
Economic PERSPECTIVE

STOCKING THE GLEN: THE RELATIONSHIP BETWEEN ORIGINAL EQUIPMENT MANUFACTURERS AND THE SCOTTISH SUPPLY BASE

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As one of the major employment sectors in Scotland, Electronics has been championed as the saviour of Scottish manufacturing. The concept of silicon glen is a populist image of the survival of productive services in an economy which increasingly is moving towards the service sectors for growth and development. This paper examines the relationship between the largely foreign-owned Original Equipment Manufacturers (OEM's) and those organizations which supply them with source materials. It also looks at the perceived opportunities and threats for the long term growth of this industry in Scotland. Specific reference will be made to indigenous firms, particularly in the supply chain.

Within electronics there are a number of clear groups that play a significant role; the OEM's, indigenous suppliers, foreign suppliers, Scottish Enterprise, Scottish Trade International and the Scottish Universities. One would suggest that a collaborative framework which seeks to develop the industry to the benefit of foreign investors and local suppliers would be an effective win, win strategy. However, as we shall see there are several limiting factors which currently impede the ability of the local supply base to develop effectively within Scotland let alone seek expansion abroad through exports or other means.

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Electronics in Scotland

"The stretch of land between Edinburgh in the East and Greenock in the West now contains the heaviest concentration of electronics and computer firms in the whole of Europe. This 60-by-20 mile area is aptly named 'Silicon Glen' ". (Eurobusiness, 1994). The Scottish electronics sector dates back more than 50 years to defence electronics and it has an impressive record of invention and creativity. Inward investment which trickled into Scotland in the 1950's has since become a flood, as witness the latest additions of Chungwa and Lite-on.

Scotland has an impressive record in the electronics sector supplying 35 per cent of Europe's personal computers and 10 per cent of all PC's made in the world. In addition to this 25 per cent of Europe's semi-conductors also have their origins in Scotland. However, there is little room for complacency because as the foreign owned manufacturers play a major role in the country's economic output, they remain overwhelmingly controlled from overseas. Less than 12 per cent of the industry's annual turnover comes from Scottish owned firms. Marketing and Research and Development work each account for less than 2 per cent of turnover, indicating that the industry in Scotland is dominated by production operations. McCalman (1988), notes that the large foreign MNE's felt that Scottish firms were either average or below average when compared to firms elsewhere in Britain, America and Europe. The areas they particularly fell down in were: technical knowledge, capacity, product quality, and an unwillingness to make the significant commitment required by the MNE.

The extensive ramifications of the electronics industry for telecommunications and national defence have made governments increasingly anxious to avoid being left out or left behind in what is a rapidly moving technological scene. The electronics industry, like coal, steel and shipbuilding before it, has been regarded as the touchstone of Scottish industrial success. Governments in the developed market economies, as well as those in the more industrialised developing countries, operate substantial support programmes for the electronics industry, particularly microprocessors and computers (Dicken, 1992, p.309).

In Scotland, the basic structure of the industry is simple. Original Equipment Manufacturers

(OEMs) make or assemble the finished products bought for businesses and homes. As well as computers these products include telecommunications equipment and consumer goods such as hi-fis and televisions. In order to make these goods the OEMs buy in vast quantities of sub assemblies semi-finished items and individual components from manufacturers and suppliers, as well as packaging materials and instruction manuals. These purchased items may be sourced from many different locations including the Far East, North America and Europe.

The industry is particularly marked by the number of new products being introduced, due to the rapidly changing technological environment and customer pressure. The location of the world's major electronics companies in Scotland presents an opportunity for local firms in the context of a supply role.

At present exports are dominated by Whisky and the foreign electronics OEM's. To have a more balanced economy this situation would have to change with local companies becoming more involved in selling their goods and services overseas. Scottish Trade International (STI) recognise this trade imbalance and have set themselves an ambitious plan, entitled "International Challenge" which aims to substantially increase the amount of export activity by indigenous firms. To facilitate this on the ground they have set up Local Export Partnerships with the Local Enterprise Companies. The challenge for Scotland is to keep the foreign firms here and expand the local supply base so that they too become multinational players.

One danger facing local suppliers is the possibility that a global competitor could move into Scotland. This scenario could result in an industry dominated by foreign companies not just at a customer level but also as suppliers. Another potential threat to local suppliers would be if the OEM's moved out of Scotland.

Strengths and weaknesses of Scottish electronics

Porter (1990, p.680) suggests that, "there is an important strategic choice facing both governments and firms in developing nations as to whether to pursue a strategy of being an OEM supplier to foreign firms or to seek to develop a global strategy." Although one would not suggest that Scotland could be classified as a developing nation there is significance in the fact that most nations

pursue some combination of the two, but the relative weights can vary markedly. Multinationals locate activities in the value chain in foreign nations as part of integrated global strategies. Such investments are usually made because of factor cost considerations or in order to open up protected markets,

"To achieve sustained national competitive advantage that transcends basic factor endowment, the global competitor route is more desirable. Global strategies not only themselves create new sources of competitive advantage, but provide a better foundation for proactive innovation instead of a passive response to foreign OEM customer requests." Porter (1990, p.680)

For Scotland, the 1980s and 1990s represented a foreign investment boom time. However, much of this investment was in less sophisticated assembly operations attracted to Scotland by low wage costs. The extent of foreign investment is a sign that the rate of upgrading of the Industrial scene is behind that of other advanced nations. The warning for the UK and Scotland in particular is that, "a nation's development strategy based solely [or principally] on foreign multinationals may doom a nation to a factor driven economy as the MNE can relocate when factor costs shift or wages get too high." (Porter, 1990, p.679)

The research questionnaire

A postal questionnaire was used for this research, the purpose of this was to gather more information about the companies involved in the sector. The intention was to examine suppliers current manufacturing processes with a view to determining whether these met with the current demands of the OEMs and whether there was potential for growth within the supply base. In a related area, it was the intention to gauge supplier views on the potential for growth outside the domestic electronics base in the form of exports etc.

The survey involved 100 companies in the Scottish supply base. Compiling an up-to-date list of companies over a number of sectors was not a straightforward task, made more difficult by companies being given SIC (Standard Industry Codes) that did not accurately reflect their business operations. The sample used the list of Scottish Supply Base Forum members plus additional companies not on the list but with the same profile. The other companies

were selected from the list of Scottish Electronics Companies (Scottish Enterprise 1994) and Dunn & Bradstreet Directory of Scottish Business - Financial Results 1995. The main criteria for the companies selected was that they were not owned by a foreign company as the focus was on the local supply chain where local is defined as indigenous.

The Scottish Supply Base Forum is organized around five core sectors: Plastics, Sheet Metal, PCB/PCBA, Tool Making and Precision Engineering, and Cables and Assemblies. Giving the user the option to select more than one sector revealed that only 26 per cent of the sample operated in a single sector and that over 50 per cent of the rest were involved in three or more. This seemed to illustrate the shift by suppliers to diversify and thus add value where ever possible in order to attract more business.

Supplier Working Practices

The study was particularly interested to find out how the supply chain dealt with sudden temporary increases in demand, a not uncommon situation within this sector. 90 per cent of those companies contacted were involved in either assembly or manufacturing of this 53 per cent organized their operational labour into teams. Table 1 indicates how the labour pipeline was utilised during temporary increases in demand.

During surges in demand 95 per cent said they would consider using overtime to absorb this, 51 per cent would consider using temporary staff and 31 per cent said they would use a night shift. Twi-light shifts were also popular as this particular shift pattern suited the type of labour used for assembly work - mainly women.

Material, Components & Assemblies

It was noted that 50 per cent of the local suppliers used Just In Time (JIT) schemes with some of their own suppliers and that this was an increasing trend.

JIT - Downstream

Over 50 per cent of the sample were involved in JIT with their customers and that these represented a significant part of their sales. It was also noted that this was an increasing trend. Over half of those involved said that they felt that operating JIT with their customers was beneficial to their company. The main reason given for this was the

'partnership' that was generated through the closer relationship.

JIT - Upstream

Those least involved with JIT either on a supplier or customer basis were the Tooling and Precision Machining sector. This could perhaps be explained by the lack of labour flexibility available to this group. For example, due to the skills required and their short supply they could not draft in labour to meet sudden demand. The only option was to get their staff to work longer hours. It could also be explained by the nature of the work which is often involved at the start of a project, prior to production. Here the task may be to produce the machine tools required on the production line. In this scenario their input may be a one off at the start of the project and does not vary with the demand peaks and troughs of the end consumer.

Reliability and JIT

Hand in hand with JIT systems is the concept of conforming goods delivered on time. Loss can be measured in 'waiting time' of operators and potential lost sales. The questionnaire highlighted this fact by giving the following ranking of supplier qualities (see table 2).

Why is price rated third among suppliers ? It could be that to become a supplier in the first place organizations had to be offering an acceptable price and that as the supplier customer relationship exists then an acceptable price is assumed to have been agreed and so is taken for granted. However quality and reliability may change over time and that is perhaps why they are ranked of most concern to the customers and supplier. There is very little to separate the top three features.

Quality

The emphasis or drive for quality led to asking what quality standards do the suppliers have and from this whether it adds value to the business. The intention was to see if the customer openly valued suppliers who could prove that they had attained certain formally proved quality standards. The results seemed to support this with 91 per cent of respondents having a formal quality qualification and 80 per cent of these companies stating that they thought the qualification added value to their business.

Firms were also asked to list the weaknesses of local suppliers; these are ranked in Table 3.

No Local Product - this seems to be indicative of the supply base, where whole sectors have no local product, for example power supplies and mother boards (for PC's - where 70 per cent are imported from Taiwan).

Price and Capacity - many Scottish firms are small to medium size enterprises. The response to this questionnaire comprised 35% of companies who had a turnover of less than £2m and with 60 per cent under £10m. This may indicate limitations on the volumes/capacity possible. Firms are not of sufficient capacity size to be able to deal with large orders from OEM's.

Quality and reliability - these seemed to get a lower rating, indicating that these issues were least 'weak'.

Adding Value Through Design

One method of getting close to the customer is by having a close design liaison. Data from the survey shows that 85% of suppliers have this type of link and that for 79% of suppliers this represents a significant part of their sales. 90% stated that they would like more of this type of work. 'Designing in' the suppliers, particularly at the start, is good for both parties as the supplier can lend his expertise and they will also get advance warning of new products and lines.

Teams

In recent years, companies have seen the benefits of designing jobs with employee involvement and satisfaction as one of the prime business objectives. Asea Brown Boveri Limited for example, cited by *Industry Week* as one of America's Best Plants in 1996, adopted a philosophy of organising around the process, not the task and flattened their organisation's hierarchy. A basic tenet was adopted to use teams to manage everything and to reward teams for their performance. As well as reducing their costs by 23%, overhead costs were reduced by 58% and delivery times were improved from 35 to 95%. More significantly, it was recognised that the real advantages were gained by the employees themselves, who were given the ability to take charge of the process. Once equipped with the process of knowledge and having broad decision making responsibilities, they could assure quality and thus gained enhanced job satisfaction, motivation and self esteem.

90% of the suppliers are involved in Manufacturing and Assembly and of this 53%

of these suppliers use teams. Nearly all (95%) of these companies have declared that they gain benefits from the use of teams on the shopfloor and ranked these accordingly. There seems to be a very positive response to the benefits of using teams (Table 4) However, with only 53 per cent using teams there is potential for a greater use of teams in manufacturing and assembly.

Quality - the results emphasised the customer requirements of getting the right product to the customer at the right time (JIT). The quality aspect is crucial as non conforming product could stop a customers production line.

Flexibility - the results are encouraging particularly with the increased use of JIT and sudden demand changes.

Productivity - increased productivity usually means output increased without having to employ more people, again this is very useful in keeping cost down.

Workforce Relations - this was also a very encouraging sign as it implies unity of purpose within the organization, this is particularly useful when introducing changes.

Absentee Levels - this could be correlated for example, good workforce relations may encourage people to attend work. Similarly, if there are productivity increases then there may be bonus related pay schemes. There might be a financial inducement to stay. Also if the individuals are working in small groups on group bonus then there may be peer pressure to come into work.

The growth of the supply base

The survey specifically tried to identify what factors, if any, stopped Scottish firms growing to 'critical mass' and becoming international players. Some sectors of the supply chain seemed to be more inclined towards international trade than others, for example the Tooling and Precision Machining companies considered themselves very much as local suppliers and their sales predictions generally looked no further than Scotland and the UK over the next 3 years. One possible reason for this might be the capital intensity of operations requiring skilled labour. To be successful firms must know their local markets very well, and according to the survey this seems to be a perceived difficulty for most firms in this sector.

There was a general trend amongst suppliers, downstream from the Toolmakers and Precision Machinists, that they would be interested in participating in international trade in a number of ways ranging from using an Agent/Distributor to a foreign joint venture.

Competition as a restraint to UK growth

Table 5 provides information on the competition to the Scottish companies. Table 6 indicates that 53 per cent of the respondents stated that competition was a significant issue and 40 per cent of this group felt that it had a very significant effect on their expansion plans (Table 6). 14 per cent of suppliers stated that they only had UK competitors and in this group a significant number related to Printing & Packaging and Tool Making.

Competition as a restraint to overseas growth

This is more of an issue when it comes to firms operating overseas. The survey pegs this at 60 per cent of the sample and 74 per cent of this group felt that it had a very significant effect when considering expansion overseas.

Skills Shortages

This seems to be an area of concern to many companies with 71 per cent reporting shortfalls. 44 per cent felt that this was significant enough to adversely affect their domestic growth and 40 per cent felt the same about overseas growth.

Insufficient Market Knowledge

Table 6 indicates that 31 per cent felt that this was a significant constraint on domestic growth. The same picture was reflected when firms considered factors affecting international growth except that this figure rises to 64 per cent. This position taken in conjunction with the relatively low awareness levels of Scottish Trade International (57 per cent) and similarly with their Local Export Partner initiatives (20 per cent) might indicate that more work could be done in this area to assist the supply base.

44 per cent of the supply base felt that there was insufficient domestic demand to justify growing the business, this figure reduced to only 17 per cent for the overseas growth. This could be connected to the lack of Market Information in as much as a company that did not have enough market information might be unable to properly estimate demand.

Finance

31 per cent of suppliers felt that this was a significantly limiting factor in restricting domestic growth and 30 per cent felt the same about their overseas position. Again without the proper market information it might be harder to determine how much the expansion would cost and what the expected returns would be, that is one possible interpretation. 22 per cent of suppliers felt that the risk of currency exposure would be a significant deterrent to growing overseas.

Costs outweigh Benefits

31 per cent of suppliers felt that this was a significant issue in the domestic market and 46 per cent felt the same about the overseas market. Suppliers of Tools and Precision Machining were significantly represented here, perhaps this could be due to the fact that even if there was increased demand it might not be enough to cover the cost of additional capital equipment or the cost of additional human resources. Again with limited market information this could be a particular gamble for a capital intensive organization. In addition to this the skills shortage was also flagged by 40 per cent of suppliers as being a problem.

Loss of Organizational Control

13 per cent of suppliers felt that this would be a problem for domestic growth, this rises to 20 per cent for overseas development. The complexity in co-ordinating and configuring the firm in overseas activities might be a possible reason for the increase.

International Sales - Restrictions

Listed below are the main factors that restricted firms from selling internationally.

International Sales - Methods

The results of the survey indicated that 34 per cent of firms were already involved in a strategic Alliance/Joint Venture and that of the balance who are not, 66 per cent of them would consider doing so in the future. 80 per cent indicated that they would consider a Joint Venture with a foreign firm in that firm's country. 38 per cent already use an Agent or Distributor and of those that do not 56 per cent would consider using one in the future.

On the export side there seemed to be relatively low awareness levels of the main

government funded organizations whose role it is to promote exports; namely Scottish Trade International (only 57 per cent aware) and Local Enterprise Partners (20 per cent aware). This may partly be explained because companies only remember the organizations that are of particular interest to them. As a number of companies were not interested in exporting they had no reason to remember STI or LEC's. This may not be the full explanation and there does seem to be some scope for STI to raise its profile, particularly with such tight targets for the new millennium.

The survey suggests that there is a high customer focus in the supply base and that they are changing to meet the demands of an ever more discerning customer. Suppliers are actively involved in JIT and Design projects with many of their customers and these particular processes are particularly good at enabling good communications and relations between supplier and customer. The demand for quality by customers has been taken up by the supply base and they have spent time and money setting up systems and successfully obtaining the relevant quality standards. Teamworking would appear to be a very useful tool for the company facing tighter demands for improved quality and response. As only just over half of the manufacturers and assemblers are using this type of working then there could be large gains for the supply base

Problems for the Supply Base

Power/Location of the Buyer

A difficulty faced by the supply base is that although the major OEM's are in Scotland, the main buying functions are often concentrated overseas at the OEM HQ. This effectively means that lobbying the Scottish OEM's may only be part of the battle as they may have to reach the head office as well.

An example of this is provided by Fullartons Computer Industries, who have managed to get closer to the buyer and the OEM head office design centres by setting up an operation in North Carolina. This services the same OEMs as it does in Scotland however they are now involved in the OEM design process so automatically they get a higher status in the supplier pecking order. Any new work required can be copied very quickly for the Scottish operation. They are now looking at developing a site in China to service the OEM's there, leveraging their direct OEM design link.

The Quick or the Dead

"Scotland has to be more flexible, it has to be more responsive, it has to be more cost effective than any other Far Eastern source. We need to grasp the nettle between the OEM's and the supply chain because our corporation can truly land a product here for the same price we can get from Kilwinning and Irvine." (George Devlin, Plant Manager, Compaq). This would tend to indicate that there is still a need to develop the OEM and supply base relationship. One aspect of this is the question of size, "In some sectors the sheer scale between the OEM requirements and the supplier capability is a problem, the problem is that most suppliers are involved in low/medium volume while the OEM's are demanding high volume." (John Henderson - SPEED)

There are opportunities for growth if some of the impediments, such as skills shortages, are addressed. Activity overseas might be better handled by STI and the LEC'S, here again, in exports there is an uneven service provided by the LEC'S. If STI are to meet its ambitious targets for the new millennium it should address the awareness levels and their lines of communication to and from the different LEC'S.

Exports

Some international sales activity is already present within the supply base and this should be actively encouraged to increase the amount of business overseas. For those companies still not involved but who have the potential there should be a targeted drive by STI and their LEP's. This could take the form of a series of local (LEC) level seminars and workshops. If possible the event might be triggered off by a high profile central seminar explaining the objectives and detailing the planned programme at the local level.

Skills

This seemed to be a factor holding back growth, many of these 'skills' cannot be 'switched on' without a relatively long lead period. This lead in time could result in the loss of market opportunities. It is critical to the economy for a skills audit to be performed and any gaps identified and programmes set up now to address them. This requires forward demand analysis and consultation with customers and suppliers.

Workforce practices - Teamworking

95 per cent of those manufacturers and assemblers who used teams stated that they had benefited their business. Only just over 50 per cent of that group use teams so there may be some scope to develop the use of teams. This leaves a possible productivity potential not fully realised and possible opportunities for growth without having to increase the workforce. In addition to this opportunities exist for increased flexibility which ties in with the growing demand for JIT. More of the supply base should be adopting the teamwork approach to production if they wish to remain flexible and productive. This is an area which could be addressed by SE (Scottish Enterprise), one route would be to get the LEC's and the JIT Club involved in a series of local seminars and workshops.

Locate in Scotland

There was a lot of strong feeling amongst the supply base that LIS were spending money that the supply base could use which did not need to be spent as companies were coming to Scotland as a result of OEM JIT pressure. The RSA grants average £9750 per person and other grants are available on top of this. Scottish Enterprise could review the possibility of Joint Ventures as a future model for inward investment attraction. This is the model many western companies have to use when setting up in South East Asia.

Customer Design - Supplier Input

There is evidence of increasing supplier involvement in customer design, this has not been fully realised with the OEM's, largely because their design centres are in the USA. Some Scottish companies, such as Fullartons, have recognised this and set up operations close to US PC company headquarters. This has proved so successful that they are planning to set up a plant in South East Asia to leverage even further their Design advantage.

Design - Supplier/Customer Relations

There is evidence, from the survey that there is a closer relationship developing between suppliers and customers. The catalyst for this has been the introduction of customer JIT systems and the closer involvement in customer design.

Strategic Alliances and Joint Ventures

The survey indicates a significant willingness on the part of the supply base to become involved in this sort of activity. This is an area that could be researched more by SSBF, SE, LEC'S and STI.

Scottish Electronics Forum and Scottish Supply Base Forum

The SSBF should become more focused on what it seeks to achieve in terms of its lobbying and in doing so provide a better service for its member companies. In this respect it can learn a lot from the SEF and its operation. The Scottish Supply Base Forum suffers from a lack of power and co-ordination, living in the shadow of the Scottish Electronics Forum. SEF does seem to achieve targets and it does this by bringing the strength and power of the OEM companies together. This enables them to lobby LIS with a shopping list of companies they would like to locate in Scotland. It also enables them to get something like the National Microelectronics Institute off the ground and have specially designed training courses that match their needs.

These organizations are now formally linked and the OEM's are getting a measure of what the local firms can supply. To be effective both organizations must get past the talking stage and get down to real business.

As Porter says in his Monitor Report, "Scotland must defend and build on its current position as a value added logistics gateway into Europe by developing advanced supply logistics and communications capabilities. These actions must be taken now to mitigate the threat of multinational investment in the next couple of years....addressing short term survival needs will not be sufficient....Scotland must strengthen its core skills and add a new portfolio of market driven activities.... Scotland must focus its efforts on developing key 'enabling technologies' and turning them into reality. Candidates include optoelectronics and photonics.....In doing so, Scotland will be assured a continuous pipeline to fuel its cycle of innovation, while reinforcing its image as a high technology centre." (Scottish Business Insider).

It would appear that there is still a lot to be done in terms of creating a significant Scottish segment of the electronics industry which can satisfy the needs and demands of foreign operations let alone develop export potential.

However, the growing development of the SSBF and its relationships with these organizations will go a long way towards assisting these supply logistics. With pressure on LIS not to poach foreign investment from elsewhere in the UK, the growth and development of supply linkages may become even more critical. For example, if foreign operations begin demanding the arrival of their own foreign suppliers, and there is evidence of this already happening, it increases the level of local value added but the future of the traditionally Scottish end of the supply base will be placed in jeopardy.

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Table 1 - Methods of Dealing With Temporary Demand

Method	(%)of companies
Overtime	95
Temporary	51
Sub-contract	35
Night Shift	31
Twilight Shift	26
Part-Time	13
Buy	06
Other	02

Table 2 Supplier Ranking of Features

Rank	Feature	Important	Of which very important
1	Quality	95	95
2	Reliability	93	97
3	Price	90	79
4	Understanding your business	77	57
5	Recognised quality standards	62	42
6	Being local	57	30
7	Growth capacity	57	42

Table 3 Local Supplier Weaknesses

Rank	Feature	(%)
1	No product	53
2	Price	35
3	Capacity	31
4	Quality	22
5	Reliability	17

Table 4 Benefits of Using Teams in Manufacturing and Assembly

Feature	Significant	Of which very significant
Quality	90	83
Flexibility	90	83
Workforce relations	90	66
Productivity	90	66
Efficiency	85	60
Absentee levels	75	40

Table 5 National Origins of Competitors

Country	(%)
Rest of UK	71
Scotland	68
European Union	48
USA & Canada	40
Taiwan	22
China	22
South east Asia	17
Korea	13
Japan	13
India	08
Europe (Non EU)	06

Table 6 Factors Affecting Domestic and International Growth

FEATURE	(%) firm responses (domestic growth)	(%) firm responses (international growth)
Competition	53	60
Insufficient market knowledge	31	64
Skills shortages	44	40
Costs outweigh benefits	31	46
Finance	31	30
Currency exposure		22
Insufficient demand	44	17
Loss of organizational control	13	20