Seeing the wood for the trees: clustering for competitiveness in the Welsh timber sector

David Pickernell, Welsh Enterprise Institute (WEI), Nick Clifton, Centre for Advanced Studies (CASS), Rhys David, Institute of Welsh Affairs (IWA), and Tim Palazon (WEI).

Introduction

Networking and clustering are potentially important in Wales, both in their own right and through enhancing competitiveness, which is increasingly significant in the context of globalisation and the emphasis on innovation and flexibility. UK Regional Development Agencies already place importance on cluster/sector promotion policies (see WERU, 2002). Such policy intervention is seen as necessary to ameliorate market failure in the transmission of

qualitative information required for network development and interaction. More information is needed, however, on core competencies, trade prospects and potential risks faced by existing businesses in Wales. The work described here builds on research by Roberts and Stimson (1998), WERU (2002) and DTI (2001), to create a more comprehensive evaluation framework using available statistical data on the economy as a whole, complemented by in-depth cluster-based analysis.

As a result of an exhaustive review of the literature (see also David *et al*, 2005) it has been possible to identify multiple elements to clusters and networks. Clusters show variations in their *structures* in terms of degrees of formality, their horizontal and vertical attributes and types and whether the benefits derived from clustering are transactional, relational or flow from agglomeration. Clusters also vary in terms of the *processes* which drive them. Six process elements complete

Table 1: Cluster Types, Structures and Processes

| | Cluster Type | | | | | | | |
	Industrial Complex	**Hub and**	**Italianate District Spoke**	**Marshallian District**	**Urban Hierarchy**	**Social Network**	**Virtual Organisation**	**Satellite Industrial Platform**
Structures								
1. Nature of network	Formal	Formal	Informal	Informal	Informal	Informal	Formal	Formal
2. Direction of linkages	Vertical	Vertical	Vertical	Vertical	Horizontal	Horizontal	Horizontal	Horizontal
3. Benefits of clustering	Transactional	Relational	Relational	Agglomerational	Agglomerational	Relational	Relational	Transactional
Processes								
4. Returns sought	Cost-based	Cost / Knowledge based	Cost / Knowledge based	Cost based	Cost based	Knowledge based	Knowledge based	Cost based
5. Participant goals	Individual Firm survival	Collective survival	Collective / wider economy survival	Individual / collective survival	Individual survival	Wider survival	Collective survival	Individual survival
6. Participant conduct	Control	Collective action	Collective action / co-operative learning	Control / co-operative learning	Control	co-operative learning	Collective action	Control
7. Network Type	Transactions-based	Trust based	Trust / Team based	Transactions / trust based	Trust based	Teamwork based	Trust based	Transactions based
8. Network System Management Focus	Start-creating the network	Survive - Connecting	Survive-Connecting the Network	Start - Creating / Sustain-developing the Network	Start - Creating the Network	Sustain-developing the Network	Survive-Connecting the Network	Start Creating the Network
9. Network Learning Focus	Doing things better	Doing things better / doing things differently	Doing things better / doing things differently	Doing things better	Doing things better	Doing things differently	Doing things better / doing things differently	Doing things better

the framework for analysis. These are the type of returns sought, participant goals, conduct, network types, network system management, and network learning. Table 1 shows how each of these structures and processes can be combined to create eight different types of cluster.

A timber-based cluster was chosen as a case study because it encompasses several distinct industries linked to each other through the use of the raw material, and is linked to other important sections of the economy. Upstream (forestry) timber activities are increasingly being integrated with the recreational/leisure and tourism industry (Forestry Commission Wales 2005). Downstream (processing) has been the focus of increased government attention in recent years, and is important because of issues of sustainability, support from the Welsh Assembly government for publishing, and increased competition and declining demand in printing. Additionally, many small firms within the timber sector are likely to require support to enable the investment in new skills and production technology needed to become more competitive in meeting local demand, counteracting global competition, and exploiting new markets (see Sommer *et al*, forthcoming).

Methodology

The information required to assess sector 'competence' was derived through a multi-stage analytical process. The first stage comprised a statistical audit to quantify employment, number of firms, size of firms, GVA, growth rates, location quotients (LQs)

(relative to the UK) from which a general, superficial timber-based cluster can be identified, as well as smaller sub-clusters and sectors in Wales. Data from input-output analysis was then used to identify linkages between sub-sectors, and their imports and exports. Finally, Multi Sector Qualitative Analysis (MSQA) was undertaken (see Roberts and Stimson 1998, WERU 2002, David *et al* 2005 for more details). Quantitative information on regional and sector core competencies; economic and industry risk, trade possibilities, and cluster structures and processes was generated from interviews of key experts on the cluster involved (from government, industry, and academia). The experts' answers for the nine elements contained in Table 1 were compared with the eight cluster types identified in the table to determine the cluster type of "best fit". These questions were asked under two scenarios, the "actual" cluster/networking arrangements in existence, and then the "ideal" types of arrangements that should exist if the cluster/network were operating for maximum benefit to the industry. The experts were also asked about the importance (on a scale of 1-5 with 1 as "irrelevant" and 5 as "very important") of each of these factors to the industry under the "actual" and "ideal" scenarios, to determine the value of these to the industry's operations. The specific clusters and sectors chosen for MSQA are outlined in Table 2.

Results

In 2002, the timber cluster in Wales employed around 30,000, with half in paper, print and publishing, and the rest in wood products and furniture. The

Welsh Timber LQ compared with Great Britain was 1.04, largely the result of the relatively high presence of wood products and furniture, rather than print and publishing, which is under-represented in Wales. Compensation of employees was higher than the All-Wales average and highest within Printing and Publishing, the other sub-sectors being much closer to the All-Wales average. The GVA per head in the Welsh cluster as a whole, and particularly for printing and publishing, was higher than the All Wales and All GB averages, but lower than for the GB timber industry as a whole (where only wood products show an above average result). Additionally, while the cluster's GVA showed a growth of 11.1% between 1996 and 2001, this was only around half that of the Welsh economy as a whole. The average unit size was approximately 20% higher than the Welsh economy as a whole, concentrated in furniture and printing, with a small firm concentration in wood products (see David *et al*, 2005 for details of statistical analysis).

Adding together the gross output of the five timber–related sectors (forestry, wood processing and products, printing and publishing, furniture), the Welsh Input-output table (WERU, 2004) gives an estimate of total cluster gross output of £2,441.4m. Total exports of £1,608.5m can be divided between £83.3m to Overseas and £1,525.2m to the rest of the UK. The cluster imports £415.4m from overseas and £534.2m from the rest of the UK (£949.6m in total), indicating a large trade surplus of £658.9m. Of total intermediate purchases of £1,448m, only £190.1m is within the cluster (13% of the total), compared to total imports of £949.6m. Overall, the input-output analysis suggests that Welsh timber seems to be more a loosely vertically arranged set of sectors in a supply chain, rather than an integrated cluster, with relatively small transactions between the sectors, and relatively large imports and exports at almost every stage (Welsh Timber Forum 2005). Printing and publishing appear to have only the most limited links with the upstream elements within the overall timber sector. Furniture manufacturing also seems likely to depend primarily on non-Welsh inputs.
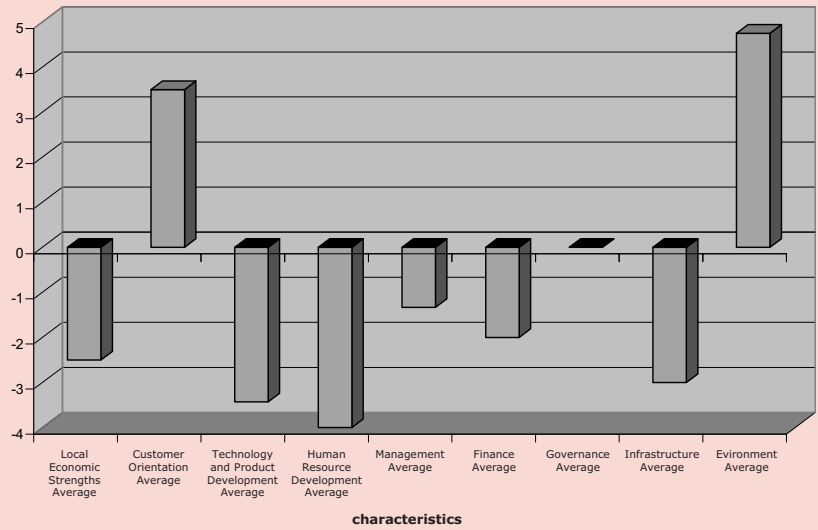
The MSQA method was then applied to determine the cluster characteristics, exposure to risk, and trade potential for timber and its sub-sectors. The results are outlined in the graphs, followed by a summary of the analysis undertaken for each of the sub-sectors.

Table 2 Cluster and Sub-clusters chosen for analysis

Name	Size
Timber	Large
Softwood Timber	Cross-sectoral
Hardwood Timber	Cross-sectoral
Publishing	Sectoral
Printing	Sectoral
Wood Products	Sectoral

Figure 1 examines the performance of the overall timber cluster in terms of nine core competencies, which are described across the x-axis. The sector is generally weak on this measure, only scoring positive results in terms of environment competence because timber is a renewable resource and activities are low pollution, and in terms of customer orientation because the sector is not unduly reliant on the Welsh market. A poor score in local economic strengths can be accounted for by low business start-ups, weak local supply chains, and an absence of high wages. Other weaknesses were found in the technology and product development category (low R&D spend and lack of collaboration between firms or with institutions), Human Resource Development (HRD) (poor training, recruitment, skills development and range of occupations), finance and infrastructure.
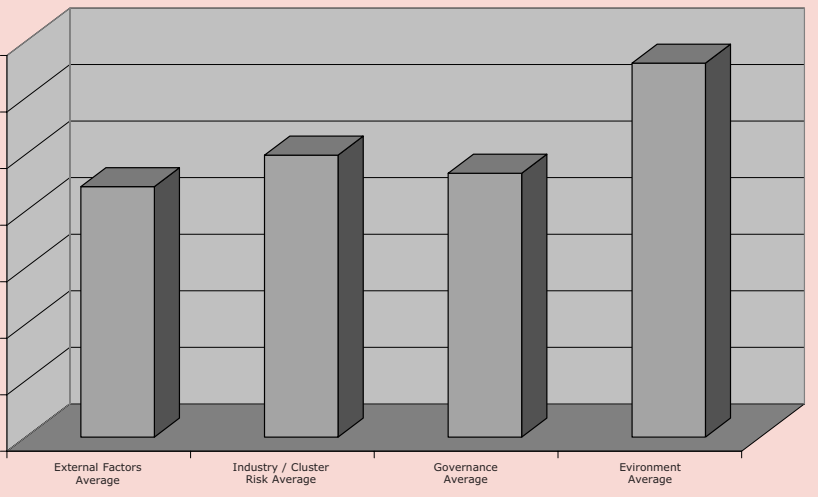
These weaknesses then transfer into perceived risks for the industry. Risks were perceived in all areas, particularly the environment (from natural resource depletion, regional pressure groups and environmental change). Industry-related risk was also perceived to be high (because of threats from skills shortages, managerial and technical shortages, and lack of financial capital), whilst Governance posed regulatory risks and the sector was vulnerable to risk factors outside Wales.

Figure 3 Current Trade and Future Potential

In terms of trade, the rest of the UK is seen as by far the most important external market, with the rest of (pre-expansion) EU, and possibly China as potential future markets, emphasising the import-substituting (at UK level) nature of much of the industry.

Of the 8 cluster types outlined in Table 1, timber industry experts identified the Italianate Type as being of the greatest potential benefit to the industry, (with 7 of the 9 characteristics identified under the "ideal" scenario fitting this cluster type). However, the existing "actual" timber cluster currently shares more of the characteristics of the horizontal social network type. In order to achieve the most advantageous characteristics as identified by the experts, the industry would then need to build vertical and relationship based structures, currently missing from the industry. Experts were also asked, however, about the relative importance to the industry of both actual structures and processes *and* the ideal. The importance placed on current

Figure 1 Timber Cluster Characteristics

Figure 2 Timber Industry Risks

and ideal structures and processes had very close correspondence. This suggests, therefore, that such changes would not generate major benefits to the industry as a whole, thus questioning whether cluster development policy should be focussed at the all-industry level.

The sub-sectoral analysis also supported the view that the "cluster" is currently several distinct industries very loosely linked to each other, but with some parts having greater potential for clustering and/or existing suitable structures and processes, while other parts lack this capacity. Different markets are served by the softwood and hardwood sectors, and the MSQA seems to support the view that potential

clustering benefits are greater in the hardwood production and consumption chain than in softwood, and that there are existing structures and processes that can be built upon in hardwood. In wood products, there also seemed to be a potential for the development of Italianate district type structures and processes to benefit the industry, but little in the way of existing architecture on which to build such a cluster. Conversely, the findings of the MSQA analysis calls into question the benefits of cluster-based policy approaches (as opposed to developments of individual beneficial processes) within printing and publishing. This suggests that differentiated policy approaches are required for specific sectors within the overall "cluster", either based on

Figure 3 Current Trade and Future Potential

individual processes and firms (or groups of firms) or building and strengthening coherent cluster structures and processes for sectors, through which knowledge and training, could be directed.

Conclusions

The desired cluster structure, where this is viable and desirable (in hardwood and wood products) is the Italianate district, characterised by small locally-based co-operating companies and enjoying strong government support. Where the potential building blocks for this structure are in place in relation to hardwood activities, or can be developed further (wood products) effort ought perhaps now be directed to improving their effectiveness, to help generate industry (or at least sector) wide solutions to these management, skills and R & D deficiencies. Where other structures are deemed more viable, for example with respect to

printing, other policies more focused on individual firms or small numbers of cooperating firms may be more viable.

References

David, R., Clifton, N., and Pickernell, D. (2005) Auditing Welsh Industry: A clusters based approach, Welsh Assembly Government Research Grant Pilot, Cardiff.

DTI (2001) Business Clusters in the UK : A First Assessment, DTI / Trends Research, London.

Forestry Commission Wales (2005) *Better Woodlands For A Better Wales.* Forestry Commission Wales. Aberystwyth

Roberts, B., and Stimson, R.J. (1998) Multi-sectoral qualitative analysis: a tool for assessing the competitiveness of regions and formulating strategies for economic development, *Annals of*

Regional Science, Vol 32, pp. 469-494.

Sommer, T. Palazon, T. & Thomas, B. (Forthcoming) Barriers to Business Support in the South East Wales Timber Industry. *Journal of the Institute of Wood Science*. IWSC. High Wycombe.

Welsh Economy Research Unit (2002) Welsh Growth Sector Analysis 2002, Welsh Economy Research Unit, Cardiff.

Welsh Economy Research Unit (2004) Welsh Input-Output Tables, Welsh Economy Research Unit, Cardiff.

Welsh Timber Forum (2005) Report Calls for Action by Welsh Forest Industry *Welsh Timber.* Welsh Timber Forum Brecon.