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Innovation In Wales: Assessing the Innovative Potential of Welsh Small and Medium Sized Manufacturers

Tim Edwards, Cardiff Business School

The attraction of manufacturing investment from overseas was the main focus of regional development policy in Wales for much of the 1970s and 1980s. Whilst Wales has been particularly successful in attracting foreign enterprise, the contribution of new investors to improving longer-term regional economic prospects has been questioned at several levels. With concern over inward investor stability, issues of commitment, and contribution to local value added, increasing weight has been given to the encouragement, and development of innovative indigenous and medium sized enterprises (SMEs) in the Welsh economy (see Munday, 2000).

General and sectorally targeted initiatives to encourage SME development and innovation in Wales have also taken place against a background of historically low levels of new firm formation in the region (Keable and Walker, 1995), together with the technological capacity of the region, its enterprise and SME growth including low levels of capital availability, high levels of external control, and a poorly diversified industry and occupational structure. A recent consultation document produced by the National Assembly for Wales noted that there are a comparatively low number of businesses per capita in Wales, and an over dependence on declining and low value adding industries (NEDS, 2001). Ultimately, it is hoped that a strongly performing indigenous controlled SME sector will go some way to improving regional growth prospects, and hence play a role in reducing the persistent GDP per capita gap between Wales and the UK.

During the 1990s a series of research and consultancy studies in Wales have been undertaken seeking to audit SME activities, define needs and identify market failures in provision of information and services (Brian and Jones, 2000). These have formed the basis of policy and planning of new resource directions emanating at the regional, local and community levels. A critical component of the new agenda for regional SMEs has been the attempts to improve their innovative capacity. In part this follows from the development of the Wales Regional Technology Plan (see Thomas, 1997), which designed a strategy to improve the innovative and knowledge-based capacity of firms and institutions. The Regional Technology Plan has served to inform other policy initiatives led by the Welsh Development Agency and its partners, and also informed Priorities within the European funding frameworks. For example, the Objective 2 Industrial South Wales programme Priority 2 Increasing Innovative Capacity for SMEs included measures to assist the transfer and utilisation of technology, and human resource development for innovation (see European Structural Fund Programme, 1996). Similarly, innovation is prioritised under the West Wales and the Valleys Objective 1 programme 2000-2006. Priority 2 Developing Innovation and the Knowledge Based Economy includes the following objectives:

- creating a culture of innovation,
- diversifying the economic base by growing more technology and knowledge driven firms, and increasing links to the knowledge base,
- increasing investment and R&D, and
- developing higher level skills to support innovation and R&D.

Underlying the encouragement of innovation within such programmes is the broader aim of improving the productivity and competitiveness of the Welsh economy. However, there is some danger that initiatives encouraging innovative activity in Welsh SMEs are being designed and executed without a clear appreciation of the nature of innovation, and more importantly how innovative activities link to innovative outputs and then feed through to improved business/regional performance. In part these problems are apparent in the monitoring indicators underlying priority measures. Often these are posited in terms of activity indicators such as firms assisted by measures, jobs created and safeguarded, and processes developed (see European Structural Fund Programme, 1996). The nature of these indicators makes it difficult to tie 'innovation activity' to improvements in regional competitiveness.

Improving our understanding of innovation demands that our definitions go beyond the notion that innovations only refer to new technology (e.g., computers or patents) and that their introduction is easy to achieve and will surely have positive implications for the firm. This is not to deny that technology or new products are unnecessary. Far from it; it has become conventional wisdom that a firm's competitive edge no longer rests solely with static price competition but rather is increasingly relies on a firm's ability to create knowledge a little faster than their competitors (Maskell and Malmberg, 1995). Yet, to make better policy and business decisions it is essential that policy makers and business people appreciate the nature of the innovation process and the implications this has for assessing the value and nature of organisational change. Understanding these connections and the linkages between different types of innovative input and outputs and business performance is an important component of policy design. If these linkages are poorly appreciated then scarce policy resources may be inappropriately targeted.

Arguably, if Welsh manufacturing and in particular SMEs are going to prosper or simply survive the recent slowdown in the UK and world economy, they will need to improve operational efficiencies and redouble their efforts to respond appropriately to the demand of a potentially shrinking and demanding customer base. In an attempt to provide better understanding of how far different innovative inputs and innovation outputs are linked to improved operational and business performance, researchers have begun assessing the innovative potential of a sample of manufacturing SMEs in Industrial South Wales. This work is significant in so far as it offers new insights into the Welsh economy and tests the notion that an innovative firm is one that identifies, interprets, and applies knowledge effectively and as appropriate throughout the organisation.

This article briefly outlines a working model of an "innovative firm" and specifies how it might be possible to make better sense of the link (if any) between innovation, and operational and business performance. This paper also contains some important comments about the preliminary findings of the study of SMEs in Industrial South Wales.

Innovation and the link with performance in SMEs

Innovation has meant different things to different individuals, although opinions are gradually conforming to the view that innovation involves "the development and implementation of new ideas by people whom over time engage in transactions with others within an institutional order" (Van de Ven et al, 1989:590). These ideas may relate to new products or manufacturing processes (technological) while they may also concern changes in management practices (social).

In the case of innovative SMEs, their behavioural traits have been readily identified. For example, Hill and Newby (2000) contend that innovative capacity
is related to the following factors:

- **Culture** or the extent to which the firm supports innovation,
- **Resources** including its financial, intellectual, human and physical capital,
- **Competence** meaning the range of capabilities within a firm that supports innovation, and finally
- **Networking** or the extent to which a firm makes use of network ties for innovation.

In the case of technological innovations, Rothwell (1989, 1991) provides a more detailed appraisal of the organisational factors shaping innovative SMEs:

- Suitably qualified In-house engineers and scientists (especially if the type of innovative activity is technically orientated),
- In-house and outside knowledge gathering to be complementary,
- An established technology strategy to organise the accumulation process.

Despite these useful insights, the majority of studies considering innovation in SMEs have not explored the link between practice and performance (e.g., output, exports, employment, market share etc) (Hoffman et al. 1989). Most commonly, sources like the Science Policy Research Unit innovation database confines innovation to involve the introduction of new products or processes (Pavitt et al. 1987; Tether et al. 1997). In terms of outputs, Smith et al (1993) define the performance of innovative small firms according to 'closure after innovation' (long-term survival), 'employment change' over time, 'total asset growth' where assets are taken to reflect not only investment but also the wealth of the firm, and 'return on total assets', the percentage of operating profit to total assets. Such definitions and measures although useful tend to ignore the softer innovative activities (managerial) while omitting to quantify the operational implications of, for example, continuous improvement.

Despite the lack of relevant research there are studies that offer insight into the likely relationship between innovation and firm performance. For example, Chaston and Mangles (1997) argue, in their study of core capabilities as predictors of growth potential in small manufacturers, that growth is linked to organisational capability (i.e., goal specification, positioning strategy, planning infrastructure, resource evaluation) and the revenue performance of the firm. It is assumed the key characteristics exhibited by growth firms [is] a reflection of the [organisational] internal capabilities’ (Chaston and Mangles, 1997:48). Hence, an analysis of current capabilities can be used to define specific activities for enhancing future performance. Chaston and Mangles (1997:49) suggest the most relevant operational management issues for growth include (i) effective new product management, (ii) an appropriate structure for motivating employees, providing job satisfaction and effective personal development, (iii) provision of satisfactory product/service quality, (iv) adequate employee productivity supported by investment in technology to aid continuous improvement, and (v) information flows to permit problem resolution and decision making. Considering organisational design and competence in terms of revenue performance provides a useful framework to measure the value-added of technological and managerial innovative activities.

**The Innovative SME: towards a model of innovative potential**

Innovation not only reflects the introduction of new products or manufacturing processes, it also represents the process through which ideas are translated into reality. Hence, an innovative firm is one that "identifies, interprets and applies knowledge effectively and as appropriate throughout the organisation". In other words, innovative potential refers to the skills, competencies and structures that enable "change" (Figure 1).

For the purpose of modelling a firm’s innovative potential (inputs) and performance (outputs) it is necessary to consider a broad range of activities including corporate strategy, new product development, shopfloor and human resource management, business information and communications, worker responsibility and organisation and supplier and customer relations. Considering business performance (e.g. profit) and performance at the level of operations (e.g. right-first-time) is equally important. Innovation not only involves new product development, it is also about continuously improving the organisational design so that the manufacture of new and existing products is achieved with increasing efficiency, and therefore improving margins. It is because innovation represents a process that the management of innovation (input) is as important to measure as the technological outcomes (see Figure 2):

The broken lines in Figure 2 allude to the possibility that innovative activities may only indirectly influence business performance (see Caggiano and Spinelli, 2000). Certainly, a firm can be highly innovative in terms of operational efficiencies, however unless the firm can sell its products, cost efficiencies will not ensure its survival. That said, the analytical links depicted in Figure 2 reflect commonly held assumptions that manufacturing practices, such as continuous improvement and problem solving, will be accompanied by improvements in manufacturing efficiency and quality. It remains to be seen what direct/indirect links exist between differing configurations of organisational design.

**Auditing Innovative Practices and SME Performance: the case of Industrial South Wales**

This section reports on the preliminary findings of research being conducted in Industrial South Wales, through a
project funded by the European Union (ERDF). The work to date has been limited to a profiling exercise, although over the autumn period of 2001 the research team will be conducting in-depth case study research with a number of the participating firms. Although the research is in progress it is possible to comment on the sample and the issues emanating from the fieldwork. To date, 79 small and medium sized manufacturers have been approached of which 26 have so far declined to participate with some 23 in negotiation and the remaining 30 agreeing to be involved (of which 26 have been surveyed). The aim is to include 50 or so firms by the Autumn of 2001. The firms that are involved represent independent and/or owned manufacturing SMEs (employing <250) in Industrial South Wales (Objective 2 area) (Table 1).

Observations emanating from the returns generated to date provide initial insights into manufacturing in Industrial South Wales. Perhaps the most significant finding is that 67 per cent of the respondents reported an increase in profit in the last three years, with 29 per cent showing an increase of over 50%. Only a small proportion showed a fall in profit (19 per cent) with the rest (14 per cent) showing no change. On first inspection this might be viewed as a positive indication about the state of manufacturing, reflecting the relatively buoyant economy of the past few years. However, it may also represent a bias in the sample with only relatively successful companies willing to be scrutinised in the assessment exercise. Here the innovative activities of two similar firms in the sample are considered, and it is suggested that this approach to innovation (not just new products) provides important insights on the nature of a "learning factory" (see Delbridge et al. 1998). Such insights demonstrate the various ways managers have experimented in making their firms innovation driven. The two firms under scrutiny are both high performing SMEs (over 50% increase in turnover over the past three years). What seemingly differentiates these firms is their respective orientation to new product development and the management of innovation, including worker organisation and supplier and customer relations (see Table 2).

For reasons of confidentiality the true names of the firms and their manufacturing activities cannot be identified. These two examples are referred to as Welsh Electric and Welsh Accessories. Welsh Electric's management attributed growth to new customers, increased sales to existing customers and new products. In the case of Welsh Accessories growth was linked to diversification into new low cost equipment markets and continued growth in existing markets. In this case,

### Table 1 - Sample of Manufacturers

<table>
<thead>
<tr>
<th>Standard Industrial Codes (SIC)</th>
<th>Refused</th>
<th>Negotiating</th>
<th>Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - Manufacture of Food Beverages &amp; Drinks</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17 - Manufacture of Textiles</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>18 - Manufacture of Clothing</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20 - Manufacture of Wood and Wood Products</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>21 - Manufacture of Pulp, Paper and Paper Products</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>22 - Publishing, Printing and Reproduction</td>
<td>2*</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>24 - Chemicals and Chemical Products</td>
<td>0*</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>25 - Rubber and Plastics Products</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>28 - Metal Products</td>
<td>3*</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>30 - Manufacture of Office Machinery and Computers</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>31 - Manufacture of Electrical Machinery and Apparatus</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>32 - Radio, Television and Communication Equipment and Apparatus</td>
<td>2*</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>33 - Instrument Engineering</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>36 - Furniture, including other manufacturing</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6*</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

*Includes firms gone into liquidation during survey

### Table 2 - Key factors differentiating Innovative Potential

<table>
<thead>
<tr>
<th>Welsh Electric</th>
<th>Welsh Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm Strategy</strong></td>
<td>&quot;Follower&quot;</td>
</tr>
<tr>
<td><strong>Management Of Innovation</strong></td>
<td>Mgt responsibility</td>
</tr>
<tr>
<td>New Product Development</td>
<td>Continuous Improvement</td>
</tr>
<tr>
<td><strong>Business Information, Communications, Marketing &amp; Accounting</strong></td>
<td>Networking</td>
</tr>
<tr>
<td>Limited to Professional Networks - some training</td>
<td>Limited to outside expert - New Product Development</td>
</tr>
<tr>
<td><strong>Human Resource Management</strong></td>
<td>Training</td>
</tr>
<tr>
<td>Marginal Activity</td>
<td>Moderate Activity</td>
</tr>
<tr>
<td><strong>Worker Responsibility &amp; Organisation</strong></td>
<td>Organisation</td>
</tr>
<tr>
<td>Team based - No problem solving</td>
<td>Team based - problem solving encouraged</td>
</tr>
<tr>
<td><strong>Supplier &amp; Customer Relations</strong></td>
<td>Development Activities</td>
</tr>
<tr>
<td>None</td>
<td>Regular</td>
</tr>
</tbody>
</table>

*Includes firms gone into liquidation during survey
Considering the management of innovation to include organisational design, further differences between the two types of firms can be identified. It is apparent Welsh Accessories is also geared towards continuous innovation in terms of operations. For instance, Welsh Accessories seems better positioned to drive organisational changes (if and when required) as it monitors and measures quality (its current defect rate is only 0.002 per cent). This is made possible because management has systematised the routines including continuous improvement and problem solving (required) as it monitors and measures quality. The illustrated cases show little evidence that the level of success was attributable to regional assistance or the development of skills within the firm. Rather, at least in the case of Welsh Accessories, much of the innovative advantage of the firm relied on existing suitably qualified in-house engineers and liaison with outside experts and a set of mechanisms to measure and maintain employee productivity and quality.

Perhaps where assistance is most needed is in helping managers understand the significance of measuring innovation (operational). Clearly, the results of the current project will be able to cast some light on the benefits (if any) of problem solving and continuous improvement. Yet, as demonstrated, if a high proportion of firms do not even measure quality, then a policy implication must be the need to address basic management and operational skills. In this respect, once the research has been conducted and the results analysed, the research team will be developing a self-use audit tool for managers to be able to assess their own competences and performance.

References


European Structural Fund Programme (1996), Single Programming Document Industrial South Wales Objective 2, WEPE, Cardiff.


