the state, interstate, and overseas. This will have major implications for employment (i.e. it is likely to increase) and continuing difficulties in sourcing raw materials, particularly within the region.

A number of impediments to growth were identified, all of which are consistent with the literature, including competition, lack of capital, lack of skilled staff, pending retirement, and lack of access to markets. Competition at various levels of the value chain was the most frequently identified problem.

Participating businesses identified three key areas of assistance that would be of benefit to growing their businesses: changes in government policy, improved education and labour supply, and assistance with marketing. Industry networking was identified as a means of addressing all of these issues.

4.3 Current level of interest in industry networking

There is little doubt that various approaches to addressing local, regional and globally based competitive issues are in demand by respondents, with ten businesses already

engaged in some form of collaborative arrangement with other businesses within the mining and engineering sector or in support industries. The formality of the collaboration varied between businesses. Fourteen of these business collaborations (83%) had been operating for greater than four years.

There is considerable support for the broad concept of building on these existing networking arrangements, with the majority of respondents willing to follow the idea further.

This is consistent with the advantages of networking that were identified for the respondents' businesses, including the provision and sharing of specialised machinery, assisting peak workload pressures and when additional technical assistance is required. These suggest that certain characteristics of networking and clusters are required by the respondent businesses – neither one or the other is likely to suffice.

There was no evidence to suggest that businesses of a particular size were more likely to be in favour of industry networking or cluster development.

4.4 Preferred structure and function

The vast majority of respondents indicated favourably to have existing businesses within the mining and engineering sector involved in a future network/cluster. Although support for local government involvement was given by the majority of respondents, there was little willingness to engage State and/or Federal Government departments in any networking initiative. There was some interest in linking business with the local universities and training institutions, however, there was considerable resentment of TAFE shown in a number of responses. This lack of willingness to join with the education sector to improve training outcomes is contrary to the experiences of successful clusters identified in the literature.

There was no consensus on how a network/cluster should operate in terms of formality/informality, reflecting the different expectations of the potential participants. Those favouring less formality are more likely to wish to belong to a

cluster, those hoping for greater formality may be happier with a networking arrangement.

There was considerable agreement over what a 'network' would actually do including assistance with marketing, access to communication (including the establishment of a database and website), sharing labour, sharing machinery and staff recruitment, and this is in line with existing literature citing improved access, closer relationships and better information. As already identified, such a structure exhibits characteristics of both networks and clusters.

There was also considerable agreement over what a network/cluster should not be like. It was important that the network not take up too much time. Concern was also shown over potential threats to competitiveness, particularly in terms of 'stealing' personnel, products and/or ideas, and what happens if conflict develops between participating businesses. Given that competitiveness and labour shortage were identified as the most likely impediments to further business growth, this result is not unexpected.

4.5 Limitations/challenges

The pilot study faced a number of challenges, including limited and incomplete information on sector participants. Literature suggests that successful networks and clusters require a larger participant base than what exists within the OCB region.

Second, the wide range of business organizations, i.e. from sole traders employing no or small numbers of staff, to publicly listed companies made comparative data analysis difficult. Third, the boundaries of the existing networks are currently unclear, i.e. it is difficult to determine whether a business is a sector participant as opposed to one which provides a service to the sector. Fourth, a lack of participation from mining companies, despite their being dominant participants in the sector, has potentially confounded the results. Unravelling the complexity of having one or two dominant participants in the sector yet apparently unwilling to engage in networking, is of likely to be of significance. Finally determining the extent to which support for 'networking' is support for 'cluster' development

V. Conclusion

The literature suggests that it is difficult to initiate associations (particularly networks) between businesses from scratch unless social and regional embeddedness can be achieved. That is, networking is seen to be integral to the culture of relevant sector/s and to the regional economy in which the network is located. The responses in this study suggest that although there are many readily acknowledged benefits to networking there is much to be done to achieve a positive networking outcome.

Overall, it appears that participant expectations of 'networking' has a little more in common with the theoretical definition and characteristics of networking than they do with the theoretical definition and characteristics of 'clusters'. That is, their key requirements of any enhanced association between businesses in the sector are for extending market outreach, acquiring costly resources and cost reduction. On the other hand, their expectations from 'networking' lie in improved access to labour markets and suppliers, and their differing perceptions of the importance of membership are closer to expectations normally attached to clusters. Further work is needed to identify a structure of association that best meets the needs of participants. In this context it appears that successful networking (perhaps including cluster development) will require, at the very least, an in-depth qualitative study looking at factors underpinning existing conflict within the mining and engineering sector. This will assist in the identification of the complexities of input competition.

The development of a long-term (five to seven year) strategy for achieving cultural change in the mining and engineering sector, incorporating plans to enhance social capital within the sector and in line with the results of the study outlined above is also required. This will be a key to improving the trust and reciprocity so critical to successful cross sector collaboration. However, its establishment is likely to be extremely challenging given that input competition between participating businesses is particularly high. It is possible that the OCB councils may have a role to play in enhancing social capital; ideally working with members of the sector. Whatever strategy is decided upon to achieve this must acknowledge that a long-term commitment will be required. Change will not happen overnight.

Minimal staff turnover in supporting agencies is critical to facilitate the formation of the network cluster in at least the first five years of establishment.

Further exploration of other ways in which business owners can be assisted in overcoming key impediments to growth is also required. For example, they may be able to draw upon existing financial capital illustrated in low debt/equity ratios.

Efficient and effective communication between the University and participating councils, particularly given the movement of key council staff out of their original positions during the course of any further study is imperative.

Thus, although there is considerable interest in developing enhanced networking and clusters, there remains much foundational work to be done before it is likely that these innovative business development strategies are probable to succeed in the mining and engineering sector in OCB.

List of References

Atherton, A. (2003). "Examining clusters formation from the 'bottom up': an analysis of four cases in the north of England." Environment and Planning C: Government and Policy Vol 21(1): pp 21-35.

Bagachwa, M. (1997). Trust building in Tanzania's informal credit transactions. Enterprise clusters and networks in developing countries. R. Rabellotti. London, Frank Cass: pp 155-168.

Bagella, M. and C. Pietrobelli (1997). From SME's to industrial districts in the process of internationalisation. Enterprise clusters and networks in developing countries. R. Rabellotti. London, Frank Cass: pp 191-209.

Beaudry, C., C. G, et al. (1998). Industrial districts and localised technological knowledge: the dynamics of clustered SME working, European Community DG XII.

Boddy, M. (2000). Technology, innovation and regional economic development in the state of Victoria.

Cheers, B., J. Harvey, et al. (2002). The Upper Spencer Gulf Common Purpose Group: a model of intra-regional cooperation for economic development. Whyalla, Centre for Rural and Regional Development.

Colgan, C and Baker, C 2003, 'A framework for assessing cluster development', Economic Development Quarterly, Vol 17(4): pp 352-67

Cook, G., N. Pandit, et al. (2001). "The dynamics of industrial clustering in British broadcasting." Information Economics and Policy Vol 13: pp 351-375.

Cumbers, A and MacKinnon, D 2004, 'Introduction: clusters in urban and regional development', Urban Studies, Vol 41(5/6):pp 959-999

Douglas, M. and B. Hill (2001). Environment Industry Cluster: the South Australian experience. Canberra, Commonwealth of Australia.

Enright, M. and B. Roberts (2001). "Regional clustering in Australia." Australian Journal of Management Vol 26: pp 65-86.

Feldman, M and Francis, J (2004). 'Homegrown solutions: fostering cluster formation', Economic Development Quarterly, Vol 18(2): pp 127-137.

Fingleton, B, Igliori, D and Moore, B (2005). 'Cluster dynamics: new evidence and projections for computing services in Great Britain', Journal of Regional Science, Vol 45(2): pp 283-311.

Harrison, R, Cooper, S and Mason, C (2004). 'Entrepreneurial activity and the dynamics of technology-based cluster development: the case of Ottawa', Urban Studies, Vol 41(5/6): pp 1045-1070.

Keeble, D. and F. Wilkinson (1999). "Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe." Regional Studies Vol 33(4): pp 295-303.

Kotval, Z. and J. Mullin (1998). "The potential for planning an industrial cluster in Barre, Vermont: a case of 'hard rock' resistance in the granite industry." Planning Practice and Research Vol 13(3): pp 311-318.

Leibovitz, J 2004, 'Embryonic' knowledge based clusters and cities: the case of biotechnology in Scotland', Urban Studies, Vol 41(5/6), pp 1133-1155.

Meyer-Stamer, J. (2000). Adjusting to an opening economy: three industrial clusters in Brazil. Local economies in turmoil: the effects of globalization and deregulation. M. P. Van Dijk. Basingstoke, Macmillan.

Romanelli, E and O Khessina 2005, 'Regional industry identity: cluster configurations and economic development', Organization Science, Vol 16(4); pp 344-358.

Pandit, N. and G. Cook (2003). "The benefits of industrial clustering: insights from the British financial services industry in three locations." Journal of Financial Services Marketing Vol 7(3): pp 230-245.

Porter, M. (1990). The competitive advantage of nations. New York, Free Press.

Porter, M. (2001). Clusters of innovation: regional foundations of US competitiveness. Washington DC, Council on Competitiveness.

Rosenfeld, S. (2005). Industry clusters: business choice, policy outcomes or branding strategy, Journal of New Business Ideas and Trends, Vol 3(2), pp 4-13.

Saxenian, A. (1994). Regional advantage - culture and competition in Silicon Valley and Route 128. Cambridge MA, Harvard University Press.

Schmitz, H. (2000). "Does local cooperation matter? Evidence from industrial clusters in South Asia and Latin America." Oxford Development Studies Vol 28(3): pp 9-28.

Sonobe, T., D. Hu, et al. (2002). "Process of cluster formation in China: a case study of a garment town." Journal of Development Studies Vol 39(1): pp 118-139.

Sverrisson, A. (1990). Entrepreneurship and industrialisation: a case study of carpenters in Mutare, Zimbabwe. Lund, Research Policy Institute.

Tambunan, T (2005). 'Promoting small and medium enterprises with a clustering approach: a policy experience from Indonesia', <u>Journal of Small Business Management</u>, Vol 43(2): pp 138-154.

Van Winden, W, Van Der Meer, A, Van Den Berg, L (2004). 'The development of ICT clusters in European cities: towards a typology', <u>International Journal of Technology Management</u>, Vol 28(3-6) pp 356-387.

von, G.L and C v Egeraat (1999). "Achievements of the Industrial 'high road' and clustering strategies in Singapore and their relevance to European peripheral economies." <u>European Planning Studies</u> Vol 7(2): pp 145-173.

Wolfe, D and Gertler, M (2004). 'Clusters from the inside and out: local dynamics and global linkages', <u>Urban Studies</u>, Vol 41(5/6): pp 1071-1093.

Xianping, R (2004). 'Research on China's small and medium-sized enterprises' cluster development model', <u>Chinese Economy</u>, Vol 37(5): pp 7-18.