

# **The Role of Industry and Place in Clustering: An Australian Study**

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## **Abstract**

This paper is part of a broader study of clustering and regional development in Western Victoria, Australia. The research is concerned with the overlap of wine and tourism clusters, how they interact, and perform and the processes underpinning clustering. The paper builds on a qualitative analysis of the industry based clusters and applies a more quantitative approach to identify those factors which impact the performance of these clusters and whether it is industry or location or both that affect cluster strength and structure. The data demonstrates quite conclusively that industry influences clustering more than location. The results may be context specific but could be the basis of a number of important generalisations that underlie effective cluster development.

## **Introduction**

How much do the specific factors describing industry and place matter in the development and working of a cluster? A priori it might be expected that these factors are critical to clustering. Place, as defined by geographic boundaries partly determines the social structure of a cluster which according to Porter (1998) governs the interaction between cluster members. Industry as defined by common markets and processes will have a critical impact on a cluster in terms of the common knowledge frameworks that determine and facilitate alliances and technology transfer. Bringing these two factors together, this paper uses quantitative and qualitative data to examine the impact of industry and place in a study of the wine and tourism industries in Western Victoria, Australia.

## **Clustering in the Australian Wine and Tourism Industries**

The study, which is part of a PhD, is also part of a broader analysis of how overlaps of clusters impact their behaviour and performance and lead to the development of new and distinctive industries. The wine and tourism industries within Western Victoria share a number of common attributes such as geographic co-location and economic, social and natural resource assets. In some cases the industries compete for land, capital and skilled labour. However, they also have significant demand and supply side complementarities that create better conditions for the development and performance of both industries. This complementarity however, in terms of its nature and economic significance, varies considerably from one region to another.

The primary aim of the doctoral study was to develop a model of complementarity in regional wine and tourism clusters that describes how and to what extent cluster overlap influences inter and intra cluster strength and structure. During the course of this study some distinct differences between the wine and tourism industries and the way they cluster have emerged and this paper is based on our observations of this.

The study used the phenomenon of regional clusters based on industry sectors as the means to explore the complementarity in locally based wine and tourism sectors (Feser and Bergman 2000). Because our research applies cluster theory to small rural/regional industry groups, a non-traditional approach was used. This approach assumes the cluster exists at various levels of development and activity, and as such, focuses on the cluster process rather than the cluster definition (Rosenfeld 2001). In this context a cluster is ‘...simply used to represent concentrations of firms that are able to produce synergy because of their geographic proximity and interdependence, even though their scale of employment may not be pronounced or prominent’ (Rosenfeld 1997 p.4). In adopting this approach, clusters of activity that may not, in their own right, have the economic significance or industry focus to be captured in more standard cluster definitions, can be identified. This approach also recognises that a region may achieve specific economic advantages particularly through joint industry activity or cluster complementarity.

There are several factors that make cluster theory particularly relevant to understanding the relationship between the wine and tourism industries. The factors that have become important in understanding clusters in this study are that co-location can be as important as physical resources. Economic activity is often embedded in ongoing social relationships (Harrison 1992; Rosenfeld 1997; Porter 1998), and the intersection of clusters can be particularly vibrant (Porter 1998). These factors reflect the spatial, economic and perceptual complementarity between regional wine and tourism clusters.

As in other countries, the economic importance of both the wine and tourism industries in regional Australia varies from region to region and clustering may well be a contributing factor. There is a drive from both industries and governments to foster greater complementarity between the two industries by the promotion of a ‘wine tourism’ product (Dowling 1998; Sutton 1998; Cambourne and Macionis 2000; Macionis and Cambourne 2000; Hall, Sharples et al. 2000). By focusing on the wine and tourism industries, and regions where these industries are active in the context of

regional clusters, this study has provided an opportunity to gain an understanding of the synergies between the two industries and the importance of location on the processes of clustering.

The study develops a framework to capture the complexity associated with cluster research and views clusters as part of a complex system 'a system of interconnected firms and institutions whose value as a whole is greater than the sum of the part' (Porter 1998 p.231). To gain a better understanding of this complex system required the identification of key elements (Van Gigch 1974). By comparing the diversity of cluster definitions and approaches in the literature, three common elements emerged: geographic elements, economic elements, and social elements. These elements can be further divided into dimensions that identify those attributes that have been recognised as part of an active or dynamic cluster (Harrison 1991; Jacobs and De Man 1996; Rosenfeld 1997; Bryant and Wells 1998; Verbeek 1999; Enright 2000; Rosenfeld 2001).

The framework developed in this study describes wine and tourism clusters by determining the strength and structure of each of the elements and dimensions identified. The framework finally allows strategies to be developed that strengthen the identified complementarities. The study uses a case study methodology to identify if the strength and structure of the relationships developed in each wine and tourism cluster effected wine-tourism business development in each case study area.

The study proceeded initially in a quantitative way. In each region (or case) the qualitative evidence showed that each region or place displays subtly different characteristics that may explain the way their wine and tourism clusters have developed and the processes that are active within and between these clusters. The study showed that in all cases the tourism cluster showed passive interaction that is most tourism enterprises do not engage in joint activity or actively seek to grow their business through interaction with other related businesses within the cluster. On the other hand, in most cases the wine clusters demonstrated more active collaboration. In these clusters most wine enterprises actively engage in activities with other enterprises to grow their business.

In addition, when assessing the level of interaction or complementarity between the two co-located clusters it was evident that the wine clusters were more inclined to show active complementarity with the tourism cluster but the reverse was not the case. In one of the locations however their appeared a greater level of complementarity between the two clusters and this suggested that this location or place has attributes that lead to greater clustering activity within and between the different sectors. Hence, at the qualitative level three phenomena emerge.

- The wine industry operates more like a cluster than the tourism industry.
- Wine-tourism collaboration or development stems mainly from wine based enterprises.
- The impact of these effects is partly influenced by location.

This essentially qualitative analysis of the three locations and how the wine and tourism clusters function and interact, raises important questions about the role of industry and place on clustering activity. The remainder of this paper develops some

theoretical perspectives and uses some quantitative data to test the main proposition that industry type explains clustering better than place but that place can have a moderating effect.

### **Place, Industry and Clustering**

Clusters and clustering are according to Martin and Sunley (2002) a chaotic concept promoted by leading thinkers in the context of an emerging knowledge economy. In particular they ask; 'why has Porter's notion of clusters gate crashed economic policy when the work of economic geographers on spatial agglomeration of economic activity and the growing salience of the region in the global economy, is being largely ignored'? Others have concluded that there is great similarity between Porter's conceptualization of clusters and Marshall's description of 'industrial districts'. Whilst the debate continues, the resolution of these perspectives and Porter's contribution is that Porter brings together the factors that are industry specific as well as those that are location specific.

Porter (2003) asserts that the basis of enterprise competitiveness lies, on the one hand, with soundness of the political, legal and social context and the quality of the local business environment; and on the other, with the sophistication of firm strategy and operations. Critical to Porter's analysis of clusters are the dynamic effects created by interaction of industry and place, although he is also sometimes criticised for being too static in his analysis – that is he explains why an industry and geographic location is effective as a cluster without explaining how it got there. Whilst this is valid, the weakness is most likely attributable to the multidimensional processes and phenomena that lead to a successful cluster. Such processes sometimes result in successful but sometimes unsuccessful cluster development as the 'selection environment' culls those that either do not achieve critical mass or fail for any one of a number of macro, micro or social reasons.

As we outlined earlier, our study is based on the notion of 'clustering' rather than mature clusters and hence our questions are focused on the conditions that successfully drive clustering behaviour and processes, and how these are influenced by location and place. In Porter's model, location and place are potentially both important. The geographic agglomeration that defines the cluster, influences factor markets, infrastructure, local competition and is also a focus for consumer choice. However the industry type also influences these through the impact on intelligent capital, specialised labour, 'industry' knowledge and customised product (McKinsey and Co 2000). Whilst both industry and geography are necessary, neither is sufficient, however one factor might dominate or, each factor might operate effectively only in the presence of the other. Swann et al. (1998) propose a model of clustering based on the generation of dynamic capabilities that over time outweigh the static and natural resource advantage of a cluster industry. Critically they propose that because knowledge development and spill-overs are what creates dynamic capability, narrow clusters grow more quickly than broad clusters, but in the face of a changing selection environment, are more fragile, can become more congested, and decay at a faster rate.

Whilst Swann et al. (1998) identify knowledge creation, adoption and diffusion as a critical issue in cluster development; they fail to explain how it happens. In the knowledge management literature however, a number of studies have mapped out the knowledge creation process. In particular, Leonard-Barton (1996), in her work on the growth of steel mini-mills, identifies the need for an infrastructure of physical/technical systems, socio-organisational systems and core values and attitudes to be in place for knowledge creating activities to be productive. These factors provide a context of trust, goal congruence and effective processes that enable technical innovation to progress. Whilst this work was undertaken within an organisation, it is proposed that these factors will also drive knowledge development in a community or a cluster.

What are the implications for cluster development in different industries and different places? The main body of empirical data on clusters comes in two forms. First there is a preponderance of US data, much of it based on the work of the Cluster Mapping project conducted at the Harvard Business School (Institute for Strategy and Competitiveness 2004). This data suggests that there are dominant locations and that some industries, particularly science based industries are over-represented. Other data emanates from the classic industrial districts of Italy (Harrison 1991). Cluster development has been dominated by the specific history and culture of northern Italy and experience here may not be that transferable to the rest of the world. Here the evidence suggests a dominance of region rather than industry. Few studies have however tried to assess the relative impact of place over industry. This is of course a complex question since their relative effects may be difficult to disentangle.

This has certainly been the case in the industrial economics and strategy literature dealing with drivers of firm profitability. In this literature, the question asked is ‘does industry matter?’ After a great deal of empirical work, the answer seems to be summarised as follows – industry characteristics AND firm strategy both matter, but how much of firm performance is determined by industry depends on the decisions made by individual firms and varies from case to case, however industry probably contributes to 20% of variation in firm performance. Both matter and interaction is critical. In the field of clusters we might expect a similar pattern.

From the cluster studies identified above, we can define the main drivers of industry collaboration and adoption of competitive practice through benchmarking. We also identify the relative importance of industry or place in the creation and capture of these effects in that they create clustering behaviour and develop successful clusters. Table 1 provides our summary of these likely impacts.

**Table 1. Place v Industry and Impact of Cluster Drivers**

CLUSTER DRIVERS	IMPORTANCE OF CONTEXT		
	Place	Industry	Interaction, industry & place
Knowledge collaboration	*	***	**
Knowledge spill-over	**	*	***
Skilled Labour	**	*	***
Specialised capital	*	***	**
Supply of materials & components	**	*	***
Asset infrastructure	***	*	**
Social infrastructure	***	***	***
Co-specialised producers	*	**	***
Co-specialised consumers	**	**	***
Competition	*	***	*
Local resources	***	**	**
Chance events	**	**	*
Government support	***	*	***
* average importance ** important *** very important			

The research in this study is concerned with the wine and the tourism industries. These are two very different industries along a number of dimensions. Specifically the wine industry in Australia is technology based, collaborates widely and trades extensively in international markets (Anderson 2000). The tourism industry however in Australia is less well defined and involves a number of different industry sectors and maybe more reliant on small business starts that are unsupported by real competitive advantage in resources or strategic positions.

Hence the industries are different in a number of critical ways that affect the potential impact on them of clustering and will influence the scope of clustering in their development. The following distinctions may be appropriate in the Australian context:

**Tourism**

- Heterogeneous
- Many micro businesses
- Few barriers to entry
- Few barriers to exit
- Varied technical skills
- Needs co-location
- Rapid growth/slow change
- Limited scale economies
- Little consolidation
- Limited international competitiveness

**Wine**

- Homogeneous
- Few micro businesses
- Major barriers to entry
- Major barriers to exit
- High technical skills
- Can exist in isolation
- Rapid growth/rapid change
- Large scale economies
- Major consolidation
- Internationally competitive

The industries also have some similarities. They benefit from external economies, have a significant lifestyle segment, may be co-located, have seen major growth, are internationally traded, and have already provided classic examples of clustering. Whilst these two industries provide only a limited test of place v industry in clustering, they are also an interesting case because both have been a target for various initiatives designed to improve competitiveness and regional growth in many parts of Australia.

Our study is located in the wine growing and tourism regions of Western Victoria. There are international wine makers and tourism providers in each area. Recently the regions have seen significant and sustained economic growth and two industries have been a focus for a number of regional growth initiatives. As part of the research looking at the complementarities of the two industries we undertook a study of more than 185 enterprises to assess whether they collaborated in production, logistics, innovation or marketing, whether they were aware and responded to each other's competitive moves, or whether they benefited from being co-located with other enterprises.

The study was undertaken in three areas; Ballarat, Bendigo (two medium sized towns with a history of gold mining) and the Grampians – an area of outstanding natural beauty with a number of established and new tourism and wine enterprises. In addition to the case studies and qualitative interviews we also administered a survey questionnaire with a focus on clustering and cluster related behaviour. The key question we sought from this questionnaire was to identify the drivers and contingent factors that drove clustering behaviour.

## **Data and Analysis**

Taking the data from our survey we set out to specifically analyse whether the activities associated with the superior performance that is claimed for enterprises located within clusters are more associated with specific industries or specific places. It was not to investigate whether firms in clusters exhibited superior performance. In order to achieve this it was necessary to sample places in which more than one cluster existed, and that the industries that constituted those clusters existed across the sample of places. Clusters of tourism related enterprises and clusters of wine enterprises exist in the Ballarat, Bendigo and the Northern Grampians referred to above. There were thus six identifiable clusters, each of which existed in one of three locations and one of two industries. This not only allowed analysis of whether place or industry was more important, but whether there was an interaction between the two, and whether enterprises that were part of both clusters in any one place behaved differently.

Table 2 shows the number of firms that responded to the questionnaire disaggregated according to industry group. One group straddles both the tourism and wine industries. How distinct these groups are is a matter of judgement.

**Table 2. Number of questionnaire responses by industry and region**

Industry	Ballarat	Bendigo	Northern Grampians	Total
Wine	9	10	9	28
Tourism	19	20	20	59
Hospitality	14	36	16	66
Wine tourism	9	14	4	27
Other	3	3	-	6
Total	54	83	49	186

The questionnaires contained several questions asking the respondent to express an opinion of the degree of agreement with a set of statements, each measured on a five point likert scale. These related to the respondent's attitude to other similar business in the same region, relationships with the businesses and agencies, and sources of skill and knowledge transfer. Together these statements were designed to capture information of the respondent's attitudes and behaviour in collaboration and competition. Factor analysis of the responses to these questions could thus reveal underlying factors that would relate to concepts discussed earlier as to the determinants of clustering.

In total there were sixteen measures of clustering, competitive and collaborative behaviour and factor analysis revealed underlying factors which accounted for 30%, 14%, 9% and 7% respectively, of the total variation in the data. This reduction and consolidation of measures of cluster behaviour facilitate analysis of key explanatory factors and specifically place and industry.

The first factor related to the respondent's business working closely both with public sector agencies, various bodies, trade associations and individuals that were local, and with other businesses. The emphasis was on sources of skills, knowledge and information. This may be indicative of network activity. This factor was labelled NETWORK.

The second factor, related to awareness of what other similar firms were doing, setting higher standards than them, and working closely with local suppliers. This is rather like the sort of behaviour exhibited in copying and adoption of successful operation management practices (Porter 1998). This factor was labelled AWARCOMP as it indicated awareness of competition.

The third factor was related to co-operative interdependence between businesses in terms of working together, sources of skills and performance. This factor was labelled CO-OP.

The final factor was related to sources of skill and knowledge from businesses in the same industry both locally and from outside of the region, being influenced by what other businesses were doing and not seeing similar businesses as direct competitors, although not working with them. This factor was labelled MUTUAL

Whilst we associate both collaboration and competition as aspects of cluster behaviour, they did not come out of the analysis as completely distinct factors.

Statements relating to aspects of competition predominate in the AWARCOMP and, negatively, in the MUTUAL factors; and collaboration features very strongly in the CO-OP factor. However the four factors may be considered to capture the essence of cluster behaviour to a reasonable extent. They also recognise the sources of advantage as being both inter-business and extra-business, that is sources other than from business relationships; the NETWORK factor.

The four factor scores were derived for each respondent. These scores are orthogonal to each other which means that knowledge of respondents scores for one factor are no indication for their scores on any other factor.

Analysis of variance (ANOVA) was used to determine whether the mean values of the factor scores were different for each industry or each region or both. The results in Table 3 show the probability levels for differences between the different regions and the different industries. This indicates how significant the variants are. Hence a probability of  $< .05$  suggests only a 5% probability that the event could have occurred by chance, that is we can be 95% confident that the effect is caused by the variant identified.

**Table 3. Significance levels of F ratios in ANOVAs of the four factor scores**

Explanatory variable	Measure of cluster activity			
	NETWORK	AWARCOMP	CO-OP	MUTUAL
REGION	0.218	0.010	0.122	0.255
INDUSTRY	0.003	0.017	0.045	0.350
INTERACTION	0.673	0.018	0.306	0.020
EXPANDED VARIATION	0.025	0.000	0.057	0.032

Looking first at the NETWORK factor score there is very little evidence of differences between the three regions. We would only be able to conclude that they were different at the 21.8% level (0.218); the general rule of thumb is the 5% level. However, differences between the industries are significant at the 0.3% level; similarly, there is only evidence of an interaction between the region and the industry at the 67.3% level. We, thus conclude that there is a highly significant difference between the NETWORK factor scores for the different industries but not for the different regions. The same conclusion can be made for the CO-OP factor scores, although it is not quite so dramatic.

As regards the AWARCOMP factor score, both industry and region exhibit significant differences at the 1.7% and 1% levels, respectively. Further, there is evidence of an interaction at the 1.8% level. Thus we can conclude that both industry and place are important determinants of cluster behaviour. In addition, there is evidence that industry effects are different in different places.

The MUTUAL factor scores do not show consistent differences between industry and region, but there is some evidence that there are differences between industry scores on certain regions. However, little can be concluded from this.

Overall, these results would indicate that there are significant differences between industries in the scores for NETWORKS and AWARECOMP and CO-OP, but place only shows significant differences for AWARECOMP.

The results in Table 3 were derived using only the main four 'industry' groupings; the 'other' firms were excluded (see Table 2). Analyses which included the size of 'other' firms produced much the same results. The results were recalculated without allowing for any interaction terms. The conclusions were unchanged.

The next step was to include variables in the analysis that are likely to have an effect on the behaviour of individual members of a cluster. The relative size of the businesses (SIZE is measured in terms of business turnover), the number of years that the head of the business has been involved in the industry (YEARS), and the number of similar businesses in the region (FIRMS).

When added to the ANOVA models as covariates, SIZE had a significant negative effect on NETWORK (3.7% level) and CO-OP (8.5% level), both as expected. The number of similar businesses had a significant effect on NETWORK (2.6% level) which was positive as expected. The number of years in business had a very significant effect (0.1% level) on CO-OP which was positive and confirms our earlier proposition that trust and age of firms are linked. This result supports what would be expected: that co-operative behaviour takes time to develop.

The addition of the covariates did not affect the main conclusions relating to industry and region. The analysis of variance approach, whether with or without covariates is equivalent to ordinary least squares regression models using dummy variables however, all the categories of industry and region each have a dummy variable.

A different, but related approach was adopted in order to see whether membership of two clusters had any additional effect over membership of separate clusters. In the previous approach membership of 'wine and tourism' was treated as a separate industry. The regression approach could be used to analyse it directly as a subset of the wine industry. Alternatively it could have been regarded as a subset of the tourism industry; the statistical results would have been equivalent.

The regression model with NETWORK as the dependent variable confirmed the differences between industries but not between regions in the ANOVAs, and the significant effects of SIZE (negative) and FIRMS (positive). The combined effect of wine and tourism would only have been significant at the 17% level.

The regression model explaining AWARECOMP again confirmed the previous results, although FIRMS was not significant while SIZE was negatively significant. However, the combined wine and tourism effect producing a significantly lower score for AWARECOMP than membership of a single cluster. The regression results for CO-OP confirm industry differences but suggest rather more of an effect for region than the ANOVA results suggested. YEARS was again positive and strongly significant, while SIZE was not. The wine and tourism combination had no significant effect.

Finally, the MUTUAL regression model again has a very low explanatory power, again confirming the ANOVA results, with no variable being significant. The overall

conclusions relating to a business being a member of more than one cluster would seem to be that if either makes no difference, it reduces desirable cluster effects.

## **Conclusion**

Taken as a whole all of the analyses in this study indicate that cluster behaviour is affected more by the industry that a business is in than the place it is in. The industry in which a business is in has an influence on both NETWORK and CO-OP scores, while place does not. Both industry and place affect AWARCOMP – business's awareness of what other firms in both the industry and the supply chain are doing – that is awareness of potential and actual competitive pressures from various directions. We would expect that such pressures vary from place to place as well as industry to industry, and so the result is not surprising. Neither industry nor place has an impact on MUTUAL, the factor that captures the recognition of interdependence between businesses. This may be because such recognition is essentially firm-specific.

The effect of causal variables such as SIZE of business, years in the business and number of actual and potential competitors, were much as expected. The SIZE of the business had a negative effect on NETWORK and CO-OP, while the number of years in the business affected CO-OP. The number of similar businesses affected NETWORK. The addition of these extra causal variables did not affect the significance of the industry or place effects, thus it is reasonable to conclude that industry is a more important determinant of clusters behaviour and hence clustering than place

The results may be specific to the industries and locations studies. However we are not surprised by the data as we would expect, on the basis of the wine industry as determined by its knowledge base, scope and culture, for it to cluster more and with greater effect than tourism. There are many factors to consider including the history of the two industries and the impact of this on trust, social structures and conjectural variation.

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