Inward Investment, Diffusion of Knowledge and New Working Practices

Recent experiences in the Welsh automotive components and electronics clusters

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■ ABSTRACT

This paper examines intra-firm labour market resource transfer within the South Wales automotive components and electronics manufacturing cluster. Most importantly it illustrates, via three case studies, the process of resource transfer of production and management skills from incoming multinationals to other firms in the region, through the recruitment of indigenous management employed in such multinationals by local firms. The consequences of transference of such knowledge on the firms involved are also discussed, as are limitations to beneficial transfer created by the structures of the firms and industries involved and the inherent weaknesses of the Welsh economy more generally.

■ INTRODUCTION

Promoting inward investment from multinational enterprises has been an important element of UK regional policy. Wales has been particularly successful in attracting such investment, particularly into automotive components and electronics. By 1994 around a quarter of employment in Welsh manufacturing was in these sectors (Moyes and Thomas, 1996), in which 36 per cent of employment in foreign-owned manufacturing was situated (Welsh Economic Trends, 1994). However, the whole strategy of attracting FDI into the UK, often using generous grants, has recently been questioned by those

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such as Pike (1993; 1996) and Lovering (1995) because of the deleterious effects that FDI can have on a host economy. Young et al (1988) found that FDI may have disguised weaknesses in the UK economy, delaying efforts to improve the competitiveness of indigenous companies, while Young et al (1994) argued that the strategy of attracting FDI needed to be more realistically assessed as to its contribution.

This study seeks to make such an assessment of the Welsh situation, in terms of the visible direct effects, and the indirect transfer of new working practices and management techniques from incoming multinationals to the wider local economy. In particular, it examines the potentially very important indirect benefits that can be derived from having industrial clusters (in this case in the automotive component and electronics industries) through which multinational firms can transfer resources and practices to other firms in the region. Specifically, the study utilises data from three case studies to illustrate the issues surrounding a form of resource transfer hitherto largely ignored in the literature, namely intra-firm transfer via the labour market, rather than the more widely researched inter-firm transfer via buyer-supplier relations in the supply chain.

This paper is therefore structured as follows. The next section examines the literature concerning the effects of FDI, both direct and indirect, on the Welsh economy. The literature rarely looks at the potential for resource transfer of management practices and working practices between companies via the labour mobility of managers from multinationals to other firms within the region. It also leaves open the issues surrounding such resource transfer for the firms and the consequences of such transfer for regional agencies such as the Welsh Development Agency (WDA). From this analysis of the literature research questions are formulated. The study then presents analysis of the three case-study firms chosen, illustrating different forms of the transfer process itself, and the benefits of and impediments to resource transfer that exist in the firms chosen. Conclusions are then drawn concerning these issues and how the structure of the firms and industries in particular and weaknesses in the Welsh economy in general could affect the maximisation of benefit from the transfer, as well as the consequences for regional policy in Wales.

■ FDI: DIRECT AND INDIRECT EFFECTS IN WALES

Dunning (1993), synthesising much of the work on the reasons for FDI, argued that a firm undertaking FDI must possess net ownership advantages (NOAs), linked to technology, organisation, management, finance or raw materials, sufficient to outweigh the costs of serving an unfamiliar market. Such a firm must then reject licensing and exporting in favour of FDI, because of transaction costs and the relative locational advantages of a foreign location respectively. Such FDI is targeted by the WDA because of the potential benefits, both direct and indirect, which these firms can bring to the economy via their NOAs. However, FDI can have negative as well as positive effects, depending on the strategy of the company undertaking the investment. Hood and Young (1984) summarised these potential effects under the headings of employment, competition, R&D dependence and truncation, trade, and resource transfer (which concerns the transfer of capital, technology, management and production techniques from incoming multinationals into the host economy).

The difficulty in accurately measuring the overall effects of FDI has, however, made attracting FDI a controversial strategy. A complete analysis of the overall effects would require the actual effects of the investments to be compared with what would have occurred in their absence, the counterfactual. Another problem is the dichotomy between the more easily measurable direct effects and the more intangible indirect effects. Young et al (1994) split the potential effects into the direct static effects of FDI through the abilities of the multinationals themselves, and the indirect dynamic effects on suppliers, customers and competitors which, while potentially also very important, are also the most difficult to measure.

FDI and its direct effects

In the case of Wales a confused picture is created by the analysis of the overt direct effects. In terms of employment quantity for example, Lovering (1995) acknowledged that foreign firms employed around 70,000 in manufacturing, about a third of the total manufacturing workforce. However, Lovering (1995) also pointed out that while between 1985 and 1994 the net increase in jobs in foreign firms was 22,000, 18,000 of these came from acquisitions of existing firms and thus the overall benefit from FDI in terms of employment was relatively small. Pike (1993; 1996) also argued that government-subsidised FDI will tend to displace local employment rather than add to it.

Additionally, Wales has increasingly fallen behind the UK in terms of male and female average weekly earnings, the 1996 figures being only 87 per cent of the UK figure (New Earnings Survey, 1996). Even in manufacturing, where the bulk of the FDI has been concentrated, average weekly earnings have fallen from 108.2 per cent of the UK average in 1983, to 99.4 per cent in 1990 (Hill and Roberts, 1993). Hill and Munday (1995) found that within manufacturing, foreign companies were paying wages 11 per cent higher than the average in Wales. However, while foreign firms may be pulling up pay in the sectors in which they located, some of the sectors involved, notably electronics and automotive components, are not relatively high-paying ones. In electronics, where females make up a large proportion of the workforce, pay is lower (£11,583 compared to average foreign wages of £15,374 – Hill and Munday, 1995).

Multinationals also have the ability to separate spatially assembly from other higher-level service functions in which higher wages are paid (Cantwell, 1989). This certainly appears to be the case for Wales, even relative to FDI in the UK as a whole. For example, Roberts (1996) found that almost 77 per cent of employees in foreign firms were classified as operatives or assembly workers. This compares to the UK FDI average where operatives account for only 60 per cent of employment (CSO, 1992). Given that 48 per cent of the Welsh work-force are in manual occupations (Regional Trends, 1996), it is clear that FDI in Wales is not relatively concentrated in higher-paid non-manual occupations.

A generally worrying picture is also presented regarding R&D. This may be linked to the lack of managerial level jobs in foreign firms, as suggested by Firn (1975). He argued that the shortage of such jobs would force potential employees to leave the region, reducing the pool of potential entrepreneurs and innovators. For the UK electronics industry as a whole, Morgan (1991) pointed out that the influx of foreign firms was in danger of truncating the UK's R&D base. The UK was being used as an R&D base for Europe by some US and Japanese firms but Morgan (1991) concluded that Wales in particular was afflicted by the "branch plant" economy model in electronics because of the lack of R&D carried out by inward investors in Wales. Roberts (1996) found over 60 per cent of respondents did not have any R&D functions at their Welsh facilities.

In terms of trade, Roberts (1996) and Phelps (1997) present pictures of high exports of finished goods and imports of raw materials. Phelps (1997) found that 55 per cent of US firms' and 41 per cent of Japanese firms' Welsh output was exported outside the UK. However, only 13 per cent of US firms' raw materials were obtained in Wales and the figure for Japanese firms was 18 per cent. These figures were similar to those obtained by Roberts (1996), whose figures indicate that FDI makes an overall positive contribution to a trade surplus for Welsh manufacturing (final exports minus imported materials and services) in 1994.

The intangible "learning effects" of FDI

The lack of local sourcing indicated by Roberts (1996) and Phelps (1997) may also be limiting the diffusion of management and production knowledge via buyer-supplier relations, the most obvious conduit for transfer identified in studies such as Pickernell (1997). Beneficial resource transfers can take the form of importation of capital and technology as well as the diffusion of skills and techniques. The latter (also known as indirect "learning effects") have often been touted as a major benefit of FDI. For example, in the UK automotive industry the establishment of the Japanese car transplants was seen as a major opportunity for the UK industry to improve techniques through such resource transfer (Jones, 1992).

Indeed, in terms of management and production practices, there is much evidence that foreign multinationals in general and Japanese multinationals in particular have brought their superior techniques with them to the UK (Evans, 1996; Morris et al, 1993). Evans (1996) concluded that Japanese electronics

Table 1. Japanese Style Production Methods: An Explanation of Terms

Term	*Explanation*
Cell system	Machines necessary for the production of a family of components grouped together to simplify production flows.
Just in Time (JIT)/ lean production	The system designed to make quality products in just the right quantities to meet current demand, by pulling materials through the production process only as they are actually required by that process.
Kaizen/continuous improvement	Philosophy of searching for continuous incremental improvements in the production process. This usually involves utilising operators in direct contact with the processes involved, as well as industrial engineers in meetings to discuss and implement improvements.
Kanban	Parts and components are stored in custom-built containers, each bearing a kanban ticket showing the part reference number and quantities the container holds. When the process begins to use the container's contents the kanban ticket is sent to the previous supplier who then produces components only to replace those being used.
Multiskilling	Flexibility of labour derived from workers, usually within the cell system, having the necessary skills to carry out multiple roles within the production processes contained within that cell.
Poke Yoke	Simple fail-safe systems designed to prevent defective parts continuing to the next production process.
Quality Circles	Collective suggestion process of small groups of operators who meet to improve quality and productivity in their own work areas.
Self Quality	Assembly-line inspection for defects as soon as they occur, the cause identified and the process rectified immediately.
Single Minute Exchange of Dies (SMED)	Reducing the changeover time for machinery from producing one product to another within a single minute.
Total Preventative Maintenance (TPM)/ Preventative maintenance	Routines of maintenance by workforce who use the machinery, designed to prevent machine breakdown. This also includes analysis of reasons for problems to allow designing out of problems in future.
Total Quality Control	Philosophy that quality control should be conducted as an integral part of management control, rather than in a separate quality control department.

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companies in Britain applied distinctive employment policies and production management systems and utilised innovative industrial relations approaches which were sources of competitive advantage. Morris et al (1993) found that in all of the Japanese companies in Wales that they visited the managers were familiar with Japanese production methods and had successfully introduced "Just in Time" and "Total Quality Control" philosophies to the Welsh plants. Table 1 outlines the most used techniques together with an explanation of the terms (which are used later in the analysis).

To maximise the benefits of resource transfer from FDI requires that improved management or production techniques be successfully dispersed through the wider economy. It is in this area, however, that accurate identification and measurement of the effects of FDI is most problematic. Evans (1996) argued that non-Japanese companies needed to use Japanese style practices if they were to succeed in an increasingly competitive market place. Oliver and Wilkinson (1992) noted movement towards utilisation of such practices in UK industry more generally, although this movement was not uniform and often faced obstacles created by the existing structures and management of many UK firms.

Authors such as Munday (1995) and Phelps (1996) have examined the Welsh situation and Pickernell (1997) examined resource transfer from Japanese car transplants to UK-based component suppliers. Pickernell (1997) found that beneficial resource transfer was taking place between the Japanese and their suppliers through learning effects which aided the introduction of practices and techniques associated with "Just in Time" production. Munday (1995) also saw some evidence of this in his examination of Japanese electronics companies located in South Wales. However, the skills of suppliers were unlikely to be developed, as Japanese companies lacked higher-level functions and hence the demand for higher level skills was restricted. Overall he detected a lack of resource transfer.

Such studies concentrate on the buyer-supplier linkages of Japanese firms as conduits of resource transfer. However, these may not be the only mechanism for resource transfer. Nor are Japanese firms the only source of learning. The main focus of this paper is, therefore, to examine the alternative forms of resource transfer and the issues surrounding them. Over the past 10 years there have been widespread moves towards adopting or adapting Japanese-style production methods in the automotive component and electronics industries. There is also evidence of non-Japanese companies bringing new working practices to the UK (Pickernell, 1996). Thus it would seem sensible to examine the alternative forms of resource transfer deriving from multinational firms generally. Such resource transfer could occur via the labour market, through employment of staff who previously worked in other, multinational companies in the region, as well as via physical proximity giving the opportunity for visits. Wales's concentration of FDI in the electronics and automotive sectors gives ample opportunity to utilise these mechanisms. Thus the first focus of the research is to examine alternative transfer mechanisms using three case studies.

These case studies are also used to examine the benefits from, and impediments to, such resource transfer, especially for brownfield sites (firms with long established plants and/or labour forces). For example, Pike (1993; 1996) argues that the indirect learning effects will be minimal or non-existent for important industries such as the car industry, because brownfield sites face problems not encountered by the new greenfield-sited (brand new plants with newly recruited workforces) multinational enterprises.

Finally, the paper addresses the implications of the low level of higher-level functions such as R&D in Wales (Gudgin, 1996) for resource transfer. Porter's (1990) work suggests that successful regions need innovative industries and firms which can sustain competitive advantage through R&D and training, rather than merely price. The contrast with the Swiss watchmaking industry built around Swatch is instructive (Taylor 1993). Swatch developed the high-level technical functions in Switzerland, which allowed the maximum benefit for the Swiss economy to be generated by that industry, especially in the marketing of the products as quality "Swiss made". In contrast, the higher-level functions of R&D, marketing etc are predominantly undertaken in places other than Wales, preventing the full utilisation of a geographically concentrated cluster to upgrade the regions' advantages. This in some way reiterates Firn's (1975) point concerning the outflow of high-quality labour which can follow truncation of R&D and its knock-on detrimental effects. The study thus also examines the type of resource transfer which occurs and how the structure of the firms and industries in particular and weaknesses in the Welsh economy in general could affect the maximisation of benefit from it.

■ THE PROCESSES, EFFECTS AND LIMITATIONS OF RESOURCE TRANSFER

A focused case-study approach was adopted. Three companies in the automotive component and electronics sectors were selected on the basis of having at least one member of staff recently recruited from a multinational in Wales. These companies were each considered successful in their own product(s) prior to the arrival of the manager concerned. One of these companies was a recent greenfield site development. The other case-study companies were long established brownfield-sited firms, both of which now had multinational parentage or input reducing immediate cash flow problems. The managers and companies were chosen for their different backgrounds, to illustrate the issues raised in the research.

In each case study the manager introduced practices which improved the competitiveness of the firms concerned. This was to varying degrees dependent on the company's culture, structure, workforce and management attitudes. The changes made took account of the managers' experience of what was possible within a UK and/or brownfield context, though in the case of the third case study it also illustrated problems that such status caused in introducing new methods. However, the evidence also suggested that Wales would have difficulty transforming resource transfer benefits for individual companies into more widespread benefits for the economy as a whole in terms of employment growth or non-cost-based competitive advantage. The reasons for this seemed to concern the nature of the (electronics and automotive component) industries in which Wales's cluster is concentrated and the more widespread weaknesses in higher-level functions such as R&D.

Case Study 1: greenfield site proactive manager in the electronics industry

Manager 1 was trained by the Japanese over several years in a greenfield site. He had gained experience at setting up new factories utilising Japanese-type production systems, and moved in 1992 to a UK-owned electronics company as an operations director. In 1994 he had been given the job of establishing a greenfield joint venture plant in Wales with a European electronics company. This firm gained 18 per cent of the UK market in their consumer electronics product within a year and in 1995 the European company took full control.

Manager 1, with the benefit of managing a completely new greenfield site operation, took a very proactive approach to transferring his knowledge of the Japanese system within the constraints of a European working culture. He recognised that the process of Japanisation of work methods got diluted over time in his original Japanese company, with the original recruits much more fiercely instilled with the Japanese work system than those taken on five years later. As this had caused problems, he actively sought to maintain the Japanese industrial culture, melded with the European ethos, through his recruitment and induction for the present company. The selection process therefore sought self-starters able to cope with the severe discipline of the team ethic and peer pressure to meet targets. They were to have good attendance records and to show great attention to detail.

The manager was also greatly involved in process design. The process drew on his experience that pure "lean" or JIT production does not work in a UK environment because stock tends to be pushed down to the weakest link in the chain, which is an unsustainable long-term strategy. Recognising that operators do not work at constant pace he recommended a free-flow conveyor which operators control. Line speed is able to operate 20 per cent faster than the average line speed. Half a day's stock is held between the links in the production process and the stock areas have a total capacity of one day's stock only, smoothing production flows. Problems on the line have to be rectified within the four-hour limit created by the stock position, though expertise can be pulled in to sort out the problem within that time limit.

The production processes are designed to achieve maximum manufacturing flexibility, given that the factory produces for several customers and cannot dedicate lines to single customers. The factory is divided into three main areas: automated circuit board inputs; labour circuit board inputs; and testing, final assembly and packing. The system is built around designing for process, focused product lines, designing test procedures within the overall design by controlling product design as much as possible, self-diagnostics, feedback loops, SMED (Single Minute Exchange of Dies) to move from one product to another and team responsibility for errors. Manager 1 had thus taken a very active role in transferring his knowledge into the operation to create a production system and culture.

Of the three case studies, the benefits of resource transfer were also most clearly seen from manager 1, whose direct application of knowledge allowed the company to compete successfully with low-wage competitors in South East Asia via intelligent production line design. This allowed greater utilisation of machinery and increased volume without increased labour cost. Manager 1 was in a sector of the electronics industry facing annual 22 per cent price reductions for a product with a high proportion of value in materials. The intelligent design he instigated created an automated circuit boards section which runs 24 hours a day, has SMED and preventative maintenance and is consequently in use 78 per cent of the time available, compared with 63 per cent in Japanese competitors. This is one way in which the UK's problem, of low volume, multiple customers, can be successfully overcome.

In year one of production, output was 200,000 units, in year two it was 300,000, in year three it was 400,000 and this year it is planned to reach 500,000. The company has been able to take second place in the UK market and third place in Germany, while facing competitors in China, Korea and Eastern Europe which have wage levels 10 per cent of those of the UK. The company is able to compete because volume is increasing while labour levels remain constant. Additionally, the mechanical design and process engineering is done on site, leading to a 60-day gap between a decision to produce a product and that product hitting the market.

However, in many senses, this case study also illustrates the limitations of the beneficial resource transfer which is possible. Manager 1's expertise has created a company which encapsulates the paradox of a Welsh manufacturing sector that is efficient and competitive but offers only relatively low-paid employment. The pay rate for operatives is £4.10 for the mainly female operatives. While average in electronics, this is low compared with UK employment overall. The production system established by the manager, based on his experiences with the Japanese, has allowed a Welsh manufacturing base to deliver products able to compete with lower labour cost competitors and to deliver high levels of growth. However, because of the very nature of the industry, employment will not be expanding as production does and nor are wage levels likely to do so.

In addition, the company does not undertake pure design work, instead contracting it out to design companies in England. This outsourcing of key R&D outside Wales limits the employment opportunities for higher-paid employment in high-level functions. Perhaps even more typically, the parent company taking advantage of this productive success story is not Welsh, or UK in nationality, but European.

Case Study 2: brownfield site facilitatory manager in the automotive components industry supported by lower management

Manager 2 joined his present company in 1995 as manufacturing director with responsibility for purchasing and manufacturing, having previously been a manufacturing director for a foreign-owned multinational with interests in electronics/automotive components and aerospace. The company recruiting him had over a century's experience in the automotive component industry, was part of a UK multinational and had a Japanese components' firm as a minority shareholder. Although it had a fifth of the European market in its product the company felt the need for improvement, with manager 2 perceiving support from board and management level in this challenge.

Manager 2, in contrast to manager 1, took more of a facilitatory approach to resource transfer, utilising his knowledge to remove obstacles to change and encourage movements towards more efficient practices. Essentially manager 2's aim was to generate a process of cultural change with an existing workforce, while manager 1 sought to establish and maintain new cultural practices in a greenfield site, attempting to ensure that dilution of these practices did not occur as the greenfield site became embedded.

Manager 1's approach is, of course, much easier in a new greenfield operation than in the long-established operation facing manager 2, who preferred to facilitate change in various ways. The factory was refurbished and office space made open plan to encourage communication. Responsibility for improvement was delegated to selected personnel down the chain, with manager 2 clearing obstacles to that change. Employees from a number of disciplines were drawn together in a number of workshops, with manager 2's encouragement, to improve quality and productivity on several of the company's lines, the results of which are discussed in the next section. Manager 2 did not become actively involved in these workshops, preferring to encourage the workshop teams to take "ownership" of the change and only directly intervening where the cost implications of change were large. The four workshops undertaken since the arrival of the manager used the skills of existing staff, some of whom had also gained some knowledge of Japanese practices through contacts with other firms in the industry or previous working experience. This illustrates a different type of resource transfer which may be more useful in brownfield sites, releasing the abilities of the existing workforce to carry out change. It also provides an example to the rest of the workforce in what is possible with existing facilities and personnel, which may be important in generating acceptance of change.

The benefits of resource transfer generated by manager 2 are also more difficult to quantify than for manager 1 (highlighting one of the problems with learning effects) because of the facilitatory nature of his influence on the brownfield-site firm. However, the freeing of employees to undertake workshops to improve production processes does illustrate the potential improvements which can be made if the manager has the knowledge and ability to create the necessary conditions and the workforce have the ability to utilise those conditions. Additionally, as previously stated, several of the workforce members could also be said to have transferred knowledge of Japanese-style practices to the company through their previous working experience and proximity to other firms in the industry. The results were impressive. Even within the constraints of a UK brownfield environment, the four workshops, each one building upon the last, were able to produce dividends in productive efficiency, quality, labour and space utilisation.

The first workshop was initiated because increased customer demand on one product-line necessitated excessive overtime to meet the schedules within the existing system. The problem-solving team utilised three production operators with most familiarity of the operating process. The system's deficiencies (large inventories and defect levels, wasted movement, inefficient production) were identified by the team as being caused by an unbalanced cycle of operations. Some workstations caused bottlenecks which held up production and prevented the requisite production being completable within a normal working week. The team therefore reorganised the process flow and work content within each workstation to balance operational times at each station. This also caused the lines to be reorganised so that similar tasks were

Table 2. Gains from Workshop 1

Factor	*Before*	*After*	*% improvement*
Productivity (parts/worker/shift)	1,600	2,594	62
Surface area	266	225	15
Operational time (seconds)	18	11.1	37
Ecology (machines used)	14	12	14.3
Operators (number)	15	13	13

Table 3. Gains from Workshop 2

Factors	*Before*	*After*	*% improvement*
Productivity (parts per week)	6,229	8,293	25
Operational time (seconds)	21.96	14.02	36
Operators	11	7	36
Inventory	£8,000	£3,800	52
Internal PPM	728	295	59

adjacent to each other, eliminating waste and unnecessary movement. The gains were impressive, shown in Table 2.

The second workshop aimed to reduce the waste in manpower and inventory on another product line. It also sought to deal with problems identified from the first workshop, such as insufficient rest allowances and time for tool change-overs within the manufacturing process. Additionally, there was found to be excessive inventory between stations and quality problems requiring rework in the first workshop. The second workshop, in addition to line balancing, therefore, gave a 15 per cent allowance for operator rest allowance and changeovers, developed a kanban system to improve material flow, introduced poke yoke and self-quality systems with operators given responsibility for quality and analysis of defects at the end of the week. Again the gains were impressive, shown in Table 3.

The second workshop also identified that a 5–10 minute buffer stock between stations prevented defects being passed down the line. Although not truly lean production, this proved the most efficient workable system within the brownfield environment. The third workshop also aimed to improve quality and productivity on an existing line. In addition, however, the problem identified in workshop two of machine/workstation downtime, caused a need for maintenance. In addition to line re-balancing and reorganising material flow between workstations to minimise stock buffers between stations, a total preventative maintenance programme was also introduced as a pilot for the whole factory. Operators were trained in daily and weekly maintenance tasks and responsibility given to the operators, with downtime data sheets compiled to monitor breakdowns and support engineering out problems in the future. Once again the improvements were impressive (see Table 4).

Table 4. Gains from Workshop 3

Factors	*Before*	*After*	*% improvement*
Quality (PPM)	850	320	62
Productivity (parts/shift)	1,920	3,388	76
Labour (no)	16 (on 2 shifts)	15 (13 days, 2 on shifts)	6.3
Operational time (seconds)	15	8.5	43.3

The fourth workshop was established to create the extra capacity required to accommodate new business without creating an unjustified dedicated facility. Additionally, the workshop examined the problem identified in workshop 3, of time lost searching for tooling. The solution adopted was to split a current line which serviced two customers, A and B, into two lines, one for customer A and one for customers B and C (C being the new business), without increasing labour input. The products produced for A, B and C were similar in design and the original line required improvement anyway to reduce labour input and improve quality.

The two lines were, therefore, staffed by the same amount of labour as the previous single line. The original line was re-balanced and the new line was balanced, incorporating principles highlighted in previous workshops. Operators were trained in kanban, poke yoke and TPM. A training programme in multi-skilling was also introduced, as were tool boards (with shapes of tools painted on) to eliminate time wasted looking for tools. Overall, a 29 per cent increase in output was achieved across the two lines, with no additional labour input. The improvements helped the company create a line which was cheaper to set up and operate than an equivalent in the Japanese shareholder's Japanese plant.

These results, while impressive, cannot be wholly attributed to the effects of resource transfer. Manager 2 also acknowledges the need for further improvements in aspects of the company's culture and attitude via training and a shift in culture which he intended to instigate. Nevertheless, the improvements which had taken place had occurred within an existing brownfield site, with an aging workforce and low-volume customers. Additionally, the changes had introduced Japanese-style working practices into a brownfield site (albeit with modifications) with encouraging results.

It must be remembered, however, that such changes are easier within the context of growing company turnover, and the increased productivity has not led to increased employment, though it may have improved the security of the existing employment. This case is also interesting in that the manager essentially cleared obstacles to change, rather than initiating every change himself, allowing the workshops to develop naturally. This is slower than for a greenfield site, which may indicate a limitation of the resource transfer in terms of speed at least. However, this may be the most efficient way to change within a brownfield environment, indicating ways in which clustering in Wales can work to the advantage of existing companies, in productivity and efficiency terms at least.

Case Study 3: brownfield site manager in the automotive components industry unsupported by higher management

Manager 3 had previously been employed as supply quality manager by a

European first-tier automotive component supplier, the role involving contact with customers and suppliers. His present company initially employed him to establish BS5750 standards and his official role concerned quality. The company itself is a second-tier supplier (previously first-tier). UK family-owned, it had been sold to a US multinational in 1994. The company was on a brownfield site but moved to a new factory in 1993, next to the original one.

Manager 3, while having a more direct role in changing the practices of the company than manager 2, felt that his experience was not effectively used, possibly because of his lower status in the management hierarchy. Manager 3's influence was limited before 1994 because the previous managing director had been resistant to change. When he retired a new management team (including several existing employees) came in which was more committed to change, allowing manager 3 to introduce techniques acquired in his previous employment such as taking shop floor workers to meet customers and suppliers. The new managing director encouraged this, as well as visits to multinational automotive component firms in the area (in other sectors of the industry). Indeed, this latter occurrence also indicates another benefit of clustering. The manager had also instigated removal of goods-in inspection with responsibility for quality devolved to suppliers. There was also much less in-process inspection. Instead the quality department takes samples for analysis each day.

Efforts had been made by the management generally to introduce limited kaizen, improve quality standards, removal of the production/administration divide and moves towards quality circles. Manager 3 was trying to push the firm towards the logical conclusion of the introduction of such measures, namely a cell system (which had existed in his previous company), which would require more multi-skilling, teams and more widespread kaizen.

For manager 3, however, the benefits of resource transfer had been limited because of resistance from the workforce and higher levels of management to the possible employment and remuneration consequences of manager 3's ideas. As stated earlier, manager 3 was pushing to introduce a cell system, which would require more multi-skilling, teams and more widespread kaizen. However, the workforce were resistant, and worried about losing employment. The fact that the workforce has an average age in the 40s with people at the firm for an average of 14–20 years also created a resistance to change, as did rivalry with one of the European sister plants in the grouping which caused copying of techniques which were more akin to mass than lean production. Another impediment to multi-skilling came from senior managers. They were worried about the consequent need to upgrade workers' remuneration in line with increased skill.

Overall, although improvements had been made to the company, the impediments to change were slowing the process, possibly also demonstrating differences in the speed of resource transfer possible caused by the status of the incoming manager. Additionally, even if the changes were successful, again there would not be additional employment. The economic climate was such that more needed to be done with the existing workforce because improvements and cost-cutting were required year-on-year.

■ CONCLUSIONS

The case studies illustrate that managers can transfer knowledge acquired in a multinational firm to another firm located in the region and thereby improve productive efficiency within an industrial cluster such as electronics and automotive components. However, neither the processes nor the benefits are uniform, depending on the manager's background and status in the company as well as the nature, history and structure of the company itself. Manager 1 clearly had the most ability to transfer knowledge, given his controlling role and the greenfield nature of his firm. For Managers 2 and 3 however, there were salutory differences. Manager 2 clearly had support both from higher and lower tiers of management in generating and facilitating change. Manager 3, in contrast, faced resistance both from higher and lower tiers of management in the firm, limiting the amount of change that was possible.

Given that each company was successful within its sector, the case studies also demonstrate the scope for improvement that may exist within the two sectors as a whole. Within this, the type of resource transfer illustrated could play an important part. The managers' previous experience enabled them to judge what change is possible/desirable and how to undertake that change. In the case of manager 1, the greenfield status of the plant and his experience allowed him to set up what in some ways is a model factory, while manager 2 facilitated a situation where improvements are being generated by a section of the existing workforce which also serves as an example of what is possible to the rest of the firm. These case studies thus indicate that given the right conditions and the right manager, resource transfer via the labour market can significantly improve a company's competitiveness. This is obviously an advantage of clustering of sectors within a region.

However, for reasons connected to the industry sectors themselves and the weaknesses in the Welsh economy more generally, the role of resource transfer in the cases outlined is limited to that of allowing the companies to survive with their workforces intact, rather than allowing growth of employment and wages. In none of the case-study companies, even with successful resource transfer, were there plans to increase employment. At best they aimed to utilise their existing workforce to deal with increased output.

Electronics and automotive components are highly competitive sectors and cost pressures and competition from low-cost foreign sources are ever-present threats to these important sectors of the Welsh economy, leading to constant downward pressure on cost and hence labour and wages. The resource transfer identified was limited to improving production processes specifically to reduce cost and improve quality. This implies that the clustering in Wales of these industries, while important for employment reasons, may be limited in its ability to improve living standards, especially given Wales's poor record in undertaking higher-level, higher-paid functions such as R&D. Indeed, the recent switch of emphasis by the WDA to the valleys may re-emphasise Wales's problems, with evidence provided by Brooksbank et al (1997) that UK firms were being encouraged to re-locate on the basis of grant aid and labour costs which were lower than their previous UK location.

Hudson (1997) concluded that for peripheral regions such as Wales the best that could be hoped for was more embedded branch plant investment, some small endogenous firm growth and some investment in service sectors such as tourism, with continuing high relative unemployment and limited job creation. Morgan (1997), however, believes that safeguarding existing jobs, embedding foreign plants and promoting linkages between these plants and indigenous plants and disseminating best-practice more widely through the regional economy justifies the strategy. The resource transfer via management movement and close proximity illustrated here can be seen as helping create the social links crucial to Morgan's idea of the learning region. Additionally, the WDA's increased emphasis on developing supplier links, improving skills and developing a service sector to serve the multinationals are all badly required. However, Wales also needs to target those areas in which it has the capability of developing indigenous industries in which sustainable advantage is possible, if the Welsh economy is to have any hope of improving the economic well-being of its population in the twenty-first century.

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