

**Supplier-Investor Linkages  
and the Internationalisation of  
the Electronics and Oil-Gas Sectors  
in Scotland**

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## Abstract

The following paper is based on research conducted as part of a project awarded by the Economic and Social Research Council ('Growing Global: Foreign Investment and the Internationalisation of Local Businesses in Scotland'). The project aimed to compare the role of multinational investors in influencing the internationalisation activities of local Scottish suppliers in both industries. The two main sections of the paper consist of the sector reports arising from the research.

The move towards global patterns of sourcing creates opportunities as well as threats for local (Scottish and UK-owned) suppliers. However, overall internationalisation among Scotland's supply base appears to be quite limited. Local electronics suppliers appear to fall into one of three broad categories according to their objectives and strategies for internationalisation: *limited exporters*, *piggy-backers* and *global suppliers*. Of these, piggy-backing, whereby investors provide opportunities for Scottish suppliers to enter new foreign markets, appears to be the most common form of internationalisation in the electronics industry. OEMs in Scotland do not give suppliers much in the way of direct assistance when attempting to internationalise. OEMs may instigate personal introductions to procurement managers abroad, but no guarantees regarding future business levels are given. Owing to the need for spatial proximity between subcontractors and OEMs, direct foreign investment and joint ventures appear to be the most common methods through which local suppliers internationalise. In order to effectively internationalise, a quantum leap is frequently required in terms of a supplier's ambition, scale of operation, resource requirements and managerial capacity. The lack of procurement and product-related mandates within most OEMs prevents close collaborative investor-supplier linkages (e.g. new product develop with suppliers etc.) in Scotland which may hinder internationalisation. With respect to support for internationalisation, there is some albeit limited evidence that the electronics sector operates as a 'cluster', though it remains one vulnerable to short-term shifts in location advantages.

Similarly, globalisation is also creating both opportunities and threats to Scottish suppliers in the oil-gas sector. In reducing the risks inherent in internationalisation, suppliers have been greatly facilitated through linkages with foreign investors in the Scottish economy. As with electronics, this has taken place principally through 'piggy-backing', by which investors provide opportunities for Scottish suppliers to enter new foreign markets. However, to a greater extent than electronics, internationalisation of Scottish oil-gas suppliers has been encouraged by the nature of the sector's markets. The global nature of the industry has ensured that there have always been potential opportunities for Scottish suppliers, as the same major oil-gas production and oil-related companies can be found in all the key international markets for the industry. Internationalisation is also closely linked with the level and value of Scottish supplier links with investors. Multinationals' procurement strategies in Scotland have supported internationalisation. Local sourcing is high as procurement tends to be subsidiary-based, in large part because of the high levels of customisation required of oil-gas products and services. Finally, with respect to support for internationalisation, there is some evidence than the oil-gas sector operates as a 'cluster', though it remains one vulnerable to long-term shifts in location advantages.

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# FOREIGN INVESTMENT AND INTERNATIONALISATION OF THE SCOTTISH ELECTRONICS SECTOR

## Introduction

Scotland's electronics industry is currently experiencing severe turbulence. Against a backdrop of rationalisation, plant closures and continuing turbulence in various sub-sectors, particularly semiconductors, pressures have increased on Scottish suppliers in the electronics sector to reduce costs and seek out new international markets. These developments have undoubtedly heightened the role of the Scottish Enterprise in both providing support to suppliers in their internationalisation efforts and facilitating wider sectoral activities in adapting to the new global conditions. At the same time, the Scottish Enterprise Network Strategy has recognised the challenge to the whole Scottish economy in adjusting to an increasingly globally-competitive environment. The strategy also acknowledges the continuing impact of foreign investment in catalysing the development of the Scottish economy, not just in terms of creating jobs and generating local income but also acting as sources of product, service, production, managerial and skills innovation. Indeed, the two issues are explicitly linked: the strategy review consultation document notes "that our international activities will be enhanced through an approach that links inward investment, export and overseas business development" (Scottish Enterprise, 1998a, p.11).

It is these links between supplier internationalisation and foreign investment which formed the basis for an ESRC-funded project carried out by our research team. Following this work, the current research note is intended to contribute to the policy-making debate within Scotland on how best to adapt to the new global environment. The study was based on an in-depth, case-study analysis of two highly-internationalised sectors within the Scottish economy: electronics and oil and gas. With respect to the electronics sector, the research involved face-to-face interviews with a panel of 25 firms – 8 foreign-owned oil operators and 17 Scottish suppliers.

Using the preliminary research findings of the study, the current note is divided into several main sections following this introduction:

- an overview of the electronics sector;
- an overview of internationalisation in the electronics sector;
- an analysis of the impact of foreign investors on supplier internationalisation; and
- a discussion of the impact of industrial clusters on supplier internationalisation.

## Overview of the Electronics Sector

Electronics and related industries is one of the most dynamic parts of Scotland's manufacturing sector [1]. Between 1992 and 1996, output in Scotland's electronics industry grew by an average of over 20 percent each year. It is worth highlighting that the strong growth in electronics manufacturing has concealed an overall decline in other forms of manufacturing in Scotland however. Between, 1992 and 1996, output in non-electronics manufacturing fell by an average of 0.8 percent each year (see Table 1). The electronics industry is also very diverse, comprising computers and other office machinery, consumer electronics, semiconductors and defence electronics. Growth of computer production and semiconductors has been strongest in recent years.

**TABLE 1: INDICES OF OUTPUT 1992-96: BY ELECTRONIC GROUPS AND TOTAL MANUFACTURING (Constant 1990 prices)**

Index Values 1990 = 100

Year	Data Processing Equipment	Electronic Components	Electronic Instrument Engineering	Other Electronics	Total Electronics	Non-Electronics	Total Manufacturing
Weight	56	18	16	6	96	565	661
1992	122.8	120.4	100.0	113.8	118.0	94.2	97.6
1993	166.4	168.7	89.5	167.9	154.1	92.1	101.1
1994	206.5	245.6	90.9	283.0	199.5	91.0	106.7
1995	226.1	309.1	93.6	328.5	226.3	90.9	110.5
1996	279.5	353.4	108.2	264.8	264.2	91.2	116.3
% Change 1995-96	23.6	14.3	15.6	-19.4	16.8	0.4	5.2
% Change per annum 1992-96	22.8	30.9	2.0	23.5	22.3	-0.8	4.5

*Source:* Index of Production and Construction for Scotland

In 1998, the electronics industry employed over 40,000 in Scotland, with another 30,000 jobs in supplier businesses (Scottish Enterprise, 1999). As a share of total Scottish manufacturing employment, electronics has increased from under 10 percent in 1992 to nearly 13 percent in 1995. In 1995, investment, in terms of net capital expenditure by the electronics industry, accounted for 40 percent of all investment by Scottish manufacturing industries (Scottish Office, 1998).

Since 1996, the electronics sector has experienced a recession, particularly in consumer electronics and components. This has been evidenced by recent plant closures (Mitsubishi in Haddington, Lite-On in Lanarkshire and Viasystems in Selkirk) and rationalisations in some parts of the sector (e.g. Seagate in Livingston, National Semiconductor in Gourock, Motorola in East Kilbride and Mitsubishi in Glenrothes).

Another striking feature of Scotland's electronics industry is its high levels of foreign ownership compared to other sectors in the Scottish economy. Over half of all employment in electronics is accounted for by foreign-owned companies. In terms of employment, the main sources of overseas FDI have been the US (42 percent) and Japan (8.6 percent). European and other countries accounted for less than 1.5 percent of manufacturing employment in 1995. Foreign-ownership is strong across most of the industry's sub-sectors, with the notable exception of electronic instrument engineering which is almost entirely UK-owned.

### **Electronics Investors**

Foreign-owned original equipment manufacturers (OEMs), such as Hewlett Packard, IBM, Mitsubishi, Compaq, JVC, Motorola, Sun Microsystems and NCR, dominate Scotland's electronics industry. Their main products include personal computers (PCs), laptops, servers, workstations, televisions, video cassette recorders (VCRs), audio equipment, cellular telephones, photocopiers, microwave and instrumentation equipment, automated teller machines (ATMs) and active electronic components, such as analogue and digital semiconductors. Indigenous firms feature more in specialist areas such as defence and lower value segments of the supply chain (see below).

There is no comprehensive and up-to-date evidence on the level of local purchasing by the electronics industry in Scotland. The most recent Input-Output tables for Scotland show that in 1995, 16.1 percent of the electronics industry's purchases were from Scotland (including components, materials and services), compared with 17 percent in 1989. For Scotland is partly attributable to the specialised and sophisticated nature of many high industry as a whole, the figures were 55 percent and 51 percent respectively. The difference value electronic components, which are not made in Scotland but produced in high volumes elsewhere.

Scottish Enterprise conducts its own periodic survey of 'sub-contract' purchases by the largest foreign electronics companies in Scotland. Their latest audit was undertaken for the year 1995/96. It showed Scottish-based suppliers gaining about 17 percent of the purchases of the major foreign firms, down slightly from around 20 percent a few years earlier, but within a context of absolute growth in the level of purchasing.

The bulk of local sourcing has traditionally taken place in the lower-value end of the supply spectrum. Items such as, packaging, printed materials, sheet metal (small parts and metal enclosures for PCs), plastic parts and mouldings, printed circuit boards (PCBs) and their assembly, are the mainstay of local sourcing. These linkages with local suppliers can be characterised as sub-contracting and are strongly influenced by considerations of cost and convenience. Local suppliers have advantages in being able to respond quickly to changes in production volumes and product design, without the need for OEMs to maintain large inventories. OEMs are also looking for suppliers to provide a wider range of services and relieve them of some of the burdens of supplier management.

Severe cost pressures in the electronics sector have been encouraging OEMs to constantly explore alternative options for component sourcing, including purchasing by the whole corporation on a world-wide, or global, basis. This reduces the need to duplicate design work and tooling in different parts of the world and generates economies of scale for suppliers which should get reflected in their prices. It also simplifies the process of supplier management. Annex 1 illustrates the highly globalised nature of sourcing by one Japanese OEM in Scotland. The company source low value parts globally including, metal pressings from Malaysia, PCBs and caps from Singapore and tuners from Slovakia. This sourcing data also shows how the host economy, i.e. Japan, also features strongly as a source of materials (integrated circuits). Prima facie, global sourcing is increasingly being used by some OEMs as a means of lowering procurement costs and OEMs increasingly benchmark their suppliers on a global basis in order to remain cost competitive.

The movement towards global patterns of sourcing creates opportunities and threats for local (Scottish and UK-owned) suppliers. Given the ambition and capacity, they may seek to become world-wide suppliers themselves. In addition, they face the prospect of foreign suppliers investing in Scotland to capture their business. Generalising on the basis of the interviews with the OEMs in Scotland, their views of local suppliers can be summarised as follows:

- Some OEMs consider that they are too small to provide the level of output they require – many lack a ‘volume mentality’;
- Some consider the suppliers to be too cautious about investing abroad.
- Some consider the suppliers to be insufficiently ‘pro-active’ in seeking to improve their service. They would like them to assist more with identifying areas for cost reduction, quality enhancement and product design improvements.

### **Local Suppliers**

Early, on, most locally-based suppliers were Scottish or UK-owned. In the last decade there has been an increase in ‘second-wave’ inward investment by foreign-owned suppliers with resources and technical expertise to expand more quickly than most local companies. Suppliers tend to be engaged in the following activities: local suppliers of parts (e.g. sheet metal, plastics and PCBs), sub-assemblies or turnkey suppliers (e.g. often local suppliers who undertake additional manufacturing, procurement or service tasks), subcontracting facilities (companies who undertake basic assembly who are issued the parts by OEMs) and repair/maintenance services.

Over the last decade there has been a marked trend towards supply chain differentiation in electronics production. Whereas in the past OEMs bought in all their material requirements and assembled them in-house, increased outsourcing within the industry has seen first tier suppliers undertaking additional manufacturing responsibilities. A hierarchy of suppliers appears to be emerging: with first tier suppliers undertaking additional functions on behalf of foreign-owned OEMs while second and third tier suppliers cease to supply OEMs directly. In Scotland’s electronics industry, first-tier suppliers undertake a range of manufacturing activities such as full ‘box-build’ and frequently coordinate lower tier suppliers. Indeed, the

process of vertical disintegration among OEMs is leading to a greater level of vertical integration in some parts of the supply chain [2].

The need to provide a more integrated service has had three main impacts on the supply chain. First, local suppliers are increasingly working together to provide OEMs with a more integrated supply service. There is some evidence of local suppliers forming 'loose' partnerships with other firms (local and non-local) who can provide additional manufacturing capabilities (e.g. sheet metal firms working with plastic suppliers). Many local firms that do not become first-tier suppliers are concerned that companies that do gain this position appear to have less loyalty to them than the original OEM, partly because of the increasing cost-pressures on them. Second, increasing consolidation in the supply base is taking place through mergers and acquisitions in order to secure economies of scale and scope through vertical integration. HSP's takeover of Strathclyde Fabricators and FCI's takeover of Mimtec are just two examples.

Third, a number of larger foreign-owned firms have entered the supply sector, such as Bermo, Foxteq and PCI. The role of Locate in Scotland has caused some consternation among local suppliers who fear simple displacement of their business with no net gain to the Scottish economy. Some foreign-owned firms have also entered the supply chain by acquiring local firms (e.g. Kinloch Electronics was acquired by the US-owned Berg Corporation and then Berg was acquired by the French-owned FCI group six months later).

## **Overview of Internationalisation in Electronics**

Three-quarters of all Scottish manufacturing exports in 1995-96 were made in three industrial sectors: whisky, electronics and chemicals. Whisky and chemicals have not experienced the same sustained export growth as electronics. Its share of manufacturing exports rose from 42.2 percent in 1989-90 to 54.8 percent in 1995-96. Of the electronics sub-sectors, office machinery has been responsible for the bulk of electronics exports - 70 percent in 1995-96. Electronics are of greater significance to manufacturing exports in Scotland than for the UK more widely - between 1989 and 1996, electronics accounted for 46.9 percent of the value of Scottish manufacturing exports, but only 17.4 percent of UK manufacturing exports.

This performance is mainly due to a limited number of large exporters. All the major OEMs in Scotland are active exporters, including IBM, Compaq, Motorola, Hewlett Packard and NCR, which all export nearly 90 percent of their output. The main market for most OEMs is Western Europe, particularly larger EU markets such as France and Germany. Some plants in Scotland, such as Compaq and IBM, cover wider areas known as EMEA (Europe, Middle East and Africa). Some smaller OEMs, such as Mitsubishi and Apricot, focus more on the UK market place.

There is a big difference in internationalisation between OEMs and local suppliers. Overall, internationalisation among Scotland's supply base appears to be quite limited, with a few notable exceptions. Most local suppliers have tended to rely on supplying the large OEMs in Scotland, and in some cases England and Wales as well. Although some local suppliers have managed to internationalise, few could be

classified as active exporters. Many of the suppliers interviewed export less than five percent of their output. Their export orders tend to be sporadic and they are inclined to rely on unsolicited orders from abroad or requests from customers in Scotland to supply overseas facilities. Part of the reason for the relatively low level of exports relates to the nature of their product/service: contract electronics manufacturing often requires spatial proximity between OEMs and local suppliers, especially for bulky products such as sheet metal enclosures and full box-build.

### **Types of Internationalisation**

Local suppliers have different methods available to them of entering foreign markets and becoming more internationalised. These methods range from exporting through contractual agreements with partners abroad and joint ventures, to takeovers of foreign companies and direct investment in new manufacturing and service facilities. They vary in terms of their cost and level of commitment involved (and therefore the flexibility and scope for change and withdrawal); the degree of influence and control over the foreign operation and customers abroad (hence the level of uncertainty and risk involved); and the ultimate purpose of internationalisation.

Many companies regard exporting as the least costly and risky method, although it may also be the most restricted in terms of its ultimate impact and effectiveness because it offers least control over foreign market. This applies particularly to sub-contractors since they typically have few really distinctive advantages over rivals located closer to their customers. Indeed they may be at a real disadvantage because of the extra transport costs and lower responsiveness. Yet exporting is often the first mechanism by which companies get exposed to new markets.

Electronics suppliers in Scotland intent on achieving a more substantial international impact have begun to explore three other methods. Several companies have established new manufacturing facilities abroad, usually in the US. A few have taken over smaller suppliers abroad as a relatively quick way of gaining access to new customers and markets. Some companies have also tried to identify similar firms abroad with which they can establish some kind of joint venture, a method most popular for expansion into the Far East, partly because of cultural differences with the UK and uncertainties about business practices discouraging new ventures.

Local suppliers appear to fall into one of three broad categories according to their objectives and strategies for internationalisation:

- *Limited exporters* have no real exporting capabilities or internationalisation ambitions. Typically, such firms are very dependent upon one or two dominant OEMs in Scotland. They may export periodically; however, export orders often arise through chance rather than any concerted export marketing effort. These firms often rely on their customers to organise the logistics and documentation for any exporting activities that take place. Although they recognise the potential of exports they do not have the managerial capacity to become internationalised. These firms are often traditional component suppliers or prototype suppliers who do not undertake higher level assemblies such as full box build.

- *Piggy-backing* suppliers have stronger international ambitions and are still in the early stages of becoming more internationalised. Their initiatives are often linked to particular OEMs who are important customers. They may take the form of fairly regular export orders, or direct investment in a new manufacturing facility abroad, or a joint venture with another supplier abroad. The particular method of expansion depends in part on the bulkiness and weight of their products (i.e. transport costs), the importance of speedy response to customer delivery requirements, and the cost and risk of failure of different methods. Suppliers typically locate their foreign investments close to the plants of their existing customers. They are not guaranteed any business in advance, but may be encouraged to set up such facilities by hints that work may be available if they do so. In recent years many OEMs have become more strategic in their approach to supplier management, including seeking companies that can service them on a global basis, and do so more cost-effectively than independent, country-specific suppliers. There are several Scottish-based suppliers in sheet-metal, plastic moulding and cables that have opened up satellite operations in at least one other country.
- *Globalising* suppliers are firms who have developed their own products or services independently of OEMs. These suppliers are quite often specialist firms with their own technological (product or process) capabilities. Internationalisation for these suppliers either takes place through exporting activities or through overseas investments. Most of these firms are active exporters, familiar with exporting practises and procedures - even those with overseas investments. One of the notable features of these firms is their capacity to internationalise at an early stage of their development. Most of these firms have an explicit export ambitions or internationalisation strategy. Although these firms may initially have benefited from the presence of overseas investors in Scotland, they now have a diversified customer base, often incorporating different sectoral and geographic markets. Examples of these suppliers in Scotland can be found in the PCB sector and specialist semiconductor suppliers.

Overall, the level of supplier internationalisation seems quite limited. Part of the reason appears to be the lack of suppliers with their own product technology, skills and financial capacity to do so. Direct foreign investment and joint ventures appear to be more common methods through which local suppliers internationalise than in the oil and gas sector. Other forms of internationalisation, such as R&D cooperation or takeovers, are rare.

### **Barriers to Internationalisation**

The main obstacles to supplier internationalisation seem to be a lack of resources to commit to export marketing and foreign direct investments, logistical issues and a concern about the relative risks and rewards. The firms that have gone the furthest in terms of internationalisation are typically owned by large, publicly quoted groups, with access to external sources of capital.

Another notable feature of the internationalisation of the supply base is the strong focus on the US and European markets. An important reason for this is that market

knowledge is better in these regions. Suppliers seem to eschew difficult markets, such as the Far East and Latin America, because of limited information about them. Even in Europe and the US, several suppliers complained about the poor return they get from using sales agents in these markets. Many believe that a direct physical presence is required to make real headway in foreign markets.

### **The Role of Locally-Based Investors in Internationalisation**

The internationalisation of Scotland's supply base has been aided by local supply relationships with foreign-owned OEMs in Scotland. The research found several examples of local suppliers working with other overseas operations of OEMs located in Scotland. This fits in with the aim of many OEMs to consolidate the number of suppliers they work with to achieve greater scale economies in purchasing. Suppliers believe that working with local OEMs may give them inside information and enhanced credibility. This form of instant track record also reduces the transaction costs faced by suppliers when developing relationships with customers (e.g. quality accreditation and performance auditing).

There are large differences in how piggy-backing occurs and what benefits it confers to local suppliers. Broadly speaking, there seem to be four types or stages of piggy-backing.

- First, piggy-backing takes place through export orders to other subsidiaries for parts which they currently manufacture for the Scottish operation of the investor. Although there was some evidence to suggest that suppliers can use piggy-backing as the basis for a more aggressive internationalisation strategy, some suppliers treat these links as a 'one-off', as was the case with the first category of suppliers outlined earlier. Clearly, in the latter case such relationships do not aid the development of the supplier's internationalisation, especially when suppliers engaged in this type of relationship are small with little real experience exporting or desire to internationalise.
- Second, export piggy-backing to other branches of foreign-owned OEMs in Scotland can lead to additional export orders to other parts of the MNE or additional third party customers. Several companies in Scotland use initial piggy-backed relationships to develop more orders either with the same company or explored the opportunity of doing work for other firms in the same market. This type of development has been particularly evident in the US market by firms undertaking higher level assemblies, such as box build or PC monitor assembly. Indeed, one local supplier has been able to use its initial export orders with one US-based MNE in the US to serve five different divisions of the same firm.

- Third, suppliers open production facilities to serve other plants of existing customers in Scotland. Often, this takes place following a period of direct exporting, but this is not always the case. In most cases, suppliers set-up to supply one or two major customers. The research found that OEMs in Scotland do not give suppliers much in the way of concrete assistance when this takes place beyond personal introductions to procurement managers abroad. OEMs may also give suppliers indications that local suppliers are not performing up to standard and that new supply opportunities are imminent, but no guarantees regarding future business levels are given. Rather, OEMs expect suppliers to take the initiative and full risk themselves. One supplier claims that a US-owned OEM threatened to withdraw its business in Scotland unless they established an overseas plant in the US.
- Fourth, suppliers which have opened up overseas facilities to serve a specific customer but have now expanded to attract new customers. In this situation, supplier internationalisation also helps the firm to diversify its customer base. Most suppliers which have opened up overseas facilities to serve specific customers still remain closely linked with these same OEMs. In fact, our research suggests that many overseas operations are relatively small and have not developed as well as the supplier anticipated.

Piggy-backing is not the only method of internationalisation available to suppliers, nor is it a simple continuum from exporting to foreign direct investment. Some suppliers become internationalised from the outset and embark on overseas investments even prior to undertaking any exports. Similarly, some suppliers have been engaged in export piggy-backing for some time but have not then moved on to open overseas production facilities. Indeed, piggy-backing is not seen as a positive development by some suppliers and is sometimes used as a 'defensive' strategy by suppliers to avoid losing work in Scotland.

The geographical focus of most piggy-backing to date involves either exporting to other US subsidiaries or setting up production facilities in the US to feed other plants owned by the same company. This is not surprising given the overall importance of US foreign investors in the Scottish electronics industry. Another reason for this is the cultural similarities between Scotland and the US. Few examples of piggybacking were found with European customers and no piggy-backing appears to take place with Japanese or Far East OEMs at present. This may reflect the fact that Japanese and Far Eastern MNEs have very strong domestic supply relationships.

### **Importance of Networking**

Informal and formal networks seem to play important roles in the electronics sector although perhaps not to the same extent as in oil and gas. First, informal networking helps suppliers to become established. This occurs through a number of different ways. Suppliers often recruit sales staff who have either worked for OEMs or for rival suppliers, which gives them inside knowledge about important industry developments. There are also cases when suppliers hire vendor engineers from their OEM customers, particularly when engineers have previously worked with the supplier to develop certain manufacturing processes. Second, more formalised

networking takes place through bodies such as the Scottish Electronics Forum (SEF), Supply-chain Partnership Empowering Economic Development (SPEED) and the Supplier Forum (SF). In association with Scottish Enterprise, these private-sector-led bodies bring together suppliers and OEMs which further develops personal networks in the electronics sector. Although the remit of each organisation is different, all try to develop ‘best practice’ throughout the local supply chain by fostering more cooperative relationships between OEMs and suppliers.

Although difficult to prove, the role of networks also seems important in internationalisation. In some cases, good personal links between staff of OEMs and suppliers have led to communication and dialogue which have facilitated internationalisation by raising awareness of the opportunities and procedures required to do so. Information and contacts are pre-requisites for effective development of international markets.

Personal networking can also foster internationalisation indirectly. Many suppliers in Scotland are owned by people with long-standing links with the industry, who often have close contacts with other suppliers and OEMs. Although these networks do not always lead to collaboration, suppliers are generally well-informed about the strategies of rival suppliers. For example, when FCI first opened a US facility in the early 1990s, other suppliers became more interested in the opportunities for overseas expansions, and started exploring possible methods of developing an overseas presence. Close personal networking could help to explain a climate which fosters this type of ‘bandwagon effect’.

### **Importance of Procurement Strategies**

Buyer-supplier relationships in the electronics sector vary greatly between sub-sectors and individual firms. Some OEMs form stronger and more collaborative relationships with key suppliers than others. For example, one supplier interviewed had entered into a ‘long-term agreement’ with a foreign-owned OEM which is a legal document binding the two companies together over the duration of a product. This type of close interactive relationship seems more common in low-volume, high value-added sectors, such as industrial electronics. It can also occur in semiconductor manufacturing owing to the importance of the quality of suppliers’ materials.

However, this level of cooperation seems unusual in the electronics industry. Asymmetrical relationships seem much more common, in which the buyer’s interest is more short-term and limited to concerns over price, quality and delivery. OEMs often advocate close partnerships with suppliers, but in practise they seem to adopt a more adversarial approach, according to many suppliers. The reasons for this are complex and interdependent. First, many OEMs continue to source parts from several different suppliers thereby reducing their reliance on any given supplier and strengthening their bargaining position. Even when OEMs single-source parts, they often retain ownership of tools (e.g. for plastic mouldings) to enable them to switch business to other suppliers if necessary. Second, some suppliers remain heavily dependent upon one or two key customers for the bulk of their business. In fact, the research discovered that some suppliers have as much as 70 percent of their business with one customer. In this situation, a supplier is very much at the mercy of the

OEM. Third, the intense price pressures in many electronics products means that procurement is highly price sensitive. Finally, few suppliers in Scotland seem to offer a genuine technological advantage which might make them more equal partners with OEMs.

The procurement strategies of OEMs can play a positive developmental role in the internationalisation of local suppliers. The most common way in which this seems to occur is through Scottish suppliers supplying other parts of the OEM's operations. The export piggy-backing process is particularly evident when OEMs establish International Purchasing Offices (IPOs) in Scotland. IPOs procure parts and manage suppliers in different parts of the world and are often located in large geographical markets, such as Europe, Asia and North America. Although there appear to be fewer of these in Scotland compared with some other electronics clusters (see Brown, 1998), there are examples of local suppliers feeding into the global networks of OEMs through local IPOs. The globalisation of procurement can also work in favour of local suppliers in the reverse direction. For example, one supplier in Scotland undertakes work on behalf of a US supplier who works for the OEM in the US. The supplier is then sub-subcontracted by the US supplier to serve the OEM's plant in Scotland.

### **Types of Investor Effect on Supplier Internationalisation**

In addition to the opportunity for piggy-backing through formal and informal networks, the desire of OEMs to consolidate their supply chains and the existence of IPOs, the experience of working with electronics OEMs in Scotland gives suppliers important expertise and a track record which can help to sell themselves to other customers worldwide. Some suppliers grasp these opportunities energetically, while others seem more passive. Their stance is crucial since suppliers have to grow and internationalise on their own accord and following their own initiative. OEMs will not do it for them.

There appears to be limited assistance available from OEMs on R&D issues. There are some examples of suppliers being given advice when they buy new capital machinery or computer software, but this is typically one-off. Suppliers are being encouraged by some OEMs to provide more input into design for manufacture and some basic product-related design. Opportunities for advanced R&D cooperation are circumscribed by the nature of the electronics industry and supply base in Scotland, which focuses on the manufacture of basic components and higher level assemblies. Other forms of assistance or cooperation, such as inward transfer of product technology or international R&D linkages seem absent in the electronics sector.

Skills transfer between some OEMs and suppliers does take place, particularly with internal manufacturing issues. Some OEMs work closely with key suppliers to assist with their manufacturing processes. For example, one OEM gave a local sheet metal supplier a great deal of help and 'hand-holding' when they were first developing the plastic injection mouldings side of their business. The OEM involved even donated an 'in-line printing' machine to the supplier. The owner-manager of another supplier explained how they learnt a lot from their main OEM customer by them 'beating us about the head and also working with us to resolve our production problems'. Some OEMs also help suppliers with exporting procedures, logistics, customs etc.

Working for OEMs can also help to transfer skills and knowledge to local people, who may subsequently go to work for local suppliers or start their own businesses. The owner-manager of one supplier to IBM said that working for the OEM had given him and his two colleagues a very good understanding of its needs and expectations of global suppliers.

## **The Role of Clusters in Supporting Internationalisation**

Scotland's electronics industry was one of the first industrial sectors in Scotland to be analysed using Porter's cluster concept (see Monitor, 1993). This analysis looked at the key characteristics of the industry in Scotland as a whole using Porter's 'diamond' approach. The Monitor study concluded: "analysis of the cluster and its comparison with other globally competitive clusters, highlights a weak underlying competitive position, threatening both the clusters near-term survival and its ability to adapt to changes in the competitive environment in the longer-term" (Monitor, 1993, p.6). Many aspects of this report still seem relevant today, although the overall size of the industry has increased and a second-wave of inward investment by foreign suppliers has occurred in the intervening period.

The study identified that Scotland's electronics industry has three main weaknesses limiting the cluster's overall cohesiveness. First, it found that Scotland's main competitive advantage was its relative strength in basic factor conditions (low-cost labour, access to EU market, government incentives etc). This explains why the structure of the industry is dominated by a handful of foreign-owned MNEs, with limited decision-making autonomy. A dynamic cluster typically features well-rooted domestic and foreign-owned firms which are internationally competitive. Second, the study discovered that local demand conditions are weak. In the main, the customers for products assembled in Scotland are non-local and have little direct interface with OEMs in Scotland. Close interaction between producers and end-users (either public or private) is said to be a key feature of strong high-technology clusters.

Third, another key weakness detected by this analysis was the lack of linkages between OEMs, local suppliers, government bodies and local universities. Strong networks and linkages are traditionally key advanced factors germane to dynamic sectoral clusters. Links between OEMs, suppliers and local research organisations are very limited, not least because few undertake original R&D or product design. Linkages between OEMs and local suppliers tend to be limited to basic activities conducive to localised supply, such as basic parts manufacture and turnkey supply services. The lack of a strong supporting sector undermines opportunities for genuine close partnerships and reduces the scope for technology-transfer. Furthermore, increasing consolidation in the supply base also means that the most progressive suppliers are externally-owned. In the short-term, higher levels of external ownership open up opportunities for greater market reach, higher levels of capital investment and new management techniques. On the other hand, this could see the supply chain increasingly at risk in the longer term if foreign investors do not view their Scottish operations as an integral part of their global production strategy, as recently occurred with Viasystems in the Scottish Borders.

Although a number of Scottish suppliers have managed to grow and internationalise on the basis of these supply relationships, as a whole the Scottish electronics cluster has not managed to develop many technology-based suppliers with the capacity to upgrade and develop independently of local OEMs. In part, this owes to the type of relationships and networks that become established in Scotland. Broadly speaking, there are two aspects of OEM-supplier relationships which influence internationalisation: horizontal and vertical.

In the former, OEMs work and develop suppliers through *horizontal* or local supply relationships which leads to a supplier becoming embedded into an OEMs supply network. However, the lack of procurement and product-related mandates within most OEMs means that horizontal relationships between actors are heavily circumscribed in Scotland. The main reason for this seems to be the truncated decision-making autonomy of OEMs in Scotland. They do not have sufficient autonomy to closely network with local suppliers within Scotland (e.g. new product develop with suppliers etc.) and this militates against the kind of interactive buyer-supplier relationships which can actively develop local suppliers. OEMs do, however, aid internationalisation through *vertical* relationships with MNEs which connect suppliers to other parts of local OEMs' global operations. This type of piggy-backing allows suppliers to use local supply relationships as a conduit to overseas markets and can give suppliers a positive springboard to internationalise further.

Unlike the oil and gas sector, suppliers are increasingly expected to open production facilities near to their customers' plants. Overseas FDI by suppliers is contingent upon their financial capacity, the type of supply service or parts manufactured and the willingness of the supplier to become globalised. These factors are more apparent in suppliers with integrated contract manufacturing capabilities or specialist supply products/services (e.g. PCBs and LCD repairs). Outwith these areas, internationalisation is often firm-specific and considerable variation exists.

## Conclusions

Globalisation is having important, wide-ranging effects on the Scottish electronics industry. It is creating opportunities for locally-based suppliers to become much larger and to enter international markets. Yet it is also posing major threats to local suppliers from cheaper imports and inward investment by lower-cost competitors. The precise balance between these outcomes is not yet clear.

Several Scottish-based suppliers have become more international in orientation during the last five years. Some have done so by exporting products from Scotland and others by investing abroad or establishing joint ventures with foreign suppliers. The exact method of market entry varies according to the product and market circumstances and the objectives of the supplier.

The number of local companies that have become true global suppliers is limited at present. Only two are known to have significant manufacturing facilities abroad and only one of these has a facility in more than one other country. Four further companies are known to export more than a third of their output. Most of these six companies are UK – rather than Scottish – owned.

The presence of foreign investors in Scotland has undoubtedly helped the leading suppliers to become more international in outlook and capability. Some have transferred expertise in production techniques and processes over many years, and provided valuable information, advice and customer contacts about international market opportunities. Other OEMs seem to have been less helpful, either because they have worked less closely with local suppliers, or because they seem to have been less inclined to support internationalisation by local suppliers. In some cases they are engaged in high volume production of commodity products, which imposes considerable demands on suppliers for large scale, low margin production. Some OEMs are sceptical of the ability of local suppliers to become global operators in this context.

Globalisation is double-edged in many ways, presenting problems as well as opportunities for local suppliers. The production of several products by OEMs in Scotland has migrated to the Far East or Central and Eastern Europe, leaving local suppliers of components in difficulty. Cheaper imports from these regions are constant threats to local suppliers' performance. Pressures to cut costs, generate scale economics and integrate parts of the supply chain also threaten independent, relatively small local suppliers because of their difficulty in competing in this new global environment.

Local suppliers face a variety of obstacles to internationalisation. A step change is frequently required in terms of ambition, scale of operation, resource requirements and management capacity. This may not be feasible or even desirable for all firms, particularly those in private ownership. Some have sought or accepted takeover bids, which may facilitate the process of internationalisation. The Scottish economy will not necessarily benefit if internationalisation simply means investment abroad.

## Notes

1. According to the Scottish Office, electronics is classified under four main headings which incorporate the seven activity headings from the 1992 Standard Industrial Classification of Economic Activities: first, data processing equipment (30020) which is the manufacture of computers and other information processing equipment; second, electronic components (32100) which includes the manufacture of electronics valves and tubes and other electronic components; third, electronic instrument engineering (33201) which is the manufacture of electronic instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment; fourthly, other electronics which includes the manufacture of telegraph and telephone apparatus (32201), the manufacture of radio and electronic capital goods (32202), the manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods (32300), and finally, the manufacture of electronic industrial control equipment (33301).

2. Meanwhile, vertical disintegration has also seen an increase in the types of specialist supply services which suppliers provide to the OEMs. Some suppliers, for example, provide electronics OEMs with 'outplant labour', i.e. personnel employed by the supplier who work at the OEM's plant on an ad hoc basis.

## **FOREIGN INVESTMENT AND INTERNATIONALISATION OF THE SCOTTISH OIL-GAS SECTOR**

### **Introduction**

Against a background of persistently low oil prices and contraction of the domestic market, pressures have increased on Scottish suppliers in the oil-gas sector to reduce costs and seek out new international markets. The developments have heightened the role of the Scottish Enterprise Energy Group in both providing support to individual suppliers in their internationalisation efforts and facilitating wider sectoral activities in adapting to the new global conditions. At the same time, the Scottish Enterprise Network Strategy has recognised the challenge to the whole Scottish economy in adjusting to an increasingly globally-competitive environment. The strategy also acknowledges the continuing impact of foreign investment in catalysing the development of the Scottish economy, not just in terms of creating jobs and generating local income but also acting as sources of product, service, production, managerial and skills innovation. Indeed, the two issues are explicitly linked: the strategy review consultation document notes “that our international activities will be enhanced through an approach that links inward investment, export and overseas business development” (Scottish Enterprise, 1998b, p.11).

With respect to the oil-gas sector, research involved face-to-face interviews with a panel of 25 firms – 8 foreign-owned oil operators and 17 Scottish suppliers. Using the preliminary research findings of the study, the current note is divided into several main sections following this introduction:

- an overview of internationalisation in the oil-gas sector;
- an analysis of the impact of foreign investors on supplier internationalisation;
- a review of the key sectoral factors influencing internationalisation; and
- a discussion of the impact of industrial clusters on supplier internationalisation.

### **Overview of Internationalisation in the Oil-Gas Sector**

#### **High levels of foreign company activity**

The oil-gas industry in Scotland has long been highly-internationalised. As in many other oil-gas regions in the world, the Scottish industry has been dominated by foreign-owned companies, particularly from the US. The exceptions have been British Petroleum and Royal Dutch Shell (a UK-Dutch concern), though few distinctions can be made between them and the foreign-owned operators in terms of their international outlook and the global nature of their corporate operations. Foreign companies have shaped the sector as a result of their pre-existing strengths, large capital reserves and in part, government policy (which in the UK, resulted in a steady diminution of state control over oil-gas assets and their development).

In addition to the oil operators, the oil-gas supply chain has increasingly been dominated by foreign-owned companies. Since the early 1990s, with the sharp fall in

the price of oil, operators have responded to cost-cutting pressures by outsourcing many of their operations – not just non-core functions like IT services, but also key activities such as the construction and operation of oilfield platforms. Outsourced contracts have been awarded for longer periods of time to single suppliers in order to keep down both transaction costs (such as personnel changeover in platform maintenance arising from switching contractors) and the administrative costs of preserving a wide supplier base. This provided huge opportunities for many engineering contractors and integrated service providers, which expanded in size in order to offer ‘one-stop shop’ services to oil operators. Some of these companies are traditional engineering service companies (‘body shops’) which have taken on larger shares of oil-gas industry business as a result of the new contracting arrangements, but many are foreign firms which have increased their share of the North Sea market through a strategy of acquisition (such as Halliburton and Schlumberger). As a result, nearly all the main engineering contractors are part of large, foreign-owned companies, apart from a few English-based companies (such as AMEC) and a few homegrown exceptions (Atlantic Power and, most famously, the Wood Group).

### **High levels of exporting by Scottish suppliers**

The sector’s high level of internationalisation is also reflected in the strong export focus of many Scottish suppliers. In reviewing the internationalising activity of Scottish suppliers though, it is worth noting the difficulties of using exports as an indicator. For many companies, ‘internationalisation’ (in the sense of involvement in international markets) cannot easily be benchmarked by levels of exporting. For example, some local companies are almost wholly based on the North Sea market (which encompasses both the UK and Norway) but still have ‘exports’ in terms of their sales to locally-based investor subsidiaries, which might use their equipment in foreign projects (a characteristic most notable of providers of rental equipment). In contrast, other local firms may be contracted to local companies with foreign projects, in which the transaction may be domestic but the firms are involved in work in foreign countries.

Despite the problems in measuring the precise level of activity, its scale is clear: exporting is high throughout the sector. From a postal survey of ‘oil-related’ firms in 1996 - a sample of approximately 10 percent of the Aberdeen firm population in this sector was used - Cumbers and Martin (1998) concluded that just over 50 percent of firms (foreign as well as locally-owned) could be described as ‘global’ (ie. exporting to more than one continent) . In our own study findings, over half of the Scottish suppliers had a third or more of their output accounted for by exports (though it varied significantly between different types of companies): this was far more than the average for the electronics suppliers interviewed in the study. Moreover, oil-gas suppliers generally had a wide spread of export markets in the different oil-gas production regions of the world - regularly including markets in East Asia, Russia, Central and South America, the US and Western Europe.

## **Problems in internationalising for Scottish suppliers**

Although many have been successful in developing foreign markets, Scottish suppliers continue to experience common barriers to internationalisation, notably the traditional ones of finance to support expansions into foreign markets, exchange rate risk, exporting experience and information about new markets and potential customers. Many oil-gas suppliers are small, entrepreneurial start-ups with restricted access to capital and often high product development costs. The ability to expand into foreign markets is limited by what are seen as the prohibitive costs of supporting local offices. In addition, many firms have difficulties in obtaining the necessary foreign market information access. Local market knowledge can be essential: for example, in some developing markets, suppliers are encouraged to enter by tenderers merely to keep down the bids of local suppliers. However, it remains a widespread criticism of Scottish suppliers that they lack marketing experience, and their activities are characterised by sporadic sales visits, poor service and few overseas sales trips (as noted in a report to the Department of Trade and Industry (Segal Quince and Wicksteed, 1997) report on the industry's supply relationships).

In finding ways of overcoming these problems, suppliers employ a wide variety of strategies for internationalisation. These normally involve a process of increasing foreign commitment and risk through a series of stages. They might begin with the use of agents in foreign markets, proceed to joint ventures with local companies and then to a more substantial presence through takeovers of local firms or greenfield investments. Nevertheless, some companies 'leap-frog' stages - for example, some firms internationalise by setting up foreign investments as their initial form of entry into new markets. Indeed, some companies used different entry strategies in different markets, depending on the characteristics of the market and their anticipated relationships with customers.

## **Investor Linkages and Supplier Internationalisation**

### **Strong role for investors in supplier internationalisation**

Investors have provided active (if limited) encouragement to Scottish suppliers with respect to internationalisation. Where investors are bidding or have successfully won tenders to develop oil/gasfield projects in foreign markets, they often bring their Scottish suppliers with them, resulting in 'pull-through' of suppliers into markets they might not have entered independently. Large investors – whether oil operators or the major engineering contractors – often require the expertise of smaller suppliers in developing oil-gas markets (especially 'greenfield' markets, such as (currently) the Caspian Sea). Investors may find that the products and services cannot be provided locally in these new markets, or that there are advantages to working in potentially difficult markets with firms where a long-term working relationship has already been established in the North Sea. The cooperation has typically been for one-off tenders and projects, though a successful contract in one area can lead to similar contracts in other regions with the supplier.

Consequently, Scottish subsidiaries often have direct interest in the internationalisation of Scottish suppliers, but the effects have not been limited to

developing new markets. Investor linkages can lead to value-added effects for suppliers, particularly in terms of developing ‘new’ products and services (usually adaptations of existing ones) and exporting them abroad. For example, in our interviews, one Scottish supplier developed a new drilling measurement product for export through technological collaboration with an investor: the investor not only facilitated the export of the new product to its subsidiaries in different geographical markets, but the supplier was able to sell the product to other foreign customers. Indeed, such collaboration has proven essential for the development of many suppliers: as they develop longer-term links with investors, they can identify opportunities for providing new services to investors. In the case of another supplier, links with an investor were deliberately used as a strategy to expand its business by ‘working its way up the design chain’ to higher value-added products and services. As a provider of technological solutions to the investor, it gained a reputation as trouble-shooter, which proved the basis for its initial forays into exporting via piggy-backing.

At its most extreme, some suppliers have allowed themselves to be acquired by larger, foreign-owned companies as part of their internationalisation strategies. These ‘big brothers’ can provide suppliers with access to international marketing networks and financial resources for expansion. The growing incidence of these arrangements underlines the difficulties faced by many Scottish suppliers in business growth.

### **Different types of investor-supplier linkages**

Similar approaches to internationalisation were undertaken by suppliers. In our research, a basic distinction could be made between three different types of suppliers: limited exporters, ‘piggy-backers’ and autonomous exporters..

- **Limited exporters.** These include firms which depend heavily on North Sea-based business. Such firms export periodically, but export orders usually arise through passive responses to chance external inquiries rather than any concerted export marketing efforts. Mainly small firms (and occasionally medium-sized companies), they either have few incentives to expand abroad (due to the strength of business in the North Sea) or face imposing difficulties in exporting their products and services. Examples of such firms include providers of rental equipment (such as drills), engineering/repair ‘body shops’, caterers, providers of logistic/transport support and other firms whose services are either of low value or dependent on significant capital investments (such as transport equipment).
- **‘Piggy-backers’.** The exporting activities of several Scottish suppliers have resulted from following their domestic customers into export markets: either by the Scottish subsidiaries bringing their suppliers into new markets or by the Scottish suppliers gaining business with other subsidiaries. Piggy-backing can occur in several forms. Scottish suppliers can be ‘pulled through’ into new markets on the back of Scottish subsidiaries exporting to non-Scottish markets, a common feature in the oil-gas sector as already noted. Similarly, suppliers may provide direct exports to other subsidiaries in a MNE group as a result of linkages with Scottish investors. Lastly, investors may suggest – or in some cases, require – suppliers to make investments in foreign markets in order to serve other

subsidiaries within a group. In this respect, one key benefit to suppliers of linkages with investors is the ‘credibility’ gained from supplying the investor in its Scottish markets. These firms are frequently service providers - especially those involving high-value personnel services (such as engineering trouble-shooters) - as well as suppliers of key niche technologies and equipment.

- **Global suppliers.** Only a few *Scottish* ‘global’ companies seem to exist in the oil-gas sector here. Where they can be found, they usually have a diversified customer base (in which many of their ‘foreign’ customers did not directly arise from their domestic business), operations in several geographical markets, and a wide range of products and services (often in other sectors apart from oil-gas). In several cases, global suppliers have diversified their markets and customers on the basis of piggy-backing. As part of their overall diversification strategy – and it has usually been formalised as a specific strategy with clear exporting objectives – it has frequently led to a shift away from purely service-based activities to a product range which can be more easily exported at a smaller cost. Such suppliers also tend to operate in specialised technological niches. They have deliberately avoided dependence on any geographical market or group of customers and aimed to reduce the share of North Sea business in overall sales.

The categories should not be considered as a typical life-cycle for suppliers in the industry: in some sub-sectors, some categories are always likely to predominate. However, over the last 15 years, the Scottish sector has witnessed a significant shift of many limited exporters to piggy-backers (with the latter probably now forming the largest group among Scottish suppliers), though examples of all three categories will continue to exist. Most suppliers remain dependent on domestic customers in some fashion for the bulk of their international business. Consequently, as noted, few global suppliers have emerged, and there are indications that there are strong obstacles to their emergence in future. Many Scottish firms have had problems in maintaining their independence, given the obstacles faced by SMEs expanding. Global suppliers are common in the industry – especially among the larger integrated providers – but they are generally foreign-owned investors entering the North Sea market.

## **Factors Affecting Supplier Internationalisation**

### **Role of markets**

Internationalisation in the Scottish oil-gas sector has been encouraged by the nature of its markets. On the one hand, the existence of a globalised industry – in which different oil-gas regions of the world are at different stages of the oilfield development life-cycle – has ensured that there have always been potential opportunities for different types of Scottish firms. Indeed, the same major oil-gas production and oil-related companies can be found in all the key international markets for the industry. On the other hand, pressures have been put on Scottish firms to diffuse their traditional reliance on the North Sea market because of its continuing slump. The traditional market access of suppliers to oil operators has been blocked by the rise of the engineering contractors (leading to a widespread sense of having been marginalised). It has resulted in a contraction of the supply chain and the number of suppliers in recent years, a trend that is widely expected to continue. Overall, it has given impetus to many local companies to expand out of the North Sea market.

The North Sea region was the first entirely offshore-based province in the world. This has given companies based in the region a strong comparative advantage in deep-sea drilling, sub-sea operations and marginal oilfield production, a feature which supports local companies entering into some oil-gas regions (eg. West Africa and Australia, where similar conditions predominate) but not others (eg. the Middle East, which is principally onshore oil production). Many of their target markets tend to lack an existing support infrastructure for the oil-gas industry, so the international oil operators developing their fields often pull in suppliers with whom they have an established relationship (as noted above). From the perspective of suppliers, the presence of key customers such as oil operators is important, as it can give them a steady stream of business and income with which to develop the new markets. Entry into *developed* oil-gas markets – notably the US – is generally more difficult because of locally-based competition. However, for some firms, it is required in order for them to be near the cutting edge of particular technological developments.

### **Role of domestic collaboration between investors and suppliers**

Internationalisation is also assisted by the level and value of domestic collaboration between investors and Scottish suppliers. The oil-gas sector is composed of an inter-related web of products and services, providing specialist niches for firms as well as opportunities for companies based in other sectors to expand part of their business into the oil-gas market. Moreover, the industry is characterised by distinctive stages in a well-defined field life-cycle - encompassing exploration, drilling, production/construction, operation/maintenance and de-commissioning - to which different products and services may be relevant. Moreover, the wide number of geographical variables involved in oil-gas production requires a high degree of long-term, constant 'customisation' of material and service inputs in drilling and the construction and operation of oil platforms.

Multinationals' procurement strategies have also supported internationalisation. In the oil-gas industry, local sourcing is high as procurement tends to be subsidiary-

based, in large part because of the high levels of customisation required of oil-gas products and services. Most subsidiaries in the North Sea have autonomy with respect to procurement, and in most cases, are among the largest, most important of their respective groups' subsidiaries. Hence, North Sea subsidiaries are procuring not just for the North Sea market, but often for other oil-gas markets and in so doing, make use of their regular suppliers in the North Sea.

### **Role of networking**

The role of networks in this process is important. Such networks are not formal and depend less on organisational (ie. company-to-company) relationships than personal ones. For example, investor subsidiaries do not often formally refer their suppliers to other subsidiaries within the group – oil-gas subsidiaries tend to be fairly self-contained, reflecting the nature of the industry, and not coordinated strongly within a group – but an individual working in one subsidiary often chooses to work with the same supplier after moving to another subsidiary (or indeed, another company). The importance of personal networks arises from both the existence of the same major companies in different oil-gas regions and the high levels of personnel mobility within and between companies. Developing and maintaining such networks is viewed as essential for any internationalisation strategy, though the use of contacts is recognised as being effective only in *marketing* rather than *sales* (ie. knowing the right person can lead to a supplier being considered for a job, but the decision still ultimately depends on price and quality).

Networking is especially important for new firm start-ups developing their business, and their success can be dependent on the existing contacts brought by founding entrepreneurs into the business. Some companies deliberately hire individuals because of their access to particular companies and networks. Such networks highlight the fragmentation of the industry into a series of niche sub-sectors in which different networks operate.

## **Role of Clusters in Supplier Internationalisation**

### **Mixed evidence for an oil-gas cluster**

The issue of whether the oil-gas industry in Scotland has developed into a 'cluster' – at least as understood in the Michael Porter sense of the term – has been a controversial one. In many respects, the sector displays many of the key characteristics of the Porter 'diamond'. Local demand conditions are strong. The long-term presence of the oil operators has ensured a relatively steady source of demand for different types of local suppliers. Cost pressures have led to the development of more innovative approaches to extracting oil from marginal oilfields, enhancing the area's comparative advantage in sub-sea and peripheral field technologies. In terms of supply conditions, the sector has developed a strong pool of local skills, partly evidenced by the high degree of personnel mobility and the development of networks. Lastly, the sector is characterised by the presence of a number of inter-related industries within close proximity, which have provided powerful impetuses for innovation throughout the industry, both in terms of the diffusion of technologies between different sub-sectors as well as the impact of demand pressures across these sub-sectors to develop new products and services.

The extent to which the oil-gas sector in Scotland operates as a cluster has been questioned. For example, in his report of the April 1998 Cluster Seminar sponsored by Scottish Enterprise, Peter Jones drew attention to the fact that UK exports comprise a low share of the global oil-gas market (Jones, 1998). Moreover, it is questionable how self-sustaining the cluster is. The sector's survival in the region continues to be tied to its resources: it is feared by many that as soon as the oil and gas reserves diminish, the oil operators will abandon the area and demand will collapse. Embedding foreign investment has been difficult to achieve in this sector, given its ultimate dependence on a fixed-term asset. Over the decades, the sector has produced a number of local companies which are likely to survive because of the strength of their international business – the Wood Group is a good example – but these are unlikely to be enough to preserve the cluster.

The issue of ownership is particularly relevant here. Much of the sector is dominated by foreign-owned companies, not just in terms of the main oil operators, but increasingly in large parts of the sector's different supply chains. Indeed, the recent trends towards concentration of the various supply chains in single integrated contractors seem to have worked to the detriment of indigenous suppliers – at least in the short term – as the bulk of these contractors are foreign-owned. Again, as demand declines, the contractors will have little else to keep them in the region.

Nevertheless, there is a strong argument to suggest that aspects of clustering have supported the internationalisation of Scottish suppliers. Industry initiatives such as CRINE have been successful in promoting measures to reinforce the competitiveness of the Scottish cluster, notably in terms of achieving significant cost reductions throughout the industry; such pressures have made some Scottish suppliers more cost-competitive in entering foreign markets. Similarly, the Aberdeen Offshore Technology Park represents a determined effort to strengthen technological linkages between larger companies, smaller suppliers, universities and the public sector, which will reinforce exporting efforts by providing a new source of competitive technologies

and products. Lastly, within this study, the evidence highlights the fundamental role that linkages formed within the Scottish cluster have in allowing Scottish suppliers to develop international markets.

### **Continuing role for public sector policy in supporting the cluster**

Scottish Enterprise has rightly assessed that its role in supporting such cluster effects can only be a contributory one; ultimately, the sector's development into a long-term cluster is dependent on the dynamics of the industry. In its facilitating activities, perhaps the most important measures that Scottish Enterprise have taken have been to encourage higher value-added investor-supplier linkages, especially with respect to innovation in products, services and production technologies.

In the interviews, many Scottish suppliers noted that such linkages have been threatened by recent supply trends. Oil operators seem to have reduced the resources they devote to R&D and the engineering contractor firms have not made compensating contributions. Further, smaller suppliers reported that as they had fewer direct linkages with investors, their opportunities for collaborative innovation have declined. Many of the new supply relations between these suppliers and the engineering contractors are characterised by efforts to drive down costs rather than pursue higher value products and services.

Consequently, such initiatives as the establishment of the Aberdeen Offshore Technology Park have created new ways in which more value-added supplier-investor linkages can be achieved. Similar measures are likely to support clustering within the Scottish sector, and eventually encouraging the emergence of more global, Scottish-owned suppliers.

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