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Effectiveness of Cluster Associations from the Perspective of Firms *Case Study: BioValley Association*

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Abstract: Supporting biotechnology clusters including cluster associations has been a significant component of regional economic development initiatives. This case study will contribute towards alleviating the dearth of research on cluster associations by assessing the extent to which they are perceived to be effective by firms and, providing useful guidance not only for associations themselves, but also for firms and policy makers. In the literature realising the benefits of positive externalities and overcoming the existence of market failure emerge as rationale behind intervention. Comparing these with firms' perceptions in this study produces a mixed picture. Participating firms highlight that the primary focus should be the facilitation of networks with cross-border relationships most important. However, forging international collaboration among firms seems to be a challenge for this particular association.

Keywords: Association · Biotechnology · Cluster · Network

Introduction

The concept and the benefits of industry clusters have been popularised in the last decade or so since Porter's seminal work on 'The Competitive Advantage of Nations' [1][2]. The concept is still surrounded in ambiguity and governments' and international organisations' increasing willingness to adopt clusters as a 'policy panacea' for local/regional economic development has fuelled debate around their effectiveness as a policy tool (see Martin and Sunley [4], Raines [5], Bailey [6], Meyer-Stamer [7]). It has been argued that knowledge-based industries (and their associated clusters) are the most promising source of competitiveness for advanced nations (*e.g.* Thurow [8]). Thus, not surprisingly, supporting biotechnology clusters including cluster associations has been a significant component of regional economic development initiatives (*e.g.* Germany's Bioregio competition) [9]. However, specific research is lacking on the purpose and activities of the associations [11].

This case study of BioValley will attempt to fill this gap by assessing the extent to which cluster associations [15], in an industry which has a tendency towards localisation, are perceived to be effective by firms which are typically their principal target [16]. The findings will provide the basis for a set of recommendations on their appropriate role and activities to meet firms' needs and indicate areas for improvement to enhance the cluster's performance. The results should be more generally relevant as a perusal of various European biotechnology cluster associations' websites showed that BioValley is representative in terms of its objectives, activities, structure [17] and financing. However, it should be noted that a distinctive feature of Biovalley is its geographic scope.

Section 1 will review the literature concerning cluster policies and related institutions. Section 2 discusses biotechnology clusters. Section 3 analyses the results of the investigation while Section 4 provides recommendations and concludes with areas for further research.

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1. Cluster Policies and Related Institutions

1.1. *Cluster Policy*

Throughout the cluster literature three common themes underlie the array of measures which comprise cluster development policies (see *e.g.* Best [18], Porter [3], Raines [19]). These are:

1.1.1. *Creating a Collective Identity*

Building internally and projecting externally an identity for the cluster and increasing the members' sense of 'belonging'. A collective identity is developed which acts as a signal of quality to customers and service providers, thereby reducing uncertainty and thus transaction costs.

1.1.2. *Providing Public Goods*

Although the firms in the cluster share a common interest in the provision of public goods such as specialised information, infrastructure and skills they do not have a common interest in paying for the cost of provision resulting in market failure.

1.1.3. *Encouraging Inter-Firm Co-operation and Collective Action*

The facilitation of inter-firm linkages [20] has typically triggered the creation of cluster associations [23]. However, Raines [5] finds that the linkages critical to cluster

development are not just tied to regional economic spaces but are equally likely to be national or international restricting the influence cluster policy can have on these interdependencies. Raines and Taylor [24] and Meyer-Stamer [25] show that the success in building cluster communities and of innovation-based cluster initiatives depends to a large extent on existing cooperative behaviour among cluster actors [25]. Associations can encourage inter-firm cooperation by establishing social fora or networks, thus contributing to building the social ties and collective identity which Best [18] and Porter [3] both describe as an essential component for a cluster to realise its potential. The dense social networks in Silicon Valley are often said to have significantly contributed to its high levels of entrepreneurship and experimentation (Saxenian [28]). However, networks do have their own set of problems *e.g.* the tendency for 'collective conservatism' (Kuran [29]).

1.2. *Institutions – Are They the Solution?*

Swann *et al.* [30] expect that as production becomes more knowledge-intensive economic performance will increasingly "come to depend upon institutional mechanisms for correcting or at least mitigating market failure". Best [18] believes institutions offer a means of enforcing individual responsibility to the common interest. Case studies by Doner and Schneider [12] reveal that technology diffusion often involves meso-level institutions such as business associations and the European Commission [10] recognises a need for a supervising role from an intermediate partner to encourage inter-firm collaboration.

In their study of clusters Christensen *et al.* [31] found that economic development intermediaries and small business assistance providers can work most efficiently and effectively if they focus on clusters. Putnam [32], Best [18] and Humphrey and Schmitz [27] among others recognise that associations with an element of inter-firm cooperation might enhance economic performance. Nadvi [33] found a positive and statistically significant relationship between improvements in firm performance and increases in joint action through business associations in his cluster case studies, although he acknowledges this does not imply causality.

On the other hand, Schmitz and Musyck [34] in their review of European industrial districts found little empirical evidence on how local and regional support institutions influenced enterprise behaviour [35]. Similarly, Enright [14] found that on average cluster associations appeared to play a very minor role in coordinating the activities of firms within the cluster. In the ENSR Cluster Survey (European Commission [10]) cluster associations ranked only seventh out of eleven policies considered important for cluster development.

1.3. *Evaluation*

Lagendijk [37] emphasises the difficulties posed in evaluating cluster initiatives *e.g.* finding appropriate measures for their impact on business performance and avoiding self-fulfilling evaluations and suggests recording particular practices and using these for the exchange of best practice [38] as well as to correct inferior performance. Raines [19] notes that evaluation can range from self-evaluation where continued participation of companies in cluster initiatives is perceived as an indicator of their value to intensive case-study analyses of changing business behaviour.

2. Biotechnology Clusters

2.1. *Why Do Biotechnology Clusters exist? [40]*

– Allansdottir *et al.* [36] highlighted the importance of biotechnology firms' 'capabilities' *i.e.* their ability to exploit knowledge and to collaborate with many actors across product, scientific and industry boundaries.
– Audretsch and Stephan [42] discovered that scientists working with biotechnology firms were more likely to be located in the same region as the firm when the scientist was involved in transferring new economic knowledge to the firm.
– Quince and Whittaker [43] found evidence suggesting that for high-tech businesses the effect of untraded interdependencies (see [20]), especially the transfer of tacit knowledge, is the primary benefit of proximity.
– Swann *et al.* [30] suggested the main factors contributing to the underlying motivation to cluster in biotechnology were the presence of specialised labour, other specialised inputs and knowledge spillovers. On the other hand, Krugman [44] is cautious in attributing knowledge spillovers as the typical reason for the localisation of high-tech industries. In fact, as Enright [45] points out superior information flows in the cluster can also act as a disadvantage as it proves more difficult to appropriate the gains from innovation.

2.2. *Factors Critical to Biotechnology Cluster Development (DTI (1999))* [*46*]

i. Strong science base
ii. Entrepreneurial culture
iii. Growing company base
iv. Ability to attract key staff
v. Availability of finance
vi. Premises and infrastructure
vii. Business support services in related industries
viii. Skilled workforce
ix. Effective networks
x. Supportive policy environment

3. Case Study Findings and Analysis [47]

3.1. *Cluster Development from the Firms' Perspectives*

3.1.1. *Creating a Collective Identity: Key Results (see Fig. 1 and 2)*

Positive Results

– 35% of respondents satisfied or very satisfied "developing a cluster brand image".
– Moderate statistically significant correlation (0.48) between the satisfaction rating for "developing a cluster brand image" and the impact the association had on the company's reputation.
– 59% of respondents consider BioValley activities as somewhat important or very important in improving their company's reputation.
– Marketing and PR benefits are mentioned by over 50% of respondents as a reason for joining the association.
– Sales and R&D are both considered by 27% of respondents to benefit from the company's location in the BioValley cluster.

Negative Results

– Single-factor ANOVA test: no statistically significant difference (F-statistic 0.6) in the satisfaction rating for the category "developing a cluster brand image" between those who believe being located in the cluster has a positive impact on sales and those that believe it has none.
– Little correlation existed between the satisfaction rating "developing a cluster brand image" and the extent to which the company believes BioValley had been important in improving sales and marketing.

These results would seem to demonstrate that traded and untraded interdependencies (see [20]) are prevalent in the cluster. A more comprehensive survey would collect quantitative data on sales, profitability *etc*. for companies located in the cluster and compare against those outside of the cluster controlling for other variables [48].

3.1.2. *Providing Public Goods*

28% of respondents suggest training as an activity requiring joint action. Notably,

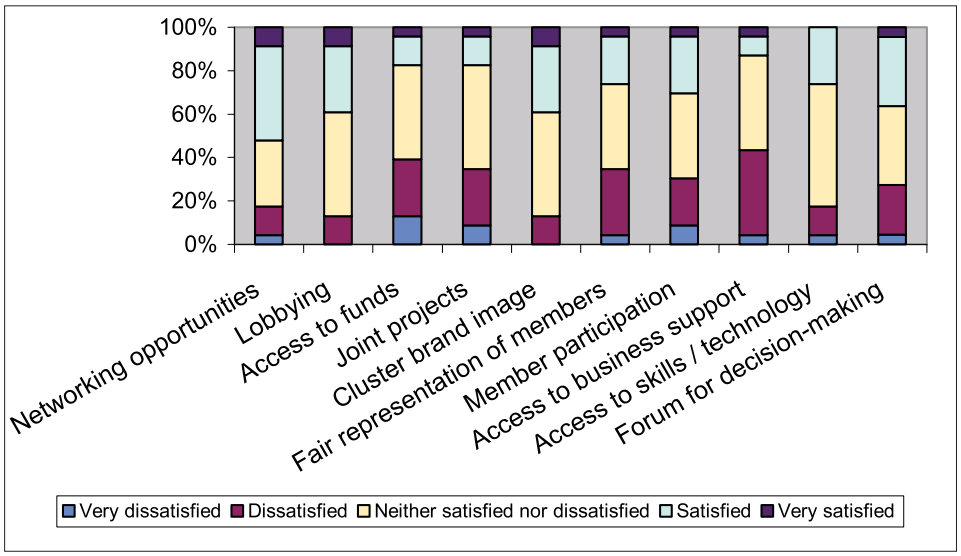

Fig. 1. Satisfaction ratings

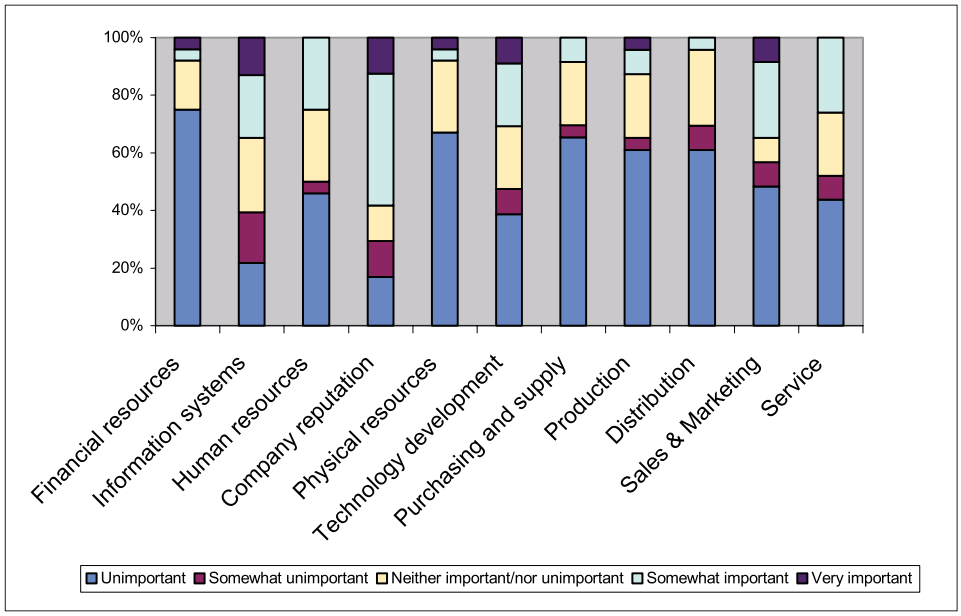

Fig. 2. Importance of BioValley activities in improving firms' resources and capabilities

human resources received a comparatively low score when the impact of BioValley's activities on the companies was assessed which suggests that in facilitating collective action for training the association is less effective [49]. Creating a pool of skilled labour would also contribute to improving the competitiveness of the cluster as a whole especially as firms are experiencing recruitment difficulties for qualified personnel [50]. In terms of information provision, firms frequently mentioned the need for a comprehensive and efficient database to allow them to identify companies with particular competencies and potential project partners thus reducing their search costs.

3.1.3. *Encouraging Inter-Firm Cooperation and Collective Action: Key Results (see Fig. 1 and 2)*

Positive Results

– Networking/liaison opportunities most frequently mentioned reason for joining the association [51].
– "Providing networking/liaison opportunities" highest satisfaction rating. Just over 50% of respondents are satisfied or very satisfied with BioValley in facilitating networks.
– A high networking satisfaction score is moderately positively correlated with BioValley having an important contribution to "improving the company's reputation" and "technology development" (0.53 and 0.47, respectively) [52]. These imply that networking might reduce transaction costs by creating social ties which reduce uncertainty (see Section 1.1.1), opportunistic behaviour and facilitating the conditions for tacit knowledge transfer.
– Joint projects with companies and/or institutions are mentioned by 35% of respondents as a reason for joining BioValley.
– 60% of respondents believe that BioValley is effective in helping the cluster act collectively. Higher than average levels of satisfaction with the BioValley performing activities from which firms benefit collectively, such as developing a cluster brand image, lobbying, providing a forum for joint decision making, show that in some instances BioValley is able to assist the cluster take collective action [53].

Negative Results

– 52% chose cross-border relationships with firms followed by cross-border relationships with institutions (20%) as most important relationships [54]. BioValley, compared to typically national industry associations, has an advantage in this respect, however, it is considered to be most effective in forming cooperative relationships between companies within national borders [55].
– In enabling joint projects BioValley is perceived by members as underperforming as only 17% are either satisfied or very satisfied.

4. Recommendations [57]

4.1. *Meeting Firms' Expectations and Developing the Cluster*

In the literature realising the benefits of positive externalities and overcoming the existence of market failure, for example, developing a cluster identity and brand image and encouraging inter-firm cooperation and collective action, emerge as rationale behind intervention. Comparing these with the expectations and perceptions of firms in this study produces a mixed picture.

4.1.1. *Creating a Collective Identity*

This has significant spillover benefits for the cluster's firms in terms of improving their reputation. Promotional activities are therefore to be encouraged especially on the global scale as it is at that scale the cluster association possesses an advantage over an individual firm (especially in the case of such a trinational cluster like BioValley) and rival clusters.

4.1.2. *Providing Public Goods*

Cluster associations should aim to act as a 'sensing mechanism' (Lagendijk [37])

and share their intelligence widely, which might be facilitated using knowledge management techniques. For example, firms may not have the resources in-house to undertake a market assessment (especially given the sunk costs involved) [58]. Given the willingness of firms to participate in joint action on training, cluster associations can play a more substantive role in improving firms' human resources and easing recruitment bottlenecks by ensuring that training facilities in the cluster are adequately tailored to the needs of cluster firms and that educational establishments are supported in their efforts to encourage more young people into the industry.

4.1.3. *Encouraging Inter-Firm Co-operation and Collective Action*

The results suggest that the appropriate initial focus for a cluster association should be the facilitation of networks. However, despite firms' recognition of BioValley's good performance there is still scope for improvement. Surprisingly, less than a quarter of respondents considered the cluster association most able to help firms take decisions together on cluster issues. Firms showed interest in the cluster association enabling joint projects, however, BioValley is perceived as performing poorly in this respect. Information asymmetry makes it difficult for partners to identify each other and negotiate mutually beneficial agreements which lead to market failure [59]. In organising joint projects and cooperative relations between firms on an international level, BioValley is perceived as being less effective despite its intrinsic advantage as a trinational organisation. Thus, cluster associations might be limited in their capacity to forge international inter-firm cooperation.

4.2. *Performance Evaluation*

Evaluating an association's performance should be an ongoing dynamic learning process probably involving 'customer satisfaction surveys' in order to improve their responsiveness and enable staff to develop intimate knowledge of the cluster through their frequent interactions with members. This would enable the capture of medium to long-term benefits (which unfortunately often do not correspond to the duration of funding regimes). Benchmarking against other cluster associations should also be a part of the evaluation, especially important is to measure changes in how the cluster is perceived internationally.

4.3. *Implications*

This research should enable firms to make a more informed decision about their participation in cluster associations by highlighting the individual as well as collective benefits. Additionally, by emphasising the contribution cluster associations can make to resolving market failure, the findings will be useful to policy makers. Furthermore, cluster associations might find valuable the assessment approach used in the study and the recommendations.

4.4. *Further Research*

The most significant areas for further research include:

- comparison of at least two cluster associations to reveal which findings are contextual
- the design of precise evaluation methods (including performance indicators)
- fit between the geographic scope of cluster associations and administrative boundaries
- an assessment of the performance of a cluster association in conjunction with the capabilities of the cluster it represents
- financing models for cluster associations

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[1] M. Porter, 'The Competitive Advantage of Nations', Macmillan, London, **1990**.
[2] Porter's cluster definition [3] 'Geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (*e.g.* universities, standards agencies and trade associations) in particular fields that compete but also co-operate.'
[3] M. Porter, 'On Competition', Harvard Business School, Boston Mass., **1998**.
[4] R. Martin, P. Sunley, 'Deconstructing Clusters: Chaotic Concept Or Policy Panacea?', *Centre for Business Research Working Paper 244*, **2002**.
[5] P. Raines, 'The Cluster Approach and the Dynamics of Regional Policy Making', *European Policies Research Centre Regional and Industrial Policy Research Paper 47*, **2001**.
[6] D. Bailey, 'Globalisation, Regions and Cluster Policies: The Case of the Rover Task Force', L'institute Discussion Paper 21, Universities of Birmingham, Ferrara and Wisconsin-Milwaukee, **2003**.
[7] J. Meyer-Stamer, 'Strategien lokaler/regionaler Entwicklung: Cluster, Standortpolitik und systemische Wettbewerbsfähigkeit', Projekt Meso-NRW, Institut für Entwicklung und Frieden, Universität Duisburg und Fundção Enpreender, Joinville Brasilien, **1999**.
[8] L. Thurow, 'Head to Head: the Coming Economic Battle Among Japan, Europe and America', Nicholas Brealey, London, **1993**.
[9] All the science-based clusters surveyed in European Commission [10] had cluster associations.
[10] European Commission, *Regional Clusters in Europe*, Observatory of European SMEs No. 2, **2002**.
[11] See Doner and Schneider [12], Dunning [13], and Enright [14].
[12] R. Doner, B. Schneider, 'The New Institutional Economics, Business Associations and Development', *International Labour Office Discussion Paper* 110/2000, **2000**.
[13] J. Dunning, 'Globalization, Technological Change and the Spatial Organization of Economic Activity', in 'The Dynamic Firm', Eds. A. Chandler, P. Hagström, O. Sölvell, Oxford University Press, Oxford, **1998**.
[14] M. Enright, 'Survey on the Characterization of Regional Clusters', *Institute of Economic Policy and Business Strategy University of Hong Kong Working Paper*, **2000**.
[15] The existence of a cluster is often the pretext for such policies and consequently for the purposes of this research it will be assumed that a cluster in the sense of that described in [2] exists and that firms' membership in BioValley also to some extent confirms that they perceive themselves to be part of a cluster.
[16] Existing literature has tended to focus on the economic development perspective.
[17] While the balance between public and private representation varies considerably from organisation to organisation, the associational model is quite common.
[18] M. Best, *New Competition*, Cambridge: Polity, **1990**.
[19] P. Raines, 'Developing Cluster Policies in Seven European Regions', *European Policies Research Centre Regional and Industrial Policy Research Paper 42*, **2000**.
[20] See Dicken [2l] and Storper [22] for explanation of traded and untraded interdependencies.
[2l] P. Dicken, *Global Shift*, Paul Chapman Publishing, London, **1998**.
[22] M. Storper, 'The resurgence of Regional Economies, Ten Years Later: The Region as a Nexus of Untraded Interdependencies', European Union and Regional Studies **1995**, Vol. 2.
[23] See Raines [19].
[24] P. Raines, S. Taylor, 'Learning to Let Go: The Role of the Public Sector in Cluster Building in the Basque Country and Scotland', *European Policies Research Centre Regional and Industrial Policy Research Paper 48*, **2001**.
[25] J. Meyer-Stamer, 'Clustering and the Creation of an Innovation-Oriented Environment for Industrial Competitiveness: Beware of Overly Optimistic Expectations', Institute for Development and Peace, University of Duisburg, Germany, **2002**.
[26] Interestingly, the Danish Network programme succeeded in overcoming the resistance to cooperation embedded in the country's industrial culture (Humphrey and Schmitz [27]).
[27] Humphrey and Schmitz [39], for example, consider the replication of the Danish network programme elsewhere as evidence of

its success. Its scale, high uptake and surveyed firms' satisfaction support this conclusion.
[28] A. Saxenian, 'Regional Advantage: Culture and Competition in Silicon Valley and Route 128', Harvard University Press, Cambridge, Mass., **1994**.
[29] T. Kuran, 'The Tenacious Past: Theories of Personal and Collective Conservatism', *Journal of Economic Behaviour and Organization* **1988**, Vol. 10.
[30] P. Swann, M. Prevezer, D. Stout, 'The Dynamics of Industrial Clustering', Oxford University Press, Oxford, **1998**.
[31] P. Christensen, N. McIntyre, L. Pikholz, *Bridging Community and Economic Development*, Shorebank Enterprise Group, **2002**.
[32] R.D. Putnam, 'Making Democracy Work: Civic Traditions in Modern Italy', Princeton University Press, Chichester, **1993**.
[33] K. Nadvi, 'Facing the New Competition: Business Associations in Developing Country Industrial Clusters', *Institute of Development Studies Discussion Paper 103/1999*, **1999**.
[34] H. Schmitz, B. Musyck, 'Industrial Districts in Europe: Policy Lessons for Developing Countries?', *World Development* Vol. 22, **1994**.
[35] Moreover, Allansdottir *et al.* [36] suggest that the presence of intermediary institutions can in some cases increase the distance between university and industry (an important relationship particularly in science-based industries). These reduce the incentive for firms and academic institutions to develop the essential organisational and integrative capabilities that facilitate the rapid transfer of scientific research into industrial R&D, a prerequisite for creating a competitive biotechnology cluster, for example.
[36] A. Allansdottir, A. Bonaccorsi, A. Gambardella, M. Mariani, L. Orsenigo, F. Pammolli, M. Riccaboni, 'Innovation and competitiveness in European biotechnology', *Enterprise Directorate - General European Commission Enterprise Papers 7*, **2002**.
[37] A. Lagendijk, 'Good practices in SME cluster initiatives. Lessons from the 'Core' regions and beyond', Centre for Urban and Regional Development Studies, University of Newcastle-upon-Tyne, **1999**.
[38] J. Humphrey, H. Schmitz, 'Governance and Upgrading: Linking Industrial Cluster and Global Value Chain Research', *Institute for Development Studies Working Paper 120/2000*, **2000**.
[39] J. Humphrey, H. Schmitz, 'The Triple C Approach to Local Industrial Policy', *World Development*, Vol. 24, **1996**.
[40] See also Conicella [41] for discussion of the emergence of Biovalleys.
[41] P. Conicella, *Biosciences in Piemonte*, Bioindustrypark, **2003**.
[42] D. Audretsch, P. Stephan, 'Company-Scientist Locational Links: The Case of Biotechnology', *American Economic Review*, **1996**, Vol. 86:4.
[43] T. Quince, H. Whittaker, 'Close Encounters: Evidence of the Potential Benefits of Proximity to Local Industry Clusters', *Centre for Business Research Working Paper 235*, **2002**.
[44] P. Krugman, *Geography and Trade*, Leuven University Press, Leuven, **1991**.
[45] M. Enright, 'Regional Clusters and Firm Strategy', in 'The Dynamic Firm', Eds. A. Chandler, P. Hagström O. Sölvell, Oxford University Press, Oxford, **1998**.
[46] Department of Trade and Industry (DTI), *Biotechnology Clusters*, **1999**.
[47] Please contact the author for complete analysis within MBA thesis.
[48] A similar study by Quince and Whittaker [43] provided evidence that businesses located in a cluster were likely to have experienced higher levels of employment growth and turnover than those located outside.
[49] This is in contrast with Lagendijk's [37] case studies where improving labour skills had been an important result of the cluster initiatives.
[50] Interviewee comment.
[51] This stands in stark contrast to Lagendijk's [37] finding that access to funding was considered the most important reason for joining cluster associations.
[52] Both correlations are statistically significant (t-statistics: 2.9 and 2.4, respectively).
[53] In contrast, Enright [14] found that cluster associations had been unimportant in lobbying and other joint activities such as branding.
[54] As noted in Section 1.1.3 international linkages often pose a problem to local cluster initiatives.
[55] Koschatzky [56] found that for firms in Alsace and Baden linguistic barriers and differences in mentality and institutional difference tend to reduce the extent of cross-border cooperation both between firms and firms and institutions.
[56] K. Koschatzky, 'National Versus Regional Systems of Innovation – Crossborder Linkages and Learning Between Baden-Württemberg and Alsace', Paper presented at the NECSTS-99 Conference on 'Regional Innovation Systems in Europe', San Sebastian, Spain, 30 September – 2 October, **1999**.
[57] This study focuses on the firms' perspective and therefore the recommendations are set in this context although other cluster associations might have a broader remit to include regional economic development (raising firms' capabilities might contribute to regional development but this is not guaranteed).
[58] Provision of specialised information and services is often lacking and therefore justifies intervention by cluster associations in the early stages of a cluster's lifecycle.
[59] UNCTAD [60] suggests match-making in its 'linkage promotion' policy proposals. Additionally, a database of competencies can also be used as an external marketing tool.
[60] UNCTAD, *World Investment Report*, **2001**.