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ABSTRACT

Leading-edge firms (LEFs)--at the forefront of their industry in terms of growth or market share--may influence skill development through diffusion of technology, products, or practices and use of market power to set standards or change customer businesses. Study of LEFs can identify the type and mix of skills needed in the industry. LEFs are likely to use work organization, recruitment, and training practices that suggest future employment trends. Case studies of two Australian LEFs were conducted through interviews with senior human resource managers at an automotive components manufacturer and an operator of textile mills. The car parts manufacturer experienced substantial production changes from 1997-2000, and skill levels of operators have increased significantly. Because the firm requires International Standards Organization certification, it has influenced supplier companies to upgrade skills. In the textile mills, work organization is driven by the need for lean inventory and production. In the auto company, flexibility is achieved through use of casual workers; in the textiles company, the continuous production process lends itself to full-time permanent workers. In both, the following were found: (1) flexible production has increased skill demands; (2) new work organization requires more management training for broader categories of workers; (3) the national training system has proven complex and frustrating to use; and (4) both are having difficulty recruiting young apprentices. (Contains 20 references and the questionnaire.) (SK)

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**Project 2000-3 Leading edge enterprise:
insights into employment and training practices**

Michael Long and John Fischer

**WORKING PAPER No. 42
May 2002**

MONASH UNIVERSITY – ACER

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- analysis of the efficiency and equity in the training market;
- policies to improve the transition of youth from education to work;
- framework for performance measures of school completion and transition to work and study;
- the impact of VET research on policy and practice;
- equity and VET;
- models for analysing student flows in higher education and in vocational education; and
- returns to investment in enterprise training.

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1 Introduction

The early recognition of changes in the qualifications and skills required by industry can contribute to the productivity and competitiveness of the economy. Indicators of change are especially important where training is provided principally by public sector institutions that are to some extent insulated from market forces.

Mismatches between the supply of, and the demand for, skills can contribute to inefficiencies in the economy. Workers with inappropriate skills may be unemployed, or unemployed for longer than would otherwise be the case. Industry may also need to pay for the retraining of workers to ensure that they have the required skills. Importantly, the development of innovation in the economy may be hampered by the unavailability of a suitably skilled workforce. Steps to improve the match between training provision and training requirements are therefore important for economic outcomes.

This report considers the role interviews with leading edge firms can play in detecting changes in the demand for training. There are, however, alternative approaches to identifying changing skill needs. Recent innovations in monitoring the skill requirements of industry in Germany are used to place the role of interviews with leading edge firms in a broader context.

Leading edge enterprises are those at the forefront of their industry in terms of growth, or of market share, and which have extended their activities to markets beyond Australia. An examination of such enterprises should provide guidance on the type and mix of skills likely to be required for future employment in the industry in which the enterprise operates and the strategies they employ to obtain them—their skill formation strategy. The approach of these enterprises may also set industry benchmarks and affect the behaviour of other enterprises, training institutions and individuals.

Leading edge firms are likely to be influential in skill formation in a number of ways. Their effects on skill formation may be indirect and may follow from the diffusion of successful technologies, products or human resource practices from as competitors attempt to emulate the successful practices of the market leader. The effect may be more direct where commercial relationships exist between large and smaller enterprises, either as customers or suppliers of each other.

This report examines aspects of the literature on the organisation of work. The way in which an enterprise organises its work can influence the level and type of training it requires. Enterprises can often choose to concentrate skills and knowledge in a core of workers or to disperse them more generally within work teams. Similarly relations of production based on hierarchy or teamwork require different management approaches and skills.

The report presents two case studies of leading edge firms, one of a car component manufacturer and the other of a spinning mill.

Several implications are drawn from the case studies:

- Greater emphasis is given in leading edge firms to the importance of continuous production and preventative maintenance. The skill needs of

operatives have increased and been transformed. The principal role is not one of repairing breakdowns in production lines but of preventing breakdown in the first place.

- Both companies have moved to provide at least some of their own entry-level training as private providers. Both have also maintained links with public providers, and one in particular seems to have been successful in forging a strategic alliance with a public provider.
- Interest by (particularly young) workers for trades and operative positions may be waning. Enterprises are finding it harder to recruit young people with the aptitude and ability to be trained in the increasingly complex tasks required of them.
- Flexibility of production, the ability to operate with shorter production runs, can provide a competitive advantage in the domestic market. Production flexibility, however, is more demanding on the skills of the workforce. Flexibility and multi-skilling has been a condition of their survival and expansion.
- The introduction of flatter management structures and work teams has increased the need for management training among a far broader category of workers.

2 Approaches to the early recognition of changing skills needs

Conducting interviews with leading edge firms is only one of many possible approaches to identifying changes in the demand for training. This chapter draws on recent German experience to map the wider array of techniques that can be used to identify developments in industry skill requirements. Germany has introduced a multi-faceted approach to the detection of changes in the skills needs of industry (Reuling, 2001). The aim is to recognise early trends in skills and qualification needs to improve the efficiency of training provision and enhance the competitiveness of the German economy.

In Germany, skills needs and their consequences for vocational training are the domain of employer organisations and the trade unions. New developments, on the other hand, often occur outside these established structures. The system for the early recognition of trends in skills and qualification needs in part provides an institutional basis for addressing these developments. The system might also help to make occupations more flexible and to reduce divisions between initial vocational training, further vocational training and higher education.

The system of early recognition of trends in skills consists of:

- Studies of the skills needs of innovative or leading-edge enterprises considered to be trendsetters in their sectors;
- Forecasts of skills needs at the macro level, including international comparisons;
- Observations of practices in the workplace followed by interviews with company experts; and
- Consultations with representatives of chambers of industry and commerce or chamber of crafts about the skills needs of companies at the regional level, in particular the needs of small and medium-sized enterprises.

Additionally there is a series of approaches designed to detect emerging occupations (especially below tertiary level), to identify their skills needs and to establish qualifications for these new occupations. The creation of qualifications necessarily lags behind the emergence of new occupations and skills. For new qualifications to be established there must be a belief that any new occupation to which they are linked is relatively permanent and that the skill needs are not met adequately from other sources. Further, potential entrants to the field must be convinced that the occupation and its skills-base provide the basis for a sustainable vocation. Occupations in new industries may also need to be sponsored by a newly created institutional basis for training.

Reuling (2001) outlines the activities that lead to the early recognition of such new occupations and the accompanying skill requirements.

2.1 Regular surveys of companies

A representative panel of 2000 companies is surveyed two or three times each year on their needs for initial and continuing vocational training. The survey addresses:

- New fields of activities and skills requirements;
- Problems finding people for positions; and
- Skills deficits of current employees.

Although the surveys provide early information about new fields of work, changes in skills requirements and any associated problems in obtaining skilled staff, they do not show *what* impact *which* technical and organisational innovations are expected to have on company skills requirements and how companies will react to these.

Further work is therefore required on indicators that identify new activity and skills profiles in companies and their related training strategies.

2.2 Analyses of job advertisements

Job advertisements reflect the current skills need in the labour market. Surveys of job advertisements in daily and weekly newspapers, technical journals and online media can be used to identify new skills requirements. A content analysis of job advertisements looks for:

- New names for activities; and
- New occupational activities with new skills requirements.

Further detail is collected on a sample of advertisements. The companies that placed the advertisements are asked about:

- Any differences between the desired skills listed in the job advertisement and the profile of the applicant who was hired; and
- Skills deficits of applicants who were not hired.

2.3 Surveys of training providers

Demand for new skills is usually met first by suppliers of new investment goods or services or by in-house training. A little later, if demand increases, specialist training providers begin to offer continuing vocational training (CVT) to meet that demand. Changes in CVT courses reflect changes in skills needs. Surveys of new courses offered by CVT providers can help to measure:

- New skills/fields of occupational activity;
- New combinations of traditional profiles; and
- New target groups.

Surveys of training providers have two problems. First, it is difficult to identify 'innovative' or new courses. Second, providers are being asked to reveal commercially sensitive information that may assist their competitors. To address

these issues, the German Federal Institute of Vocational Education and Training (BIBB) organised a *CVT innovation contest*. Participants in the contest were asked to:

- State in what way the program was innovative;
- Describe their innovative training program as precisely as possible in terms of its content, target group, learning goals, and so on;
- State how training needs were determined; and
- Describe what response the program had met with in the market.

The contest received 203 entries. New specialised content was the innovative feature in almost two-thirds of the programs specialised content. One-third of the measures related to the development of *key skills*. Overall, the contest proved to be a useful approach to surveying providers offering CVT. Future contests will be designed to have a more effective public-relations impact and will be better targeted in order to increase the number of participants.

2.4 Surveys of experts on company change processes

Increasingly companies are employing external and internal consultants who offer programs on organisational development, including identifying the skills needs of enterprises. These consultants may provide an important source of information about current skill needs.

2.5 Observation of fields of activity outside the scope of the Vocational Training Act

In Germany, as in most OECD countries, the personal services sector is growing quite rapidly. Because of the often informal nature of employment, occupations in this sector are often under-represented in official statistics and only rarely have an established employer association.

A variety of formal and informal approaches are brought to bear on the task of identifying new occupations in this sector and their associated skills needs, including:

- Analysis of book publication lists and sales;
- Evaluation of reports by public institutions;
- International reporting systems (eg. CEDEFOP);
- Awards for innovative production or training measures;
- Analysis of changes in legislation;
- Analysis of content of, and participation in, initial and continuing vocational training programs;
- Analysis of topics selected by significant technical journals and focal points of sales by publishers of trade literature;

- Job advertisements for personal services, particularly in the local press; and
- The evaluation of industrial relations agreements.

2.6 Prospects

Reuling (2001) notes that it is still too early to assess the benefits and usefulness of this multi-measure approach towards early recognition of skill trends and qualification needs. The process only began in 1998 and results have not yet been systematically compiled on all the projects in the network, let alone been able to influence training provision. Clearly, though, information about training needs from leading edge firms provides at best only a small part of the total picture.

3 Training and developments in the workplace

3.1 Introduction

The previous chapter outlined several approaches to assessing changes in the demand for skills and training. In addition to the investigation of labour market trends, surveys of companies, training providers, organisational consultants and job advertisements (among others) may provide early indicators of changes in the demand for types of jobs, skills and training. This chapter examines the contribution to the understanding of changes in the demand for skills that can be provided by interviews with managers of firms – especially managers of what might be termed 'leading edge' firms.

3.2 Leading edge firms

'Leading edge' enterprises are those at the forefront of their industry in terms of growth, or of market share, and which have extended their activities to markets beyond Australia. An examination of such enterprises should provide guidance on the type and mix of skills likely to be required for future employment in the industry in which the enterprise operates and the strategies they employ to obtain them – their skill formation strategy. Their approach may also set industry benchmarks and affect the behaviour of other enterprises, training institutions and individuals.

Leading edge firms experiment with and introduce new patterns of work and skill before they become widespread across industries or occupations. These new skills and patterns of training may not be immediately evident in traditional skill forecasts based on contemporary survey data, but if monitored will provide indicators on the future direction of demand for skill and training.

A pilot study of leading edge firms in several industries found that:

- Each company had a dominant profile within its industry sector that allowed it to set standards for sub-contractors and component suppliers. This places the enterprise in the role of teacher and diffuser of technology and skills to supporting companies.
 - Training for skills in new technology areas is, in the first instance, usually provided on an in-house basis by established training departments.
 - Each enterprise experienced deficiencies in the existing institutionalised systems of training with regard to meeting new skill requirements (Burke, *et al.*, 1998).
-

3.3 The influence of leading edge firms

Leading edge firms are likely to be influential in skill formation in a number of ways. Their effects on skill formation may be indirect through the diffusion of successful technologies, products or human resource practices from leading edge firms to competitors who try to emulate the successful practices of the market leader. The effect may be more direct where commercial relationships exist between large and smaller enterprises, either as customers or suppliers.

Where there is a direct customer/supplier relationship, the larger enterprise is likely to use its market power to set standards for product quality, timeliness of delivery and reductions in costs – standards with which the supplier enterprise must comply. In turn, the supplier enterprise will need to upgrade its skills or to change the mix of skills it employs.

Leading edge firms are also likely to influence how customer enterprises conduct their businesses. They may provide technical information and training in the use of their products. They may promote an awareness among end customers that creates expectations that their distributors must meet – often through upgrading the skills of their employees.

A large enterprise may also be a major supplier of skilled employees to its industry. Indeed previous employees of large leading edge firms may found new enterprises. Employees are also likely to move between enterprises within the industry. TAFE may use the skill requirements of the leading edge firm as its exemplar for practice in the industry. While it need not be expected that a smaller enterprise will mirror the training practices of larger firms, it will nevertheless be influenced by those practices.

3.4 The context of training

The demand for training is associated with technological and organisational change -- it exists within the context of production. Case studies are sometimes thought of as isolated examples. In the present case, however, they provide the opportunity to locate training within the larger context of production. It is likely that leading edge firms will have in place, or be planning to adopt, methods of organising work and practices in recruiting and training their people that will provide a window into the future of employment in their industries.

Changes in the organisation of production can occur on a large scale. For example, the traditional distinctions between retail, manufacturing and services and between exports and imports are becoming progressively less clear in Australian enterprises. Enterprises that would normally be considered to be 'manufacturers' can choose to manufacture or assemble products, or focus on selling or servicing products. Such enterprises have a complex mix of import, export, onshore and offshore supply. Among manufacturers, there is increasing focus on production-related services, as well as providing product locally or overseas. Similarly, enterprises that identify themselves as retailers are increasingly involved in manufacturing related distribution and goods related business services.

For instance, this increasing service orientation within manufacturing is reflected in the textiles, clothing, footwear and leather (TCFL) industries. The employment of

managers and professionals in manufacturing, wholesaling and retailing has grown from 27,308 in 1986 to 35,498 in 1996. Employment of managers and professionals in clothing manufacture itself increased from 7,276 to 9,742 (Webber & Weller, 1999). Similar changes can be expected in other areas of manufacturing, which has previously been a mainstay of vocational training.

These shifts have profound implications for education and training provision and planning. The dilemma for the industry is that while success depends more and more on intellectual capital at all levels, the industry has limited capacity to improve its standards overall. There are new skill requirements in IT, E-commerce and export marketing that need to be met.

3.5 The influence of new technology

Even industries such as TCFL, in which enterprises often provide low levels of training, are adopting sophisticated technologies. Complex information technology is required for value chain management on a global scale. Remarkable technologies are emerging in the fibres industry, including temperature-regulating fibres, fibres with antibacterial, deodorising, UV resistant properties. The development of a new super-strong fibre created by implanting spider genes into a specially bred herd of African dwarf goats was announced recently. Local companies are involved in strategic alliances of all sorts (Burke & Fischer, 2000).

New technology is a well-recognised driver of training (Hayton *et al.*, 1996). Its effects, however, are not unambiguous in the current global environment. Often enterprises cannot depend on public provision to meet their training needs. They resort to their own resources, if they have any, or rely on support from the suppliers of the technology. An increasing problem for enterprises is that as Australian companies rationalise their activities, overseas companies do so on a global scale. This can lead to the withdrawal of support services from Australia - training, maintenance, advice - and the imposition of considerable cost in bringing people from overseas or sending staff overseas for training. While it is unclear how education and training policies and strategies can address these trends, these developments are important influences on the levels of skills formation in Australia.

3.6 The organisation of work

The organisation of work effects the level of training required by an enterprise for its optimal performance. Routinised production techniques centred around a core-periphery model of a highly skilled core of permanent workers and a relatively low-skill group of peripheral workers can contain costs associated with training - but only by forgoing the advantages associated with flexible production techniques that require a more highly trained workforce.

The OECD investigation of enterprises as the units of value-creation has identified two aspects of labour flexibility: *numerical flexibility* (the ability to change the amount of labour) and *functional flexibility* (the ability to improve the quality of labour) (OECD, 1986, 1989, 1997a & 1997b). Chapter 2 drew attention to the expansion of casual labour in the Australian economy.

The two forms of flexibility contain an inner tension. The drive for greater numerical flexibility in the workforce leads to an expansion of forms of labour (part-time or casual employment) that have a substantially lower incidence of training (Roussel, 2000). The creation of a value-adding, functionally flexible workforce, however, requires an expansion of training.

Functionally flexible workplaces (also referred to as high-skill, high-involvement workplaces, or high performance work practices) (Osterman, 1995; Applebaum & Batt, 1994; Betcherman *et al.*, 1994) are defined by the way in which work is organised. Flexible work practices include: flatter management structures, greater devolution of authority, work teams, fewer job classifications, job rotation or flexibility and higher levels of training of non-managerial (particularly shop-floor) staff. Although flexible work practices are often contrasted with assembly-line production, many of the case studies in the literature involve enterprises or industries in which production is built around assembly lines (for instance, automobile manufacture, steel mills, timber mills).

Flexible work practices have been introduced to improve productivity and profitability – and there is evidence that they do. An analysis of published and unpublished case studies of workplace innovations in North American businesses between 1961 and 1991 considered 31 policies related to human resources (fewer job classifications, multi-skilling, different types of work teams, features of compensation systems, and communication procedures) and 14 indicators of economic performance (output and productivity, quality and cost) (Macy & Izumi, 1993). Of those studies that showed changes in economic outcomes, 75 per cent reported positive outcomes (although companies may be more likely to provide information on successful innovations). The number of innovations reported was also positively related to improvements in economic performance – the more aspects of functionally flexible work practices, the greater the improvement in the economic performance of the enterprise.

Another review of the literature on flexible work practices also found that systems of participatory work practices have economically important effects on the performance of enterprises (Ichniowski, *et al.*, 1996). This review concluded that innovative human resource management practices could improve business productivity. The effect is primarily through the use of work practices that enhance worker participation, flexibility in the fulfilment of tasks and the decentralisation of managerial tasks and responsibilities.

Flexible work practices have already been widely adopted in enterprises and there is a trend to their increased implementation. OECD analyses of surveys in 10 European countries, Australia and the U.S. found that within the previous three years more than half of all workplaces had introduced at least one initiative designed to produce a flatter management structure, encourage greater involvement of lower level workers, introduce team-based work organisation, or increase job rotation (1999).

A review of the U.S. literature on innovative work practices found that a majority of businesses had adopted some forms of innovative work practices designed to enhance employee participation such as work teams, contingent pay-for-performance, or flexible assignment of multi-skilled employees. Only a small percentage of businesses, however, had adopted a full system of innovative work processes. The diffusion of new workplace innovations was limited, especially among older businesses. Enterprises face a number of obstacles when changing

from a system of traditional work practices to a system of innovative work practices (Ichniowski, *et al.*, 1996).

Some enterprises are more likely to have introduced functionally flexible work practices than others. In general, adoption rates for these practices increase with enterprise size, the rate of technological change, and the degree of international competition. Flexible strategies appear to be most prevalent in manufacturing, however it is evident that similar changes are occurring in the service sector (OECD, 1997b). Indeed, it might be argued that in service provision there are inherent uncertainties associated with customer interaction that make labour flexibility even more desirable.

The concepts behind flexible work organisations can be applied to smaller enterprises. Kling (1995) cites the example of Federal Express couriers who decided on their own delivery routes, the sharing of loads, and so on without the intervention of supervisors. Although FedEx is a large enterprise, the implementation of these practices was on a local level and at relatively small workplaces. Such a case is presumably transferable to a transport company with relatively few drivers on a work site.

The consequences for the enterprise-based demand for training from changes in work organisation can be substantial. Workplaces with flexible work practices tend to train more than other workplaces – in part because knowledge and skills need to be more widely distributed within the organisation and partly because the work practices themselves require additional skills. Even though occupations may be unchanged, the skills required by workers in those occupations have.

The literature on high performance workplaces also supports the view that any increase in outcomes from a more skilled workforce are greater when enterprises make changes in sets of work practices and related organisational policies (Keep & Mayhew, 1999; Maglen *et al.*, 2001). Strategies designed to increase the level of training or skills may miss the bigger picture if they do not consider the context in which those skills are used.

One of the features of small, high-technology 'leading edge' firms reported by Curtain (1995) was the failure to implement sophisticated human resource policies. Recognition of the importance of skills formation for the success of the firm did not extend sufficiently beyond the knowledge workers essential to research and development.

3.7 Case studies – leading edge firms

The next chapter presents two case studies of leading edge firms. The firms were included in an earlier pilot study (Burke, *et al.*, 1998). Some of the focus, therefore, is on changes between 1996-97 and 2000-1. The data were collected by interviews with senior managers within the human resources of each enterprise. The interviews covered several areas related to the demand for skills:

- Products – current, new, and anticipated;
- Production technologies – current, new, and anticipated;
- Skill requirements;

- Training needs; and
- Global issues, including:
 - The adequacy of the knowledge and skills of workers in the company;
 - The firm's ability to recruit skilled workers;
 - The adequacy of public training providers in meeting the needs of the firm;
 - What governments could do to encourage more training.

A further chapter draws out the implications for the training system from the two case studies.

4 An automotive components manufacturer

When the interview was conducted in December 2000, the company employed about 1800 people at its national headquarters in Melbourne. The company is a regional subsidiary of a multi-national that has its headquarters outside Australia, manufacturing plants in some 80 countries and a product service network in 130 countries. The core business of the company is the manufacture and supply of automotive products, which accounts for nearly 70% of total turnover and which drives the growing export business. The company also imports and supplies products manufactured by other members of the group – power tools, household appliances, gas hot water systems, car audio equipment and testing and diagnostic equipment -- for a network of over 50 distributors throughout Australia, New Zealand and the Pacific. The automotive product range alone consists of more than 40,000 part numbers.

The automotive products manufactured for local and export customers include Anti-lock Braking Systems (ABS), engine management systems, fuel injectors and fuel rails, throttle bodies, fuel pumps, Vehicle Security Systems (VSS) and On-Board Electronics (OBE), diodes, starter motors and alternators. The company is also the first large-scale manufacturer of silicon chips in Australia and only one of two plants in the group manufacturing diodes. The silicon chips are an integral component of alternator diodes, which are produced primarily for export. The steering wheel angle sensor used in the Electronic Stability Program (ESP) is also manufactured in Melbourne for global distribution.

The company has overall responsibility within the group for Automotive Original Equipment in the ASEAN region and worldwide responsibility for development and manufacture of automotive on-board electronics. Products include modules and electronic controls for security, comfort, climate control, window operation, driver information, memory functions for seats/mirrors and electronic network systems. Many of the leading vehicle manufacturers in the world are among the company's customers.

By any standards, this is a leading edge company. In 1998 it was named among the 10 most innovative companies in Australia by *Business Review Weekly*. In 1999 the company won the *Australian Export Award for Large Advanced Manufacturer* – its overseas sales increased from negligible in the early 1990s to more than a quarter of a billion dollars in the year 2000. Four tonnes of electronics are airfreighted to Europe every day. In 2000 this company became the first Australian company manufacturing silicon chips for alternator diodes on a large scale to serve global markets.

The company employs more than 100 R&D engineers and has invested more than 150 million dollars over the past 5 years. The work force is supported by a sophisticated research and development facility including environmental test chambers. The company maintains strong links with numerous educational and

research institutions for the transfer of knowledge and advanced technologies to Australian industry.

4.1 Changes in production

In the 1997 interview, the Training Manager at the enterprise expressed confidence in the growth of the company. About 1200 people were employed at the Melbourne plant and this was expected to increase to nearly 2200 by the year 2000, largely driven by export growth. In the event, employment growth was somewhat less, but the overall picture was fairly correct. Employment increased by about 50% between the years 1997 and 2000 and in 2000 nearly 50% of production was exported, compared with 5% several years ago. The domestic market had provided only modest opportunities for growth.

The trend in product development has been away from the electro-mechanical to the electronic. Even between 1997 and 2000 there was a substantial change in the focus of operations. At the time of the 1997 interview, the production of the antilocking braking was the major development. Now it is being phased out as traction control braking is introduced. The production of silicon chips and diodes was a hoped-for possibility in 1997. The first production line for chips was commissioned in 1998 and by 2000 two lines were in operation. The diode assembly plant now has five lines and the enterprise supplies both its Australian competitors and overseas markets.

The shift towards larger scale production has been accompanied by a move towards automated production. Chip and diode lines are run on 12 hour rotating shifts and downtime is very expensive. Hence there is a far greater focus on preventative maintenance. Operators now drive computers that report a series of performance indicators of both the status of the production process and the quality of the product. Such changes have been associated with the introduction of cameras to examine product quality, fault-finding technologies and robotics.

Automation has led to a substantial increase in labour productivity and the skills required of operators. One operator now does the work of sixteen. The substantial expansion of production and re-training operators for other tasks has meant that there have been no redundancies among operators.

One of the features of production identified in the 1997 interview was a comparative advantage in flexible production line manufacture that permitted the profitable manufacture of a range of products in low numbers. While silicon chip and diode manufacture and the penetration of export markets have taken the company away from small-scale production, the need for flexibility is maintained in other production areas.

The somewhat different nature of much of the production in Australia also came out clearly in the most recent interview. Senior management at the company have extensive experience in production at other international plants and are said to note a far greater emphasis in Australia on flexible skills and a breadth of knowledge—workers are more likely to know a little about a lot rather than to have specialised as much as elsewhere. Workers have to cover a far more diverse product mix than in most plants within the international group, a feature that means that the Australian plant is often used as test-site for management innovation within the

group. 'Flexibility' and 'innovation' often contrasted with the 'methodicalness' of overseas production systems.

Although at the time of interview the flexibility and multi-skilled nature of the workforce was presented positively and as a distinctly Australian characteristic within an international company, subsequent public statements by the CEO cast it in a slightly different light. One of the advantages of producing for the export market is that the increased output allows more efficient continual production processes to be implemented. One source of this greater efficiency is that it is no longer necessary to train staff for a variety of tasks. On the other hand, greater training in the particular production process with which staff are involved becomes possible.

4.2 Work organisation

The ratio of operators to professional staff has changed little in the last few years, although the skill levels required of operators have probably increased significantly. Workers are organised into teams, which in turn are based on lines or collections of tasks. On average, there are about 50 workers per team leader. Teams can consist of as few as 12 workers and as many as 70. Large groups, however, are generally segmented into sub-groups. Team leaders are not the supervisors, but are more likely to be an engineer with a degree. There appears to be only limited training in team leadership.

4.3 Training

The company employs about 20 apprentices, mainly in fitting and machining and in electronics. Typically they experience difficulty recruiting young people for the available positions. Although there seems to have been little interest in encouraging adult operatives to commence apprenticeships (a possible source of recruits) the company has created career pathways by encouraging promising tradespersons to undertake advanced certificates and move into engineering. The company has offered some scholarships to employees to facilitate this process.

In 1997, and to some extent in the more recent interview, the description of the desired structure for training was one of sound initial general training provided by education and training institutions supplemented by on-going company supported in-house and external training. Nevertheless the company has sought the status of a Registered Training Provider and will be offering its own certificates in mechatronics -- a course more closely allied to its own needs.

The adult production workforce is assessed to metal industry competency standards, which are linked to more complex jobs and better pay. Workers volunteer for formal in-house or external training associated with the competencies or achieve the standards just through the recognition of skills. This approach is particularly helpful for overseas-qualified staff whose skills might not otherwise be recognised. Professional staff, particularly engineers, are subject to on-going skill audits.

In the 1997 interview it was reported that there had been significant increase in the employment of casual staff. The level of casual staff had apparently plateaued by 2000. The casual staff are employed through a labour hire company. Although more generally throughout the workforce, casual employees receive lower levels of training, the company reports providing a substantial training of casual production staff. Such training was, however, described as the “B” priority. It includes induction training, training in occupational health and safety, maintenance and quality. It is provided both on and off the job. Perhaps because of the training and skills requirement, the casual staff were often re-hired and re-employed and had the status of semi-permanence. Some recruitment of permanent staff was made from among the pool of casual staff.

The company provided little training in literacy and numeracy, although the importance of these skills was recognised in terms of the need to communicate and safety and quality issues. Instead literacy and numeracy skills were ensured by selective recruitment.

As might be expected in a multinational company, there is some foreign language training.

4.4 Suppliers

The 1997 interviews identified a ‘backwash’ effect of leading edge firms on suppliers. Interviews were conducted with two suppliers. Although the car component manufacturer provided substantial technical support, both suppliers were adamant that their subsequent expansion and improvement were not so much due to their supply relationship per se, but to the requirement that they obtain ISO and QS certification in order to be a supplier. Once this requirement was met, they became eligible to supply other enterprises with similar requirements.

Either the view at the car component manufacturer is different, or the relationship between suppliers and the company has changed in the interim. Our interview in 2000 suggests that the company’s purchasing policy and policy of tracking quality was driving change in at least some suppliers. ISO registration and QS1000 remain mandatory. In addition, however, several suppliers of materials have implemented the company’s system for tracking product quality and the company’s engineers have assisted the companies in this process. Additionally, suppliers have been encouraged to construct gap/action plans—a close investigation of the discrepancy between their current production processes and the production processes they would like to implement and then the formulation of strategies to move towards those better processes. The view was expressed that supplier development is important and that there was substantial scope for improvement in this area.

4.5 Policy

While information technology might be the archetype of the global labour market, increasingly there is a global market in skills in the manufacturing industry. The company has benefited by importing skilled workers from elsewhere in the multi-

national group and workers at the Melbourne plant have taken up positions in other plants worldwide.

It is unlikely that curricula can be written for initial courses leading to specific jobs in manufacturing. Such an ambition may be unwise in any case – jobs change and graduates need a sufficient breadth of knowledge and generic skills to either change with the job or to be able to benefit from re-training in other jobs. Education and training institutions are unlikely to have access to state-of-the-art equipment. Manufacturing enterprises need to be able to recruit well-trained graduates at a range of levels and then train them for their specific needs – even to the extent of sending them overseas for further training.

Nevertheless, the car component manufacturer believed that graduates of university engineering courses do not receive sufficient exposure to the practical problems confronted by manufacturing industry. The provision for year-long work placements as part of engineering degrees in Swinburne University of Technology and RMIT University is an exception that the company uses as part of its recruitment process.

Manufacturing industry in Australia tries to recruit young workers in a culture that seems poorly disposed to jobs in both the trades and manufacturing. Although part of the difficulty lies outside the education and training systems, some of the problem is the result of a schooling system that does not sufficiently value trade and technical education. The (re-)introduction of vocational education and training in schools is a welcome first step, but the company believed it should be extended beyond Years 11 and 12. The company also believed that there is a tendency to recruit students who are unable to cope with more academic subjects.

The initial policy emphasis on an expansion of the traineeship system as a mixture of work and formal education leading to recognised qualifications was welcomed by the car component manufacturer. The subsequent frequent changes in government policy and conflict between Commonwealth and State governments, however, have contributed to the poor image of entry-level training – neither employers nor students can understand the system. There are too many options and too many government bodies. In order for enterprises to adequately access the education and training system, they need a government counsellor who is on their side, an advocate . . . to the universities, TAFE's and training bodies.

The strategy for the improvement of entry-level training is in part obvious. The first requirement is stability of the system. The second is an emphasis on quality. Students need an incentive within the assessment system to strive for excellence.

5 The Spinning Mill

5.1 The industry

The Spinning Mill is a successful company in an industry that is generally in decline -- the textiles industry. In recent years, several other prominent Australian companies - Bradmill and Pacific Dunlop among others - have struggled to succeed. The Spinning Mill, however, has expanded through both acquisition of mills (the Moe mill) and re-equipment of existing plant. Some 30% of its production is exported to Europe, Asia and the US. Hence there is a keen awareness of the need for efficiency in production.

The Spinning Mill operates cotton spinning mills in Brisbane, Bendigo and Moe and a dye plant in Tullamarine. Each of the mills produces a slightly different form of yarn. The Brisbane mill produces high quality yarn for apparel, the Moe mill produces a thicker, coarser yarn for canvas and household goods, and Bendigo produces specialist yarns made with patented wool blends. Each mill employs about 110 people (including management) and runs 7 days a week with multiple shifts. A fire at the Bendigo mill two days before our interview caused severe damage and a halt to production.

The near secular decline in the Australian dollar against US currency during the last decade has been a mixed blessing. Mills with which the company competes are located in countries with currencies that have not necessarily appreciated against the Australian dollar. The principal raw material used by The Spinning Mill, Australian cotton, is sold in an international market priced in US dollars. Any depreciation of the Australian currency makes that cotton relatively more expensive for The Spinning Mill. Nevertheless, without the relative decline in value of the Australian dollar against the US dollar, other production costs would have increased in terms of the international market.

The Spinning Mill has some competitive advantages:

1. The relatively small size of the enterprise, its fairly flat administrative structure, and its single focus on textile production, are advantages compared with some other companies. There is a constant awareness of the imperative to be competitive across the full range of employees and management - an awareness that leads to a focus on the task.
2. The cotton The Spinning Mill sources from Australia is second only to Egyptian cotton in quality. It is described as 'super-fine cotton'. This cleaner, higher quality cotton leads to substantial savings in production costs. One of the firm's core competencies is understanding how to use Australian cotton - how to class it, how to handle it, understanding its properties and moisture level, and a close relationship with growers.
3. In the Australian market, the company has developed close ties with its customers and is able to be more responsive than overseas suppliers. It has

formalised this knowledge through customer surveys and responded to the expressed needs of its customers.

4. In the international market, it has developed patented blends that allow it some product differentiation.
5. The Spinning Mill has implemented new standard spinning technologies such as Vortex in its mills and upgraded its die plant so that it can deal efficiently with smaller production runs. It has developed proprietary processes for recycling waste, which has led to greater technical efficiencies.

Capital utilisation is high – plant generally runs seven days a week, 24 hours a day with shift work. Hence, unlike many other enterprises, The Spinning Mill employs relatively few casual or part-time workers. Full-time employment seems a natural consequence of the production process and the need for skilled workers.

5.2 The demand for skills

Although technology is an important part of an efficient production process, it is only part of the story. Just as vital are issues of the organisation of work. Management needs to focus on the performance of the business and have a vision to expand the business. The organisation needs to be customer-driven rather than production-driven. This requires a shift to smart manufacturing, with an emphasis on shorter production runs, lean inventory and lean production. Such flexibility can only be achieved by training workers not only in technical aspects of production, but in the social relations of production. Instead of being united by a production line, workers need to be organised as teams and engaged in the process of production.

The skills required for efficient production are changing, but this change is driven by organisational imperatives as much as by technology. Change is, however, driven by competition. Skills are required in management, leadership, team skills and technical skills. The company has placed a strong emphasis on organisational issues: the justification for positions, the clarity of roles, training for leadership and commitment of the workforce to the business.

The Spinning Mill holds regular staff meetings to obtain feedback from staff on site and production issues. It has also established a broadly based consultative committee at the enterprise-level to comment on the direction of the company and the implementation of policies and practices.

An intranet exists and is expanding, but is still new. All staff except operatives have access to the system which contains information on company policy and procedures, customers, sales, products, staff induction processes and the enterprise-based agreement. A human resources information system is currently being established. The enterprise maintains a skills database.

5.3 Skills provision

The Spinning Mill has been a Registered Training Organisation for at least five years and can deliver courses up to Certificate 4. An ongoing component of

training has been the development of technical skills and the company provides Certificates in textile production. The low initial education of many employees has led to some difficulties in the provision of on-going training, but several employees who had not completed secondary school have completed the Certificate 4 in Textile Production. Older workers have also risen to the challenges provided by new technology and new work practices. The National Safety Council provides a two-day occupational health and safety training program across all sites.

In the current year, The Spinning Mill had some 30 employees in Certificate 2, 15 in Certificate 3 (at Bendigo) and 4 in Certificate 4 (at Moe). Additionally several operator trainees have commenced New Apprenticeships as textile mechanics in 2001.

In keeping with its emphasis on the importance of the organisation of work, The Spinning Mill has been strongly involved in the Frontline Management Initiative (FMI). The FMI is a program sponsored by the Australian National Training Authority to provide management skills for supervisors, overseers and team leaders. Across all sites, some 50 employees (about 10% of the workforce) have participated in the FMI. Only three or four employees were currently enrolled in the FMI, which was provided externally by RMIT.

The Spinning Mill has worked with both the higher education and TAFE divisions of RMIT University during the last decade, but in recent years this relationship has become stronger. RMIT TAFE delivers some forms of on-going training to line-workers and several employees are currently enrolled in RMIT in the textiles strand of a Bachelor of Applied Science in Technology.

There is considerable concern in the textiles industry about training provision at the upper end of the skills profile. The University of New South Wales course in textile technologies has closed. In the year 2000 there were no higher education graduates in textile technology. The first students from a new course at RMIT University will not graduate until 2002.

The company is working with RMIT to develop an educational pathway through textile certificates to a diploma and higher education degree in textile production. The impetus for this development comes from several sources. First, recognition that The Spinning Mill needs to be proactive and support public sector providers of textile education programs are to continue. Second, such pathways help to attract and keep higher quality staff because they have career and advancement paths from the shop floor if they choose to take up those options. Third, and fundamentally, the company has an on-going need for highly qualified technical staff.

The Spinning Mill had a graduate program in the past. The program declined, but has recently been reinvigorated and centrally managed. It will involve the transfer of staff between sites and negotiation with several universities.

Training for the management group is more specialised. The company looks principally to higher education institutions for its management training. The price of up-grading management skills through higher education courses, however, is sometimes too high. Universities seem to price their courses at a rate that some large companies and government departments can afford -- especially for MBAs -- but that smaller companies find difficult to meet. Some skill deficiencies can be met through external recruitment.

There is an emerging performance management process consisting of staff appraisal, with salaries linked to the system of performance appraisal. This process applies to those employees not covered by the enterprise-based agreement – about 80 people. The performance management process maps individual career plans and targets.

5.4 Skill shortages

There is no shortage of technical skills at The Spinning Mill, but this is only because training in technical skills has always received a high priority. Where this has not been sufficient, external recruitment at the management level has been used. The enterprise does, however, have a shortage of leadership and supervisory skills among operatives. There is also a need to develop human resource skills in making appointments and recruiting staff.

The Spinning Mill experiences some recruitment difficulties because of the regional nature of the labour markets for the Moe and Bendigo mills. Moe, for instance, is in the Yallourn valley, the centre of Victoria's electricity industry and recruitment of electricians at normal market salaries is extremely difficult.

It is difficult to recruit skilled people to work at regional sites. Consequently, the company has attempted to become an employer of choice for people already living in the regional centres in which its mills are located. The company has worked with the ASTF (now the ACEF) to encourage VET in schools as a link to employment in their mills. Apart from attempts to improve the appearance and image of the workplaces, training pathways provide the possibility for career advancement through employment at the mill.

5.5 Problems with the National Training System

The national training system has improved substantially during the last decade. In particular, the ability of enterprises to become registered training organisations is an improvement. The Spinning Mill has, however, found it useful to work with public providers such as RMIT and has found them very responsive to the needs of the company. While government assistance is crucial, the system remains complex – and that complexity makes it difficult for enterprises to participate.

There is no appropriate training package for new apprentices in textile mechanics. The company has raised this problem with the textiles Industry Training Boards in Queensland and Victoria. Some progress is being made, and this may indicate that the system works satisfactorily to respond to training needs as they occur – but possibly too slowly.

Outside what is normally considered the province of the training system, there is a serious gap at the higher technical level where mechanics and technicians become engineers. A strategy needs to be developed to deal with this gap.

6 Implications

The case studies have a great deal in common. Both are examples of the role changing technology can play in the demand for training -- perhaps the automotive components manufacturer more than the spinning mills. For both there appears to be no weakening of demand for highly skilled tradespersons and technical operatives. Faced with only modest growth in the domestic market, both have achieved rapid export growth by concentrating on the manufacture of products requiring higher levels of skill.

6.1 Preventative maintenance

For the automotive components manufacturer technology has affected on the need for training in at least two ways. First, the skill requirements of operatives have increased and been transformed. Their principal role is not one of repairing breakdowns in production lines but of preventing breakdown in the first place. The job of the operative is to interpret diagnostic information and act on it. The second aspect is that the changes in the production process have been towards automation and labour replacement. Although the company itself has avoided redundancy of any operators, it seems unlikely that this pattern could be repeated throughout the economy. The total number of operators requiring training could therefore decline.

There is not a similar sense of change in the spinning mills. There is, however, still an emphasis on the economies achieved by 24-hour, seven days a week continuous production. Concern about the absence of suitable training packages for textile mechanics and the need for improved skills in this area points to the importance of continuous production and preventative maintenance.

6.2 Supply of skilled labour

Interest by (particularly young) workers for trades and operative positions may be waning. Both case studies raised this problem. A decline in interest might not be immediately obvious in the number of applications for apprenticeships, but rather in the quality of applicants and their enthusiasm for the opportunities provided by apprenticeships. The rapid expansion of higher education participation by school leavers over the last 30 years may have absorbed some preferable candidates who previously would have received an apprenticeship. At the same time as the quality of applicants may have declined, employers want more from apprentices because the skill requirements of tasks have increased.

In the past, apprenticeships were predominantly an end-of-school qualification -- either undertaken after Year 10 or more recently after Year 12. The pay structure of apprenticeships is designed around the needs of young people with fairly low levels of remuneration in the first years of the apprenticeship. While this reflects some component of a training wage, it also possibly incorporates an element of youth

wages. At the same time, the transition of young people into the workforce appears to be taking increasingly longer. While somewhat older workers might constitute a fertile recruiting ground for apprentices, and adult apprenticeship rates are separately specified, the historical structuring of apprenticeships around the needs of very young people may be a disincentive to undertake apprenticeships.

6.3 Flexible production

Both case studies show the effect of a small domestic market on the training requirements of Australian companies. The automotive components company employs about 1% of workers in the multi-national group. It is a small part of the total organisation. Yet in the context of the group, it deals with a very broad product range, both in production and distribution. Consequently workers must be able to deal with a broader range of tasks in Australia than in plants in countries characterised by larger domestic markets and larger-scale production. Such flexibility and multi-skilling has been a condition of the survival and expansion of the company.

The focus on exports, however, has to some extent removed the limitations imposed by a small domestic market and the company is seeking to capitalise on the economies provided by longer production runs.

The textile mill, however, has sought to improve its flexibility of production, both at its mills and especially at its dye plant. The company has found that the ability to operate with shorter production runs was a competitive advantage in the domestic market. It allowed the company to better respond to customer needs while also significantly reducing inventory costs. Production flexibility, however, is more demanding on the skills of the workforce.

6.4 Flexible workforce

The use of a casual workforce is an important element in achieving flexibility. The two companies, however, have taken different paths in employment. The Spinning Mill has minimised its use of casual labour. The continuous production process lends itself to the employment of full-time permanent staff and this has facilitated the development of a skilled labour force.

The car component manufacturer, in contrast, has maintained casual workers as a significant component of its workforce, but has found it necessary to provide training to its casual workforce. The increase in the non-core workforce in Australia has often been viewed as antithetical to higher levels of training – training is a cost that employers would like to distribute over a long duration of employment. Possibly because of the skill and training requirements, at least some elements of the casual workforce have achieved a semi-permanent status and have provided a pool for recruitment to permanency.

6.5 Work organisation and training

The introduction of flatter management structures and work teams has increased the need for management training among a far broader category of workers – work teams need leaders. The Spinning Mill explicitly addresses the needs of its workers for management skills through extensive involvement in the Frontline Management Initiative. The management aspect of training at the car component manufacturer seemed less well addressed. If the management training needs of shopfloor leaders are taken seriously, work organisation should be facilitated.

6.6 The training system

It might be understandable if employers in small businesses have difficulty in accessing public training institutions. When specialist human resource managers in larger enterprises express frustration at the lack of stability and coherence of the training system, it is a little more telling. Both companies have moved to provide at least some of their own entry-level training as private providers. To an extent this may be an endorsement of changes to the training system – the changes have facilitated the creation of registered training providers and enterprise-based training. Both companies have appreciated this opportunity.

For the automotive component manufacturer, the move to private provider status was prompted by frustration with public providers. The problem may be inherent, however. A public provider needs to emphasise more generic aspects of training that are unlikely to be tailored to specific company needs. Nor are public providers likely to have access to the same equipment or machinery as a particular company – especially if that equipment or production process is new.

The textile company, however, has adopted a somewhat different strategy. Although it has provided a substantial amount of its own training, The Spinning Mill has sought out a strategic partnership with a public provider to facilitate delivery of training tailored more to its own needs.

Both companies, however, make some use of public training providers for the delivery of some forms of training.

7 Conclusions

This report considers the role interviews with leading edge firms can serve in examining changes in demand for training. It presented two case studies, one with a car component manufacturer and the other with a spinning mill. The interviews focused on the impact of technological and workplace change on training, especially in leading edge firms. The report discusses some of the qualitative information needed to identify the changing nature of skill requirements.

Leading edge enterprises are those at the forefront of their industry in terms of growth, or of market share, and which have extended their activities to markets beyond Australia. An examination of such enterprises should provide guidance on the type and mix of skills likely to be required for future employment in the industry in which the enterprise operates and the strategies they employ to obtain them—their skill formation strategy. Their approach may also set industry benchmarks and affect the behaviour of other enterprises, training institutions and individuals.

Leading edge firms are likely to be influential in skill formation in several ways. They may have a direct effect where commercial relationships exist between large and smaller enterprises, either as customers or suppliers of each other. Additionally there may be indirect effects through the diffusion of successful technologies, products or human resource practices to competitors.

Several implications are drawn from the case studies:

- Greater emphasis is given to the importance of continuous production and preventative maintenance. The skill requirements of operatives have increased and been transformed. The principal role is not one of repairing breakdowns in production lines but of preventing breakdown in the first place.
- Both companies have moved to provide at least some of their own entry-level training as private providers. Both have also maintained links with public providers, and one in particular seems to have been successful in forging a strategic alliance with a public provider.
- Interest by (particularly young) workers for trades and operative positions may be waning. Enterprises are finding it harder to recruit young people with the aptitude and ability to be trained in the increasingly complex tasks required of them.
- Flexibility of production, the ability to operate with shorter production runs, can provide a competitive advantage in the domestic market. Production flexibility, however, is more demanding on the skills of the workforce. Flexibility and multi-skilling has been a condition of the survival and expansion.
- The introduction of flatter management structures and work teams has increased the need for management training among a far broader category of workers.
- Further interviews with other firms may deepen and expand these results.

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Appendix 1: The Questionnaire



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Leading Edge Firms and the Demand for Training

1. PRODUCTS

(a) What are the main products made by xxxxxxxx?

.....
.....

(b) What products are the major growth areas for the company?

.....
.....

(c) Is the company developing major new product lines? If so, in what areas?

.....
.....

2. PRODUCTION TECHNOLOGIES

What are the major changes in the production technologies being used or planned?

(a) In the manufacture of **existing** products?

.....
.....
.....

(b) In the manufacture of **new** types of products?

.....
.....
.....

3. SKILLS REQUIREMENTS

In what ways are the quantities and types of skills required by the company changing?

(a) In response to new production technologies?

.....
.....
.....

(b) In response to new ways of organising the workplace?

.....
.....
.....

(c) In response to other factors affecting the company (eg government policies)?

.....
.....
.....

4. TRAINING

In recent years what have been the main changes in the company's training practices?

(a) In the types of training provided?

.....
.....

(b) In expenditure on training?

.....
.....

(c) In the organisation of training (in-house, use of private or public providers etc)?

.....
.....
.....

5. INTELLECTUAL CAPITAL

(a) What do you regard as the main “intellectual capital” of the company?

.....
.....

(b) Are any formal systems or processes used for measuring the firm’s intellectual capital?
If YES, please describe briefly the approach you use and how it was developed.

.....
.....

(c) What information/support could help the firm to manage its intellectual capital more effectively?

.....
.....

6. CONCLUSION

Do you have any further comments on:

(a) The adequacy of the knowledge and skills of workers in the company?

.....
.....

b) The firm’s ability to recruit skilled workers?

.....
.....

(c) The adequacy of public training providers in meeting the needs of the firm?

.....
.....

(d) What governments could do to encourage more training?

.....
.....

THANK YOU

We look forward to discussing some of these issues with you further at our interview.



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