Science and technology based SMEs: learning from the market place

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Abstract This paper presents the findings from an Objective 4 research project funded through the European Social Fund. A total of 60 innovative technology based SMEs in the Aberdeen area agreed to take part in structured interviews which addressed a broad range of strategic issues. Information was gathered on the knowledge exchange practices utilised by these companies for example seminars, co-operative working arrangements and in-house training. Many other sources of learning such as project reviews, practical experience and brainstorming meetings were also discussed. Although the 60 companies taking part in this research have many processes in place which can aid organisational learning, it is unclear how conscious they are of the value of these processes. The sample companies are moving through a learning cycle, akin to that developed by Kolb, by reviewing and acting on learning experiences. However there are considerable differences in the time invested in this process. Few firms are translating their learning experiences into documented format to ensure that knowledge is available to all.

Introduction
The findings presented in this paper come from a European Social Fund (ESF) project which began in 1998. The project falls under Objective 4 and is aimed at identifying skill requirements in innovative small- to medium-enterprises (SMEs) in the Aberdeen area. These companies are going through rapid industrial and technological changes and it is important for them to identify the impact of industrial change on their skill requirements. The methodology employed in this two-year project involved conducting a series of semi-structured interviews with company owners/directors during which they provided examples of markets to which they currently sell and how they position themselves within these markets. Discussion also centred on the identification of the strategies and factors influencing market positioning plans. Further interviews explored human resource (HR) issues such as training and development and skills forecasting. These interviews allowed an

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assessment to be made of the extent to which HR strategies were linked to business strategy. Between 1998/1999 20 companies took part and a further 40 companies took part in the study in 1999. The participant companies were classified as software development, advanced engineering, analytical services, instrumentation and bio-science/technology. The study will be completed in May 2000.

The strategies employed by new technology based firms such as those in software, advanced engineering and instrumentation are geared towards identifying, establishing and maintaining a market niche. These companies are seen to be potentially capable of contributing to local and national economies through the employment of skilled labour, secondary effects on the supply chain and international sales. Indeed, new technology based firms (NTBFs) based on (and off) Science Parks “grow markedly faster and have lower closure rates than similar businesses outside the technological sectors” (Westhead and Storey, 1994). The competitive edge for NTBFs arises from their tacit knowledge and through the production of innovative products differentiated from other similar products on the market. These products can be adapted to suit specific industries and those with a holistic view of a product’s potential may gain sales in different markets. The management and development of an organisation’s knowledge base is therefore of significant value to the development of the organisation itself.

NTBFs working within large industrial networks can experience major problems. Examples of these include the role of the NTBF within the supply chain of a strategic alliance/partnership, where the small firm has little say and in many cases has to bring their objectives into alignment with their senior partners. The small firm may also lose part of their competitive advantage by divulging unprotected information. This can open them up to the possibility of exploitation and they may lose rights to their intellectual property. Joint projects can also mean that the small firm often takes the risk of financing the research and development of a new product (see Keogh and Evans, 1999).

As companies grow and develop, lines of communication become more complex and knowledge exchange among the various technical and commercial disciplines becomes more difficult. Increasing attention must be paid to organisational processes, such as knowledge management, to ensure information flows freely and the firm remains adaptable. The Scottish Development Plan (para 1.1, 1998) highlighted the ongoing decline in the primary and manufacturing sectors and the development of an all pervasive “knowledge economy”. Hence companies are being encouraged to put learning at the core of their strategies. Government initiatives, such as the University for Industry and Individual Learning Accounts, are in place to ensure encouragement and support is given to individual and organisational learning.

One of the aims of this paper is to examine organisational processes, including learning processes, and the strategies employed as a result of
learning experiences. Strategic issues are explored in relation to the learning experiences of the sample of firms as they endeavour to maintain their niche markets, whilst identifying new markets and potential new products/services.

**Business in the Aberdeen area**

Although Aberdeen, recognised as The Oil Capital of Europe, is the principle base for the North Sea Oil and Gas Industry (see Bower and Keogh, 1997) other industries such as tourism, food and drink (including whisky), software and engineering are of importance. The forecast loss of approximately 11,000 oil related jobs before the year 2011 (Aberdeen City Council and Aberdeenshire Council, 1997), has contributed to the development of a long-term regional development strategy which aims to compensate for the decline in oil related jobs. This strategy identifies the development of non-oil and gas industries as key to the long-term sustainability of the economy (Grampian Enterprise, 1997).

The food and drink industry and the paper industry can exemplify the importance of non-oil and gas industries in Grampian. These provided 47 per cent of the exports from Grampian in 1997 and the Grampian region in fact provides approximately 40 per cent of Scotland’s paper export sales. At present however, oil related technology based firms remain of great importance to the area. Within the Oil and Gas Industry, growth has been most recently seen in the manufacture and export of rubber/plastics and precision instruments (The Scottish Council, 1998). There are high numbers of these and other technology based firms in the local area, some of which are non-oil related and these numbers are expected to increase by 10 per cent until the year 2000 (Armstrong and Hughes, 1997). Defined sub-sectors, including electronics, telecommunications, biotechnology, medical technology, environmental technology and high value engineering/instrumentation collectively contribute approximately £730m to the local economy (Grampian Enterprise, 1997).

Research findings indicate that many NTBFs in the Aberdeen area are actively seeking work outside the Oil and Gas Industry and, indeed, many have no links to oil and gas. The development and support of these and other oil and gas related NTBFs is a high priority for local enterprises and other government agencies. For example, start-up facilities and ongoing support are provided at the Aberdeen Science and Technology Park and the Offshore Technology Park. The forecast growth of high technology firms provides the opportunity for key stakeholders to enhance skill levels in the region by attracting and retaining highly skilled workers.

Many large multi-national oil and gas companies have an established base in Aberdeen, and this provides opportunities for local NTBFs to enter the international market. The region has an international outlook with small and large firms accounting for £191.7 million and £337.9 million of local exports respectively. This represents a 16.7 per cent growth in the value of small company exports over previous years (The Scottish Council, 1998). With the growth of technology based firms, there is potential for sales to increase even
further. Countries within the European Union are the most common destination for Grampian manufactured exports with increasing sales into Norway due to oil and gas links.

Competition among NTBFs in the Grampian region is intense, particularly with so many SMEs focusing on the Oil and Gas Industry and occasionally placing themselves as a direct competitor to one of the multi-nationals. Innovation is key to the success of these firms and is used as a tool to identify niche markets and to distinguish products and services from those of their competitors. The sharing of knowledge, both within and between companies, has been recognised as conducive to the process of innovation and measures have been introduced to promote collaboration, innovation and communication among companies. These include knowledge exchange forums and the supply chain management initiative. Deakins (1999), when discussing the meaning of the term innovation, suggested that an innovative company need not necessarily produce a technological innovation, they may use technology produced elsewhere in an innovative fashion or simply devise an innovative method of production. Based on these definitions it is apparent that the sharing of knowledge, technology and methods of best practice between companies and even industries can encourage innovation.

**Research methodology**

The research was funded through the European Social Fund (ESF) under Objective 4, priority one, strand two. A total of 60 innovative technology based firms in the Aberdeen area agreed to take part in an in-depth, structured interview. In 1998, 20 companies took part in the project and a further 40 companies took part in 1999. The project consists of two stages: an initial stage looking at business plans and strategy, innovation and entrepreneurship; and a second stage looking at human resource planning and training interventions. At the time of writing, all 60 companies had been interviewed for the first stage of the research project and 14 companies had been interviewed for the second stage.

Data was collected during structured interviews with the owner/manager of the 60 companies. They were asked to give details about company activity, present and future, and were questioned in detail about various aspects of their business including those factors which were considered as drivers (see Keogh et al., 1998, for more detail). The main aim of the project is to aid companies in the identification of future skill requirements and training needs. This meets the strategic aims of the Scottish Development Plan which highlights the importance of identifying and addressing skill needs and the need to encourage organisations to put learning at the core of their strategies. By asking companies to identify current and future activity, and getting them to examine business and management processes, the first stage of the research project identified broad areas in which skill deficiencies exist. This information then fed into the second stage of the research project which helped identify training needs and skill and knowledge gaps in more detail. The data collected gave an
understanding of the organisational structure and culture and how the company contributes towards the learning organisation initiative. A steering committee consisting of three industrialists was involved throughout the project and helped to direct the project and its output.

The learning organisation has been described by Garvin (1993) as one which is “skilled at creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights.” This involves problem solving, learning from past experiences and others, experimenting with newly learnt techniques and hypotheses and managing knowledge within the organisation. The following analysis of findings examines the organisational processes and strategic issues within the NTBFs involved in this research project, and investigates how they contribute towards the development of the learning organisation as a strategic issue.

**Human resource planning**

To differentiate themselves from their competitors NTBFs must provide innovative products and services, the provision of which is very much dependent on the quality of staff and the level of innovation encouraged. It is essential for NTBFs to have people with the necessary skills, knowledge and competencies, to ensure they are adaptable enough to meet the challenges with which a rapidly changing industry such as theirs may be confronted. The skill base of their work force must keep pace with any changes in business activity and general market trends. There is a recognised need also to develop skills, particularly in the oil and gas sector to meet the challenges of internationalisation and diversification to other like industries (Grampian Enterprise, 1997). Nonaka (1996) argues that new knowledge begins with the individual and that making this knowledge available to the company should be a central activity of the knowledge creating company. It would seem to follow that staff recruitment and retention plans, training needs analyses and staff development plans should all be in place to ensure that innovation, creativity and the dissemination of knowledge are encouraged.

This study found that the majority of NTBFs do not carry out Human Resource Planning in any depth. Their ability to react to any immediate increases required in staffing levels and to plan long-term skill requirements is therefore limited. Many of the companies involved in this study encounter difficulties finding candidates with the specific technical skills they require. Finding technically competent staff with management experience also appears to pose problems. Some companies address this issue by developing policies focused on internal training and development and promotion to ensure skilled staff are in place to fill positions as they arise. However, many companies simply extend the geographical scope of their recruitment search to find the necessary people. From the point of view of organisational learning there are various implications, whilst a policy of internal succession planning ensures that knowledge is nurtured and developed as the individual progresses through the company, there is also
the danger that an insular company culture may develop. Recruiting externally has the benefit of introducing new ideas and concepts but can lead to low productivity as the new employee is inducted into the company. Retaining high quality staff appears to pose a major problem for some of the smaller firms. They are unable to offer the financial or personal status demanded by more mature, experienced staff and even graduates can be deterred by the apparent lack of a clear career path. As a staff member leaves the organisation loses the knowledge held by that individual therefore it is imperative to ensure individual knowledge is shared throughout the company.

Staff development can aid in the dissemination of knowledge. It is essential to ensure that the knowledge, skills and experience of staff are utilised effectively. At the time of writing 14 companies had been interviewed about personnel issues including training needs analysis (TNA), performance appraisal, training provision and training evaluation. Only five companies carry out a formal TNA to identify the current skill level of employees at either the individual, departmental or organisational level. With a limited understanding of present skill levels and training requirements, the majority of companies contacted were not, therefore, attempting to assess future skill and staffing requirements. However, 12 companies carry out performance appraisals. This suggests a lack of understanding regarding the tools which can be used during a TNA. A performance review meeting can provide the perfect opportunity to carry out an individual TNA which can then translate through to departmental and organisational level TNAs. A performance review meeting can also provide an opportunity for the individual to reflect on and communicate their personal learning experiences.

Findings from this study indicate a need for management development with many owner/managers of technology based SMEs coming from a scientific or technical background with little management experience or training. Great pressure is placed upon the owner/manager of a small company to be a generalist and expert in all fields of management. Although much will be learned from experience it is essential to consider some form of structured management development. There are many forms of training intervention all of which will be best suited to a particular type of learning. Peters (1996) claimed that learning to do your job more effectively means focusing on two things; understanding the technical aspects of your job and understanding the dynamic interplay of people around you. It may be relatively simple to teach the theory of engineering and business skills but an understanding of the human elements around you can only be learnt by experience and the sharing of the experiences of others. Knowledge is often tacit and cannot be explained or documented. How then can this knowledge be transferred from one individual to another? The implementation of techniques such as coaching, mentoring and on-the-job training can facilitate the transfer and development of tacit skills and knowledge. The extent to which these issues are addressed is investigated in the next section.
Knowledge exchange practices

NTBFs in the Aberdeen area face many problems during their initial start-up such as securing investment and other finances and counteracting the effects of an often unstable economy. As they grow, it becomes increasingly important to attract and retain staff with the necessary skills and competencies to contribute to the process of innovation. Organisational learning and innovation is a group and intergroup phenomenon, therefore, in addition to technical capabilities, the individual must have skills such as problem solving, communication and team building (Tushman and Nadler, 1996). In these small organisations, it is their intellectual capital which is key. Innovative products, services and processes are considered to be high value assets. These assets set them apart from their competitors and often place them within a niche in the supply chain. However the tacit knowledge residing within employees is just as valuable but far more difficult to manage and define. According to Stewart (1997) “Intellectual capital is the sum of everything everybody in a company knows that gives it a competitive edge”. In order for the organisations to make best use of intellectual capital, they must manage the knowledge base within their organisation and encourage key staff to develop and share new ideas and concepts.

Many of the company representatives spoken to claimed to have processes in place to encourage innovation through knowledge exchange. These are largely implicit processes such as an open, freethinking culture or participatory management style (Keogh, 1999). Explicit processes include an employee suggestion scheme, brainstorming meetings, coaching and mentoring. Project and product development reviews are common, held both internally and with external parties. It would appear that learning is achieved and translated into a concrete format during these meetings as the resulting learning points are used to improve products and services and even to direct future strategies. Tushman and Nadler (1996) list various elements which can contribute to organisational learning and innovation and these include teams, committees and task forces, project managers and formal meetings. They suggest that incentives, such as financial rewards can play a role in directing organisational behaviour and some form of appraisal may be linked to this. Finally they consider motivation (through job design and rotation) as a creative force and of course training to aid the process of innovation and learning.

Internal communication plays an important role in the learning process and smooths the flow of information throughout the company thus encouraging the development of a learning organisation. Over 80 per cent of the owner/managers spoken to rated inter nal communications as very important within their organisation and included it in any strategic plans. Figure 1 indicates the responses given, with one being of little importance and five of great importance.

It is possible that the smallest of NTBFs can become too reliant on one or two key individuals and this was a problem identified by several of the owner/managers interviewed. This can be a disadvantage in that the scope of the
business is limited to the knowledge and experience of these people. During the initial growth stages of an NTBF it is not unusual to have an owner/manager who has little or no management or commercial experience. Findings from the first stage of this project indicate that a lack of general management skills increases barriers to development. This includes business skills, for example marketing skills, and interpersonal skills such as communication and motivation. The company’s reliance on one or two individuals also ties these individuals to the workplace where they can oversee day-to-day operations. Focusing on organisational learning, which seeks to develop the potential of all staff in an organisation by encouraging continuous learning, could be a solution in this situation. Although many companies had processes in place which can aid organisational learning, very few seemed to exploit these fully.

With regard to knowledge exchange with external parties, many of the 60 companies actively participate in knowledge exchange networks and at least three companies were engaged in setting up forums and networks where none previously existed. These consist of either physical meetings, discussion forums or an Internet, or intranet, based site. These provide a base which is used to exchange methods of best practice and solutions to problems. This type of information exchange, where parties from a variety of backgrounds are invited to give input, has been described as the most effective form of action learning (Inglis and Lewis, 1994). It has been suggested that input from external parties is vital to inject an objective view into a problem-solving scenario. These individuals may not even have knowledge of the area in question but by asking simple questions may direct group think in a constructive manner.

Co-operative working arrangements
One way in which to disseminate knowledge between companies and industries is to enter into some form of co-operative working arrangement. Alliencing and partnering in the oil and gas supply chain has been described as a way to “promote the long-term competitiveness of the industry”. Furthermore
it is suggested that “If information does not flow projects get behind schedule leading to increased costs. If there is no co-operation working practices can be inefficient and effort duplicated.” (Investors in People UK and Scottish Enterprise, April 1997). While these initiatives are sound in theory and often in practice, there are drawbacks, such as the vulnerable position a company may find itself in if it reveals unprotected information. Hence an understanding of intellectual property rights, and the protection of intellectual property are of the utmost importance particularly to smaller, vulnerable firms.

Many of the companies spoken to are currently involved in co-operative working arrangements, strategic alliances or joint ventures. Approximately 40 of the 60 companies are involved in working arrangements and almost 75 per cent of these are for marketing and product development. Far fewer SMEs (less than ten) are involved in projects with large corporations such as the oil giants, or joint industry projects. Reasons for this would seem to include a fear of “uneven ground” with larger companies pressurising smaller companies to conform. However, each company seems to have a different opinion based largely upon their own experiences. This is reflected in Figure 2 which indicates no real consensus of opinion about the importance of collaborative working.

Fairly informal arrangements between SMEs seem to be favoured as opposed to formal arrangements such as alliances. Only 12 companies were involved in strategic alliances or joint ventures. These formal arrangements place greater responsibilities upon each party, though bringing together management teams with different approaches to work, such as in a co-operative working arrangement, can be a great learning experience. As Kanter (1996) said, a strategic alliance is “a potent way to do more with less”. You may have a mix of learning styles (Honey and Mumford, 1992), for example an activist and a reflector, each with different approaches to situations, the two can provide a healthy balance within a management team. However, with the possibility of strong opposites working together and without an understanding of the learning styles of others, the only results may be frustration and controversy (Mumford, 1995).

![Figure 2](image_url)

The importance of collaboration as an element in strategic planning
One of the sample companies explained how they had been involved in an alliance which ended when differences in management style could not be overcome. This company is now cautious in its approach and will not enter into anything other than casual marketing arrangements. Smaller firms seem reluctant to enter into arrangements with larger companies for similar reasons, they feel they will not be allowed enough autonomy and may well be exploited. Those firms which do work closely with large companies are often working in conjunction with other small firms on a joint industry project. What is apparent is that many of the companies spoken to are reluctant to take risks and use the information they gather during their initial experiences to determine their approach in the future.

Identifying and maintaining market position
Approximately 83 per cent of the companies interviewed, from the sample of 60, sell products and/or services to the Oil and Gas Industry. This is only to be expected as many local companies will have established a base in Aberdeen specifically for this purpose. Those companies who are selling exclusively to the Oil and Gas Industry rely heavily on innovation to provide them with a competitive edge. Many firms are also price competitive giving them a clear competitive advantage. In a high-tech, fast moving environment, non-oil and gas NTBFs also indicated a need for innovation to keep them one step ahead or at least in step with their competitors. Exploiting innovation quickly was also stressed by all as a key success factor. Companies were asked to quantify the importance they place upon innovation and the responses are indicated in Figure 3.

The importance of innovation is also highlighted by the fact that all but one of the companies spoken to committed financial resources to research and development. Approximately 38 per cent of the 60 companies spent 10 per cent or more of their annual turnover on research and development activities.

Many companies appear to be investigating other industries for potential sales and/or taking their products and services into other countries in an

Figure 3.
The importance placed upon innovation as an element in strategic planning
attempt to diversify and lessen their reliance on a single product, country or industry. This can lead to a situation where the company is thinly spread with no real focus or core activity. Conversely some firms have taken the strategic decision to remain focused on core capabilities, which includes focusing on one industry or one country until they feel they have the resources to diversify. The majority of companies who deal largely with clients in the Oil and Gas Industry seem to have realised the benefits of seeking work outwith this industry, preventing too great a reliance on such a boom and bust industry. They are applying or adapting their technology to suit alternative industries. Information leading to the identification of potential markets seems to come most commonly from external networks, such as information sharing networks, trade magazines and contacts or agents.

The findings from this section indicate that market opportunities are identified through information held within the company, together with information gathered from external sources. There appears to be little planning associated with marketing strategy, in the sense that new sales are often made on an opportunistic basis. This is not to say that new markets are not proactively sought out, but very few companies have strict criteria for the selection of new markets. Only one company stated that they would turn down an opportunity for new business if it veered away from company strategy. The majority of strategic planning appears to be emergent, led by senior management with staff being encouraged to contribute. There appears to be a general lack of strategic planning among the sample NTBFs. With the many pressures facing SMEs it is easy to see how strategic planning could be approached with reluctance. Plans can often become redundant within months due to external variables, particularly in a developing company which is in the process of establishing core values and capabilities. Emergent strategy evolves with the company and is based very much upon experiential learning. As a company encounters new situations people pull on their own learning experiences to suggest different approaches so emergent strategy is guided by individuals their experiences and their interpretations of situations (Peters, 1996).

**Internationalisation**

Producing an innovative product or service and actually finding or creating a market for it can prove to be two separate issues. The market positioning of products and services is therefore important and information flow plays a major part in achieving success in the market place. This research identified skill gaps in the area of marketing which can hinder a firm’s ability to commercialise technology and sell to all potential markets, including those internationally. The international potential of the products and services of many new technology based firms is recognised by the key stakeholders in the Grampian Region. Many of the large multinational oil and gas companies have established bases in Aberdeen, therefore providing opportunities for smaller local firms to enter the export market.
A recent survey by the Export Partnership (1998), an alliance between Aberdeen City Council, Aberdeenshire and Moray Councils, GEL and the Aberdeen Chamber of Commerce, found that just over half of the companies they contacted in the Aberdeen region exported their products and/or services. Many claimed that a lack of knowledge about the exporting process and international marketing strategies deterred them from entering the export market. Findings from the study to date demonstrate that there is recognition of the potential for new international sales. Over 80 per cent of the firms taking part in this Objective 4 research were found to be making international sales. This may be linked to the fact that, as mentioned earlier, many NTBFs in this area (and involved in this research) are selling to the Oil and Gas Industry which is international in nature.

In their search for new market opportunities even the smallest firms are networking outwith the UK, many having made initial sales. However, observations from the study indicate that the individual and organisational learning achieved by the owner/manager and their management teams plays a significant role in how the companies proceed. A key example involves the internationalisation process, where those companies who set up a base in a foreign country have had to adapt to cultural differences, business practices and legal frameworks. Of 60 technology-based companies interviewed for this research project, all but five were selling products and services internationally. A total of 19 had non-UK sales which accounted for 50 per cent or more of their annual turnover. Even some micro-firms (> ten employees) had 50 per cent or more non-UK sales. Figure 4 indicates that well over half of the firms interviewed considered plans for internationalisation as important when producing a company strategy.

Strategies employed when embarking upon sales outwith the UK depend very much on the market situation of the company and experiences they have had. Interviewees were shown a model of internationalisation which indicated the steps they potentially progress through on route to establishing a foreign base. They were asked to highlight their current position and discuss what relevance they felt the model held for them. From this information it became

![Figure 4](image-url)

**Figure 4.** The importance of internationalisation as an element in strategic planning
apparent that approaches to internationalisation differ. The majority of companies have a structured approach, identifying the potential country and company carefully and networking to form contacts before making any advances. One company has used past experiences to develop a list of criteria which have to be satisfied before they will consider selling their product or service. In this case they have taken learning experiences and translated them into organisational memory. The form in which the company will establish a presence was also carefully considered, many companies choosing merely to appoint a representative and not establish a physical base. Franchising is also being considered by some as a slightly less risky option.

Conversely, some firms have embarked upon internationalisation in a fairly unstructured, but no less successful, manner. Commonly, international sales are made “on the back of” an existing contract with an international company or through informal networks. Here the companies are “learning by doing” as in Revan’s Action Learning (1983) and unsuccessful ventures are simply closed down and the lessons learnt carried through to the next venture (Active experimentation in Kolb’s Learning Cycle, 1974). Overcoming political and cultural differences can provide a major barrier to a small firm seeking international sales and it is apparent these factors have, at times, proved an insurmountable obstacle.

Conclusions
The learning observed by the research team is akin to the Kolb Learning Cycle (1974) in that the organisations identify their experiences, review and analyse them, examine learning outcomes and hence put these concepts into practice. Action learning, as identified by Revans (1983), would also seem to dominate learning strategies with management teams and individuals learning by doing. Although some firms invest considerable resources in this activity, others do it in a piecemeal, reactive fashion. However, what is significant is that they are all learning.

If, as Nonaka (1996) says, knowledge begins with the individual then there are two major issues for the learning organisation to address. First, it is necessary to attract and retain knowledgeable and innovative staff (who will create knowledge). Second, the individual’s knowledge must be somehow disseminated throughout the company. This transfers it from the individual’s memory into the organisation’s memory and the process of knowledge sharing may in itself lead to the creation of new knowledge. Addressing these issues requires recruitment and retention plans, training and development plans and processes for promoting knowledge sharing. A number of factors which would generally be seen as fundamental to the implementation of these, such as job and person specifications and an individual training needs assessment and training plan, were present in only some of the sample companies.

Internal labour markets are being developed in many of the largest of these SMEs to ensure suitable, competent staff are available to fill positions as they arise. When asked what skill requirements had been identified for the future,
many smaller SMEs were unable to comment. It may seem impossible to a small firm to adopt the processes of skill forecasting and training needs analyses seen in larger companies. However, there are basic elements of skill forecasting and training and development plans which every size of firm is capable of carrying out. It is the intention of the research team, as one of the project objectives, to take these elements and bring them together to form a “toolkit” once all interviews have been carried out in the year 2000. Many smaller firms feel their size precludes the possibility of developing comprehensive human resource plans. The overall impression gained is that the issue of human resource development, although being recognised by some as important, is not being treated as being of strategic importance.

There are a variety of knowledge exchange processes in place within the sample companies. Knowledge exchange occurs naturally during processes such as coaching and on-the-job training where experienced staff work with less experienced staff to pass on their tacit knowledge. In situations like these companies are consciously facilitating the transfer of skills and knowledge. Learning experiences such as project reviews and brainstorming meetings are also conscious efforts to encourage knowledge sharing and create new knowledge. Project reviews involve active participation in the second and third stages of Kolb’s learning cycle; reviewing an experience and developing concepts from what has been learnt. Knowledge exchange with external parties introduces new concepts and viewpoints and further increases the development of knowledge. It is apparent from this research that there are a variety of knowledge exchange processes in place within local SMEs though, without the support of processes such as performance-related pay and an appropriate company culture, the extent to which these are consciously implemented to encourage organisational learning could be questioned.

It is common to find owner/managers in a technology based company who have little commercial or management experience and in these situations it is essential for the manager to identify the skills he or she is lacking. When the company is in its infancy, with perhaps a handful of employees, pressure is placed upon the owner/manger to be a generalist; expert in all fields of management. Although the companies contacted, that had identified management skill gaps, were aware this situation had to be rectified there seemed to be a general lack of awareness as to how this could be done and where information and training could be obtained.

Ultimately, these skill gaps could be said to contribute to the lack of strategic planning seen among these SMEs. This is as one would expect on an intuitive basis, with the pressure to yield to day-to-day operational demands precluding, or at least making difficult, the development of formalised longer-term plans. There are many pressures facing SMEs, particularly in the first few years, and detailed strategic planning is seen as difficult if not impossible due to the constantly changing environment in which they often work. It could also be said, however, that this changing environment makes it imperative for the
company to have a fairly comprehensive knowledge of where they are going, what resources (including skilled staff) they require and the markets they intend to target.

Product and service differentiation is of the utmost importance to gain competitive advantage. This involves the encouragement of innovation and entrepreneurship. These were identified as important issues within the 60 companies and the majority reinvest a proportion of turnover into research and development. Price was identified as an important factor when positioning a product or service but was not seen to impart as great a competitive advantage as innovation. The obvious importance of these factors highlights the need for an organisational culture, processes and procedures that encourage innovation and idea generation.

There is variety in the strategies adopted by companies attempting to enter new markets, including those internationally. Some companies choose to concentrate on the UK market and rely on their core skills and knowledge to carve a niche and gain market share with innovative products. Some companies are in effect creating markets and demand using leading edge technology. Approaches to internationalisation seem to vary between firms, from structured to fairly informal. Some companies appear to dabble with internationalisation on an ad hoc basis, moving into an international base due to contacts made via networking or perhaps on the back of an existing contract. Here Revan’s action learning is apparent but learning experiences are not documented in any way. The remaining companies have a proactive, structured approach to internationalisation which involves great quantities of prior research and a cautious approach. Learning and knowledge obtained from experience and research is translated into organisational memory in some form of document. One example of this would be the firm which has developed a list of criteria which have to be met by a potential market.

Co-operative working arrangements are quite common although these tend to be approached with a great deal of caution, particularly where the parties involved have had previously unsuccessful experiences. These unsuccessful arrangements can arise when there is a culture clash between the management parties, each being accustomed to their particular management style. Overcoming these differences would be a learning experience in itself. Successful arrangements are a deliberate form of knowledge exchange the outcome often being a product or service which combines the know-how of each organisation.

In conclusion, most SMEs exercise caution in their approach to marketing and the diversification of products and services. They are influenced in their approach to these issues by past learning experiences and appear to draw on the conclusions produced during information gathering exercises. These can have a formal or informal format and often include external input. It is important that companies realise the value these exercises can add to their organisation and do not hold project reviews and meetings purely as a perfunctory measure. It is not clear to what extent aspects of the learning
organisation have been consciously incorporated into organisational use. Evidence was found of learning processes, such as those outlined by Garvin (1993), and of the output from these being fed into future actions. However, no one company stated that they were consciously going down the route of the learning organisation.

Kolb suggests that we are all active participants in the learning process and naturally move through a cycle of learning (Kolb, 1974). This begins with an individual or organisation having an experience and reflecting upon it and what has been learnt from the experience. Finally active experimentation takes place where theories drawn together as a result of reflection are put into practice and tested in various situations. A conscious awareness of the learning cycle and the value each stage can hold can impart greater clarity and meaning to the learning processes which may already be in place in an organisation. The learning organisation will only learn if it realises the potential of these organisational processes, its people and their knowledge. It is hoped that the proposed toolkit will be of assistance to SMEs in this respect.

References


