

Employers views on graduate career paths in engineering in Germany and the United Kingdom

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1. Introduction

This paper is prepared within the framework of a research project on “Vocational Identity, Flexibility and Mobility in the European Labour Market (FAME)”. FAME is a three-year project, funded through the Fifth Framework Programme, looking at the development of occupational identities in the Czech Republic, Estonia, France, Germany, Greece, Spain and the UK. The basic aim of this seven-country study is an investigation into the how employers and employees perceive change in the dynamics of work-related identities and their socio-professional implications in relation to an increasing need for labour flexibility and mobility in the European labour market. This paper reviews employers’ perspectives on the work-related identities, flexibility and mobility in four companies in Germany and the United Kingdom (UK) that have adopted very different approaches to the employment and deployment of graduate engineers. Each company will be examined in turn before attempting to draw out some broader lessons.

The FAME project focused principally upon changing work identities in health care, engineering and telecommunications. In the first project phase we sought to elicit employers or managers’ perspectives on changing work identities. We carried out contextual interviews with managers and others with significant national or local perspectives about structural characteristics and processes associated with a number of chosen occupations in the metal working industry; health care; tourism and telecommunications. In this paper though we intend to focus upon one element of identity formation and that is upon managers’ attempts to shape certain aspects of work identities. We will in this paper also restrict our discussions to a single occupation, graduate engineers working in manufacturing companies.

Work identities are influenced by broader societal shifts and it may be a useful starting point just to map briefly some of these broader trends that provide a backdrop against which to consider how vocational identities are changing. Increasingly actors, individually or collectively, find themselves in a better position than in the not so distant past, to actively shape their own profiles and identities, including work-related identities. At the same time many of the structural aspects of work are also increasingly subject to change. Induction into particular work roles though is a complex socialisation process in which external selection is supplemented by a degree of self-selection: a meshing of choice and constraint.

Technological change, the incorporation of informatics in industrial labour processes and the tertiarisation of economic activities all trigger general changes in skill needs and labour market demands. Such general factors then provide a backdrop for changing patterns of work organisation in particular organisations. Many occupational roles have been transformed, along with parallel shifts in the processes of occupational socialisation. Through a variety of human resources techniques,

employers and managers have become more aware that they may be able to shape at least some aspects of the work identities of their employees. This paper will highlight some of the ways that employers in our sample sought to shape aspects of the work identities of their graduate engineers.

2. German company L: role of graduates in a traditional company whose organisational structure has been changing gradually (evolution)

L is a large company, founded in 1947, with 3600 employees in Germany, and 25 sites across the world. It is a world-wide supplier for the automotive industry, a specialist in gear technology, producing components and modules for automotive gears and supplier for the driving (steering) systems. The company is now part of a larger consortium (Z) dealing with the full range of gear technology. The decision made in 1968 to become an international player was a great challenge for a company that was rooted in a fairly rural region, with 7 sites in the region.

The company has a commitment to initial and continuing training typical for a German engineering company producing high quality products. This commitment to a training culture is carried into its overseas operations and experience from international activities in sites in many countries suggests that work is performed more effectively when it is linked to a formal qualification system. For example, their British subsidiary participates in a big programme in order to formalise qualifications and vocational education and training, including finding ways to certify qualifications acquired through long term work experience.

Like many companies in Germany it has some concerns over the future of the dual VET system: on one hand improvement of this system is necessary, but on the other hand it is still the guarantee for quality in initial education and training. If no improvement is possible, initial training will probably become increasingly the responsibility of individual companies. In any event experience of learning while working means that managers believe that after 10 years of work in the company workers have acquired competence which no longer refers to what has been learned during initial education and training. After initial education workers have a broad knowledge but without specifications or depth. Depending on the department of the company where he or she starts work, he or she will acquire such special know how and competence.

This company has also chosen to support a special track leading to dual qualification where a university engineering degree and apprenticeship are linked together. The company supports such dual qualifications, because management has learned that a simple initial education as an apprentice in metalworking is no longer sufficient for the requirements of work in this company. The requirements also apply to dual qualifications in electric and metalworking.

The initial education and training component in the company is adjusted to the demands of production, and it consists of two years in developing basic or core qualifications, followed by about eighteen months specialisation towards a certain occupational profile or discipline. Already within that programme will be practical work as part of 28 weeks of intensive courses on machines with programming and

realising their programs by producing the parts. These are not just products for exercises but already part of small batches for production.

Continuing training is partly on the job, often comprising a mix of informal learning associated with changing technology and through courses offered by technology providers. The company is involved in a major programme of technological upgrading. Special machines are used for production, some of which the company constructs and produces themselves. Just purchasing the different components for those machines requires much specialist information, and selection of the latest technological developments is itself a continuous learning process. Especially for those working in specialist departments such work is a form of continuing education – they have to visit suppliers to get precise information and update their knowledge, yet this learning is part of their job. Also teamwork and learning from and with ones colleagues is seen as a natural process.

The company continues to operate a paternalistic recruitment policy where employees' children are given preference. In some sites generations of families are working for the company. Another recruitment policy is to employ every apprentice for one year after successfully finishing the apprenticeship. Recruitment for open positions occurs mainly through in-house job descriptions. Between the different sites there is staff turnover, but mostly with company people. The company as a whole has very little turnover. If there are job positions filled from the external labour market the major demand is that the person's qualifications suit the needs of the company.

The profile of a skilled worker means that after two years of work experience, an employee has to be able to – for example – to start to run a machine somewhere, in Shanghai or Mexico, on their own. Change in the occupational profile meanwhile is rapid, due to fast technological developments that also affect work organisation. Twenty years ago work in production often consisted of hard, physical labour. Today workers guarantee the continuity of functioning of automation facilities of very expensive assembly and production machinery. Nowadays the prime need for workers is to know about electronic and programming systems.

Workers need to be both flexible and mobile, as they may be required to work in, for example, Mexico, Sweden or elsewhere. In general, flexibility and a willingness to learn at work in a given situation are key requirements of workers, as well as a commitment to the continuous upgrade of know how about latest technological developments.

Occupational identity and company identity have been interwoven in the past. The region in which this company located has its own specific identity, and the company is the largest employer in the region. The company has been built up and started with refugees of the second world war, with people who were bombed out, people who did not finish their apprenticeship and so on. Those experiences create a certain identity. The identity of this region is very important for the existence of the company. Mobility within the company becomes possible because of employees' loyalty to the company. There is a willingness to move even one's family abroad if the company needs it in order to build up a new facility, though the region and the people of this region are not internationally inclined.

In this context the employment of people who have completed both an apprenticeship and a degree can be seen as maintaining the traditional local (and often familial) ties, while still getting employees with the more substantive technical education that the company requires. The role of graduates has evolved in a traditional company whose organisational structure also has been changing gradually. Indeed there has been an explicit intention to 'grow' their apprentices into graduates, rather than employing 'outside' graduates in order to maintain a continuity with past identities, while at the same time modernising them. This, however, has occurred within a framework where there are strong continuities between past and current patterns of work organisation and this could be contrasted with a company in the UK whose organisational structure has been completely reshaped.

3. UK company D: role of graduates in a traditional company whose organisational structure has been completely reshaped (radical change)

The contrast between German company L and UK company D is sharp. D was the major employer and was well regarded in its region, had similar paternalistic employment policies and had a reputation for providing high quality apprenticeship training. It is an engine manufacturer, but it has suffered a massive decline in numbers employed, from around 10,000 during the late 1970s, to its present level of approximately 1,600. The company has changed to multi-functional team-working, and opened up progression routes to team leader for semi-skilled workers. These changes have resulted in greater training and increased responsibilities for semi-skilled workers, while skilled workers have less influence. The greatest change, however, has been the downgrading of the traditional supervisory role. Team Leaders are more directly involved in the work of teams, while a few Team Coaches have been given responsibility for providing support to the team leaders. The company is also now much more open to the idea of employing graduates in a wider range of positions than previously.

The company is a major producer of engines for a wide range of applications, including agricultural machines and vehicles, industrial vehicles and machinery and a variety of vehicles, such as dustcarts. Much of the production is exported, with competition largely coming from companies in Britain, Germany and Japan. The company was formed in the 1920s and for many years was a traditional family-run organisation. However, in the late 1990s it was taken over by an American-based multi-national company whose main product was earth-moving equipment.

About twenty five years ago, it operated along traditional hierarchical lines with about 670 supervisors and approximately 10,000 employees at the plant. In 2000, after a switch to team-working there were only 27 people in supervisory positions for about 1600 manufacturing employees. Greater use was also made of temporary employment at the plant, although it is reduced from a peak of 550 in the mid-1990s to 130 in 2000. This is due to the reduction from three shifts to two shifts in some areas of the plant. Up to five years ago, trade union membership was compulsory for shopfloor workers, but this is no longer the case. The trade unions now have little influence on company policy and practice.

All these changes have meant that the basis of attachment to the company is very different from in the past. Work for the employer is still keenly sought, but the

company has changed in so many fundamental respects that it is no longer regarded as a relatively permanent marker in the local temporal and spatial landscape. It is very much now part of a new industrial settlement, not least because for the last five years the company has been undergoing a process of considerable structural reorganisation. This has involved the introduction of a system of teamworking, and the phasing out of the old supervisory grades and the creation of team leaders reporting to team coaches.

At the same time, because of the rapidly changing technological requirements and skill needs within the industry, there has been a shift towards multi-skilling. Assessment Centres have been established in order to identify the skills and qualities of the existing workforce, together with any skill deficiencies of individual workers or skill gaps in the competencies of the workforce as a whole. Over and above technical skills, there has been an increasing focus upon worker attitudes. The appropriate attitude is now considered to be an essential requirement for all types of work. This approach has been introduced in an attempt to generate greater confidence about the company's ability to ensure quality.

Another manifestation of this drive to enhance quality has been the development of training courses designed to reduce defect levels, by teaching operators why things work and why certain things need to be done. Allied to this has been a series of upskilling programmes for operatives on Total Product Maintenance, which have been based on the concept that the operative 'owns' the machine and is responsible for minor repairs and keeping it in optimal condition. Team Leaders play a key role in the emphasis upon quality and in identifying any training requirements that are necessary.

In 1997, the team-based organisational (TBO) structure was introduced, with responsibilities for line management being vested in Team Coaches, who would each be responsible for a number of teams, comprising 8 to 15 employees, with a Team Leader. The Team Coaches, who broadly occupy the role formerly taken by Production Managers, are each accountable to one of four Manufacturing Coaches, who report to the Managing Director. A typical Team Coach would have about 100 employees within his remit. The Manufacturing Coach has four team Coaches, and so is responsible for 500-600 people.

Although this structure was still relatively new, this in turn was being transformed to accord with the development of a Supply Organisation structure. Here, while the roles of Team Leaders, Team Coaches and Manufacturing Coaches will essentially remain the same, the company will operate as a series of Business Centres, with, for example, a Production Manager for each engine range. There were initially 82 teams working under this system, although ultimately it is anticipated that there will be about 144 Team Leaders. The underlying rationale for the teamworking system is that, once the team identifies the route to solve a problem, they will follow it through, partly because of 'personal and team pride'.

The Team Leader normally has no more than 10 people to look after, and is part of the team. They are responsible for production, quality, cost, safety and efficiency within their cost centre, and report to the Team Coach. A Team Leader is on a fixed salary, with the addition of a performance bonus, which varies according to band within which they are allocated. In addition to his/her operational tasks, he/she also has to

sort out the labour sheets and budget sheets. Their role is to empower, and develop an interpersonal relationship with, the team, primarily through the sorting out of the work and supporting the development of their team members.

Changing recruitment policies

Formerly, supervisors were recruited from those shopfloor workers who had been identified as being good workers and capable of taking on managerial responsibilities. No specific qualifications were required and appointees subsequently received some training in communications and management. According to a manager with responsibility for quality enhancement, the introduction of teamworking has led to a major change in the supervisory role, with increased emphasis on the need for those in supervisory positions, especially Team Leaders, to develop comprehensive interpersonal skills rather than concentrate on technical knowledge.

Some graduates have been recruited on a two year development programme to Team Coach positions, while other Team Coach positions were filled by former supervisors. There is a progression route to higher level management from Team Coach. One of the Team Coaches had recently been promoted to Operations Manager. He had originally been recruited through the temporary employment agency and had only been with the company for just over a year. Although he had not been recruited through a graduate route, he had previously gained an engineering degree, having been sponsored by his previous employer as a mature student. He had received no specific training for his new roles, and prior to joining the company had done only one management course, which was at Diploma level. He now has a Team Coach reporting to him, who, in turn, has seven TLs. As his change of role was only a recent move, he was still finding it difficult to lose his former role as a Team Coach.

Assessment Centres are used to assess applicants' competence to fulfil the Team Coach role. All assessment, appraisal and training programmes are currently being revamped. It was felt that Team Coaches and Team Leaders should receive more training in management and interpersonal skills, possibly as part of their initial training. The key characteristic required of a Team Coach, as well as technical knowledge, was perceived to be the ability to resolve the issues of those for whom they were responsible, possibly through mentoring. This places a responsibility on the Team Coach to get to know their own staff, and gain their respect, by knowing that they are being asked to do 'sensible' things. As a consequence, the major concern of Team Coaches was people-management.

A perceived stumbling block to the achievement of self-empowered teams was the age profile of the plant, with an ageing workforce, very low labour turnover, and insufficient interest among the team members to stimulate deep-seated cultural change. One Team Coach felt strongly that the culture could not be changed by Team Coaches and TLs – it can only be done by the workers in the teams. This was regarded as the critical issue, which was recognised, but there was a lack of certainty about how it could be achieved.

In this company graduates could be recruited to fairly junior positions such as Team Coach simply on the basis that they possessed both the qualities required to do their current job and the potential to go further. On the other hand, they could also be recruited as part of a formal graduate development programme, whereby the Team

Coach role is seen as a prelude to work in more specialist or more senior roles. The recruitment of graduates with greater technical expertise could be seen as part of a longer-term strategy eventually to get greater expertise down into the teams themselves. The greatest obstacle to fitting such people into 'modern' occupational identities and structures came from those employees who, psychologically at least, were still attached to the former 'traditional' ways of working. These could be former supervisors, who resented the loss of prestige and other benefits associated with their former role, or older workers who simply had not fully 'bought into' the team-working ethos because they were close to retirement.

Summary

Organisational structure as the prime driver of deployment of skills

That organisational commitment is the prime driver rather than occupational identities in the organisation of work can be seen from the open progression opportunities to the positions of team leader and team coach.

Mobility

Labour market (horizontal) mobility: the employer wanted workers with 'modern' identities and skill sets, including abilities to work in teams and communicate effectively. Given the limited labour market mobility, the employer used two strategies in order to try to achieve this re-orientation of workers' identities from 'traditional' to 'modern'. First, it was prepared to invest substantially in training and competence development for its existing employees. Second, it reviewed its policy of employing relatively few graduates and then usually only in specialist positions. Now it saw graduates as 'carriers' of 'modern identities and skill sets' and it was prepared to employ them in a much variety of positions. **Spatial mobility:** the employer pays highest rates in the local area, so few employees are looking to change jobs. **Vertical mobility:** there are promotion opportunities for all workers through to positions as team leader, team coach or even beyond, if they have 'modern' skill sets and/or undertake further training. However, in practice, the availability of promoted positions may be a constraint, and while there are many opportunities at team leader level there are very few at higher levels.

Flexibility

The company has introduced greater flexibility in work through the switch to team working and expects staff to accept resulting changes in the organisation of work. Changes are being driven by a focus on quality, cost and improving competitiveness.

Employers perspective on learning

Much greater attention is being given to skills assessment, work-based learning, training and development, both in relation to team-working and the continuous improvement programmes. Willingness of employees to learn is seen as a key aspect of having the 'right attitude' that, in turn, is seen as increasingly important in any recruitment, selection or promotion decision. Work activities are still based upon assembly lines, but responsibilities have increased with the advent of team-working and possibilities for training and development mean that the employer has a much more positive approach to learning and skill development than say ten years ago. From the employer's perspective the 'right attitude' should be a central component of their employees' identities.

Organisation of work:

Major changes in roles and responsibilities for all staff have followed the shift to team working, a major restructuring and the takeover by a large US company.

Employers perspective on individual scope:

Teams are being given more autonomy and responsibility but within a process that is still constrained by the demands of the assembly line. Identification with the company is explicitly encouraged.

4. German company AS: strategic focus is upon engineering expertise rather than manufacturing

This German company (AS) uses graduate labour in a very different way from the two companies previously discussed. Their strategic focus is upon engineering expertise rather than manufacturing as such. This company has a stable workforce of about 2000 employees in Germany, and 80% of the employees are engineers, with each engineer more or less an expert in her or his field, for example structural mechanics, radiation influence in space on equipment. The company produces booster rockets, whose production now is reducing as the technology is being partly phased out. The latest products are modules for the international space station. The company mainly deals with a transportation system for the future space station. The company produces little hardware itself, as the company depends upon the expertise of its engineers who are mainly engaged on R&D tasks. Hardware production is outsourced to suppliers. Assembly then takes place in the company.

In May 2000 a consortium has been founded which consists of space companies from France, Germany, England and others. The company now is under very strong French influence, as French partners claim the leading position. This development has its roots in the history of spacecraft industry in Europe. It has been France who insisted and worked to act as counterbalance towards the US dominance of space travel technology. Coming from the understanding that the national European countries will not be able to compete with the US in their former rather loose cooperation they have decided to create a stronger counterpart by creating a European space travel company, the AS consortium. Now the French are dominating the consortium in a way that causes some discomfort in the other European sites. This has to do with a different style of leadership, different hierarchical structures and attitudes.

The task of management is to activate and steer the coordination between the technological development and construction of different parts in order to create a total product that works. This means engineers from different disciplines and backgrounds have to communicate and cooperate. A client gives specifications to be met according to a given schedule. However, it is possible that during the development process the client gets insight into other technological developments that require negotiations about time frame and financing, and engineers involved in the development process then take part in the negotiations.

Especially because of the new company situation there is a great need to harmonise ways of working and accommodate different styles of leadership. The French style tends to operate within centralised and hierarchically inclined company structures,

whereas the German style tends to be more participative. There are difficulties in intercultural communication and cooperation. Before the consortium was founded national engineers were in a rather competitive and very critical relation towards each other, now they have to work together. In addition, German, Italian and French engineers approach and process their work and problems very differently. In order to realise effective ways of working together it will be necessary in order to come to valid intercultural understandings and to develop the habit to accept the different approach of others. Right now there is rather a great frustration due to the clash of these differences, not just in Germany, the same is true in France. With time a European quality will need to be developed which only can happen through a common process of learning. While the work involves some frustrations the German company has very little turnover (2%) and employees take few sick days. This could be because of a strong identification employees feel for the company.

Engineers come from polytechnics and universities and many also have a doctoral degree. Many have studied air and space technology, but there are also engineers who come from electronics, automation technology or mathematics. They mainly come from the northern part of Germany, where there are three universities that teach air and space technology. Continuing further education and training tends to be general rather than specialist, less concerned with technological developments that are an integral part of work and more in the fields of communication, leadership and management training. However, if new software is introduced company wide appropriate training will be given to all employees. In addition, the company offers in-house training, including for example a 30 day training programme for project leaders or a 45 day training programme for experienced system engineers (45 days). The French do not provide such training programmes for their staff.

The personnel department conducts a yearly qualification survey for upcoming needs, a summary of interviews with management and their estimation where qualifications are missing and which may be needed in future. The task of the personnel development is to develop and offer training that will cover these needs in the given frame of time and finances. Another task of personnel development is to oversee the development of new managers in order to assure a fast settling-in period. There is also a need for cross-disciplinary qualifications, as for example to support and foster the integration process of company members from other countries and nationalities. Top management receives training in leadership, communication, team development and conflict management.

However, the major professional development happens during the course of work itself. There are always confrontations with new tasks, which means the search for new problem solving solutions. Employees may then have to go to library, communicate with colleagues, travel to different institutions and consult relevant experts.

The self-esteem and identification with work-role of German engineers tends to be high, but this is especially so if they work in air and space technology. There is an awareness of being special and they value their autonomy and they do not like being told what to do. It is important that employees develop certain attitudes as for example being willing to engage in life long learning. This is not meant in the abstract way of agreeing that life long learning is necessary, but it has to be practised.

Employees are asked to learn about new computer programs or get information from different disciplines and not only learn through formal seminars offered by the company. There is the demand that employees also invest some of their private time for learning. This willingness is very strong amongst the German employees and fits with their professional self-image.

The strong feeling of being special amongst employees working in air and space technology, particularly if they also studied in this field, comes partly from the specific challenge of working with the conditions of space which are so different from those on earth. In addition each task is unique, there is no mass production. This requires a permanent process of learning. Also this work includes a certain element of playfulness, a creative element. To be able to realise your creativity is one of the bonds employees have with the company.

Managers believe that engineers in this company do not have their job by accident - they have to want this type of work and be able to spend one's working life with it. Not everybody is suited to every profession or occupation, and these engineers are challenged by their continuously changing tasks and their requirements for continuing professional development. Managers believe it is a specific type who seeks these types of challenge and lives with this degree of change. The engineers feel themselves as something quite different to engineers in the automotive industry.

Overall then, managers believe engineers have a strong sense of identity with the company and the profession. The sense of identity with one's profession is considered to be pretty much the same for their French colleagues. However, German managers believe French engineers are not willing to give as much private initiative and time to the company as their German colleagues do.

Managers point out that the company needs flexibility from their employees in their cooperation with people from other countries. This is only partly realised in practice, however, as some still behave according to their preconceptions and prejudgements. Managers hope this will improve following more exchanges of co-workers between sites in the different countries. German employees are perceived as being generally more willing to move abroad for a given period of time than for example their French counterparts. However, even at the top level of management such exchanges are not possible without specific incentives. Family of course plays an important role – for example, are there children who go to school, who will have to be integrated into another education system – and these are major decisions to make. Or for example, in France colleagues are much more integrated in a communicative network. If they have spent some time in for example Germany, it seems to be very difficult for them to become integrated again into such networks.

Besides a willingness to be geographically mobile, managers argue it is necessary for employees to have flexibility in their thinking, so they are capable of taking different approaches to problems. However, increasing geographical mobility remains the big challenge. The company has striven to develop an integrative work process but has yet to realise it in practice. If employees choose to stay in their native company sites, this process of integration will take much longer to achieve than is desirable.

4. UK company OR: strategic shift of focus from engineering construction to provision of services based upon engineering expertise

The fourth company (OR) is interesting because it is changing its product market strategy and this has consequences for its utilisation of graduate engineers. It is trying to achieve a strategic shift of focus from engineering construction to provision of services based upon engineering expertise. This UK company is moving from being predominantly concerned with engineering construction and is now developing a stronger service focus. It operates in a relatively new industrial sector, related to offshore oil extraction, and has shifted its focus from a company principally bidding for, and undertaking, major offshore engineering projects, to one of providing expertise, as a product service company, for large-scale, long-term offshore extraction projects. The shift from direct manufacturing to (also providing) engineering services is typical of many manufacturers: these companies often sell their expertise in addition to, or instead of, selling products. This has had major implications in the type of work undertaken, the mix of skills required and how the company is trying to shape employee identities so that they see themselves as more flexible in the range of work they can undertake. For this reason they have increasingly looked to employ graduates in a range of supervisory positions.

This move was partly driven by the perception that there would be more opportunities and more profit in the provision of services, based upon specialist expertise, in partnership arrangements, than in undertaking very large engineering construction projects by themselves. However, in the first half of 2001 the company won a massive order for oil-rig construction so it is back in the 'heavy end' of engineering construction too. Such traditional construction activities may still be undertaken, but the move is still more towards provision of facilities and services in addition to (or partly in place of) engineering construction: this now applies to the building and maintenance of airports or transportation infrastructure as well as oil-rigs.

The group of companies, of which this establishment is part, is involved in large scale engineering and construction projects on an international scale. This particular arm is responsible for 'Process and Energy' services, focusing on the offshore oil industry. Head Office recently introduced a new management structure, whereby, in place of the five subsidiary companies which formerly existed, three distinct business sectors were defined:

- *Capital projects*, incorporating civil engineering, construction and onshore process and energy
- *Services*, comprising offshore process and energy, rail, utilities and facilities
- *Investments*, comprising project investments, plant and transport.

From the mid-1990s then there has been a change of strategy, involving a conscious decision to move the company away from over-reliance upon major projects, and towards services. There was also a recognition that they could not necessarily buy in all the expertise they would need for specific jobs. Therefore, they would need to share expertise with other 'competitors'. As a result, they have successfully bid for large contracts from the major oil-producing companies, by bidding in collaboration with these former rivals. Product service contracts usually last for 5-7 years, with mini-projects in between. The company has also sought to compete across a much

wider range of international markets and this shift in markets has had implications for its Human Resource strategies. Whereas when the company was supplying 'hardware' for North Sea oil rigs, it did so to the standards demanded in the UK, and with which the supervisors are fully conversant. However, in future, in the international markets, the 'hardware' will, in all probability, be built outside the UK (possibly with UK supervision), and built to individual specifications. Subsequently, the supervisor will take over project 'hardware' with which he/she is less familiar and be responsible for supervising a workforce that is likely to be multi-cultural. The cost of labour may also be important. For example, in the UK they always try to 'optimise hook-up': that is, get as much done in-shore before taking the equipment out to sea 'in a big lump' utilising a small, manageable workforce. However, the cheaper labour available from Third World countries may lead to more of the work being done off-shore in other parts of the world. For the future, it is envisaged that the sub-sea market will be highly significant globally. This will entail establishing drilling platforms on the seabed.

With these overall changes, the nature of the workforce has changed, and supervision and management structures have also had to be revised. Most significantly, in the past the company used to provide 'bodies' to work on the offshore oil rigs, without the responsibility of managing them. Now, under the new system of collaborative management of projects, the company is responsible for the overall process, and 'man-management' is a vital part of that role. Operatives at all levels have to be accountable, which places great responsibility on the supervisor, because they are at the interface, and can therefore control what goes on. The realisation of the burden of responsibility and accountability that rests with supervisors has greatly increased their workload.

The company, and indeed the industry, had a long tradition of employing staff on a contract, rather than a permanent basis. At present, there are approximately 900 'core' staff and around 2,500 contract staff. Currently, emphasis is being placed on converting the best of the contract staff to 'core' staff. Core staff tend to be in the areas of engineering, planning, Human Resources, quality and so on. There has always been a distinct culture among offshore workers, engendered largely by their mutual interdependence and the fact of working and living together for long periods. In an industry that is renowned for having skill shortages, the company has tended, in the past, to attempt to overcome this by buying people in.

In that situation, there was a lack of development of any graduates who may have been recruited. This position has now changed, so that the policy is to bring on younger potential managers, either through an internal career path, or from external recruitment. The difficulty with this approach is that, while the workload is 'going upmarket intellectually', many of those currently in post do not have the skills or capability for what will be required in future. Some shift in the technical skills required has already taken place, but there is a need for multi-skilling and greater intellectual ability. At a corporate level, a skills audit is being undertaken. This process is designed to produce an index of skills within the organisation nationwide, which will then be entered on a company skills database. The thinking behind this is to develop a mechanism for the cross-fertilisation of information across all divisions of the organisation.

Despite the major shifts that have occurred over recent years, it was asserted that the basic skill requirements, certainly at craft level, have remained the same. However, the new skills that need to be grafted on to them had changed. These new skills tended to be a mixture of traditional skills and others such as planning, supervision, the ability to manage on a day-to-day basis, problem-solving, and those related to safety and quality issues. It was also felt to be important to have an awareness of the commercial context in which the company was operating, thus requiring some knowledge of business issues.

At a more senior level, a perceived need to cut overheads has resulted in a restructuring, involving a reduction in the numbers of senior managers. This has also meant greater responsibility has been pushed down the hierarchy. For example, supervisors' roles have changed so there is now more emphasis on the management of the discipline. Whereas previously supervisors worked to a budget produced by the engineering manager, they now have to devise their own budget and submit it for approval. As far as technical skills are concerned, their importance for the supervisor has diminished, because they are able to delegate these tasks to members of the team. The number working in the teams can vary, according to the requirements of the job, but is unlikely to exceed twenty. The team is given specific time targets against which to complete the job and has to liaise with other teams. This liaison is sometimes difficult because of the overriding importance of production. For the teams working offshore, a structured plan of their work is produced by the onshore planner, based on a week of 86 hours per man, with allowances for breakdowns and so on. Thereafter, the supervisor has to liaise with 'the beach' to plan jobs and establish priorities.

There is no single career path to management. Whereas many companies may have a 'glamour group' of employees from which those with management potential emerge, this is not the case with this company. Partly, this is attributed to the fact that it is a relatively new business. There are a lot of people in the management group, some with technical skills, but also those with experience of dealing with clients and getting things done. This still leaves room for people with 'nous' to get on.

The traditional route to supervisory status from manual engineering grades was through standing in for the supervisor on a temporary basis, in order to establish suitability for the post when a vacancy arose. However, now promotion to supervisory positions comes both from skilled manual workers and technical support staff, some of whom may be graduates. In contrast to before, when little formal supervisory training was provided, concerns for developing supervisors and middle managers has seen the introduction of two major training and development programmes that can lead ultimately to an MBA. Although these programmes are largely competence-based, there is also academic input provided by a University Business School and delivered in residential blocs, usually lasting three days. Teambuilding, teamwork and presentation are built into the modular course, and, again, evidence of achievement in these areas is required. A mentor is allocated and is available to provide assistance with the modules if problems are encountered. There are over 100 on the programme for middle managers (of whom a quarter are staff of 'client' oil companies), with a further 50 on the Management MBA Programme.

The whole supervisory and management structure has therefore become more professionalised, and new graduate recruits are likely to be more at ease with the

training and development requirements. The company is therefore explicitly trying to create a cadre of supervisors and managers with more flexible, 'professional' identities. Appraisal, including looking for development potential, has been introduced throughout the company. The overall intention is to make people 'more dynamic' by empowering them, but much is still to be done in winning over the sceptics and affecting people's 'hearts and minds'. The senior manager with responsibility for this process is realistic about the difficulties of effecting such cultural change and is seeking to achieve it through a variety of 'carrots and sticks'. For example, the introduction of performance criteria has made it difficult for individuals to refuse to undertake particular training.

There was an increasing attachment to the value of academic qualifications, as an indicator of potential for development, within the organisation. This did not exclude those with craft qualifications though as they could still progress through learning while working and participation in training programmes. Thus both graduate supervisors and some of those from a craft background were willing to undertake further qualifications to improve their career prospects.

Overall there seemed to be little resistance to changes in the organisation of work consequent upon organisational restructuring. The key group affected, the supervisors, adjusted reasonably well to changes in their roles and responsibilities. The company sees graduates in these and other positions as playing a key role in strengthening their core expertise and in helping bring about the shift to more 'professional' identities.

Summary

Organisational structure as the prime driver in the deployment of skills

That organisational commitment is the prime driver in the deployment of skills rather than occupational identities can be seen in the company decision to reorient its strategic focus and in the expectation that in future supervisors would require different skill sets. The employment of more graduates is seen as a means of strengthening the intellectual capabilities of the workforce and in helping bring about the shift to more 'professional' identities, but they are quite open about where graduates start and in their subsequent career paths.

Mobility

Labour market (horizontal) mobility: there is a strong demand from the employer for supervisors with technical skills, 'modern' skill sets and 'professional' identities.

Spatial mobility: employer pays highest rates in the local area, and there have traditionally been periodic skill shortages in the area. **Vertical mobility:** there are promotion opportunities for all workers through to positions as supervisor or into management, provided they have 'modern' skill sets and are willing to undertake further education and training. In practice, graduates enjoy a significant advantage in this respect.

Flexibility

The company has a long tradition of hiring most of its manual workers on a contract basis. The shift to selling project management services also requires key staff such as supervisors to be flexible as the contexts in which and the clients for whom they work necessarily changes.

Employers perspective on learning

Much greater attention is now given to work-based learning, training and development, with clearly mapped (learning) progression routes open to all, although promotion itself depends upon possession of the appropriate attitudes, modern skill sets and vacancies for supervisory or management positions.

Organisation of work:

Major changes in roles and responsibilities, especially for supervisors, have followed the increased emphasis given to the provision of project management services.

Employers perspective on individual scope:

Work activities are quite varied, and the responsibilities of supervisors in particular have increased considerably. This has driven the desire to 'professionalise' identities for this group of employees.

5. Conclusion

In the UK generally organisational commitment rather than occupational identities drives much of the organisation of work in manufacturing, with particular emphasis being given to flexibility and possession of a wider set of competencies than those usually associated with a single occupation. However, there are enormous variations in the degree of skill required of workers in different workplaces and companies. A number of companies, including the case studies mentioned above, are making greater use of graduate labour. The strong demand from employers for workers with 'modern' skill sets, including abilities to work in teams and communicate effectively, is driving this trend for the increasing employment of graduates. It seems sensible given there is a relative dearth of workers with intermediate skills and 'modern' skill sets. Furthermore, in both our cases, graduates were seen as carriers of more modern and professional work identities.

Employers in the two UK companies had previously attempted to lock employees into the company through paying highest rates in the local area, in the knowledge that most employees wish to remain in the area. Younger graduates, however, may be much more willing to move. All companies have been introducing greater flexibility in work and expect staff to accept resulting changes in patterns of work organisation. The drivers of this in some cases were because of a switch to team working, while in others it was due to an attempt to improve manufacturing practice through a focus upon continuous improvement. (and on quality, costs and delivery). Flexibility in work organisation has been a major goal of employers in manufacturing, and there are major differences in how companies are trying to achieve this, but the employment of more graduates is one common strategy.

Generally greater attention is being given to work-based learning, in relation to team-working, continuous improvement programmes, supervisory training or supply chain development. External training and qualifications are also being used either for some staff or as part of general employee development training. Some companies were making much greater use of graduate level entry for supervisory or production support positions.

Companies vary greatly in the extent to which regular work activities provide a rich or poor learning environment, depending upon how work is organised, the nature of production and the size of the company. Different groups of workers may also have differential access to further education and training. Employers' commitment to learning is very variable, but general competitive pressures and actions across supply chains is driving at least some learning in the workplace.

Employers have been changing roles and responsibilities and experimenting with different patterns of work organisation (including team working, manufacturing cells and varying skill mixes). Such changes, together with the shift in some cases from direct manufacturing to the provision of engineering services has required changing skill sets for many employees, as part of a shift from 'traditional' to 'modern' work identities. One significant difference in the organisation of work is between companies where skilled workers are a very small minority and production is largely routine and those where more highly skilled workers, including graduates, play more of a role in production, support and related activities.

There seems to be a clear divide between those cases where most workers are being given more autonomy and responsibility and those where the manufacturing process is being even more tightly controlled, with an emphasis upon cost reduction. With all the changes to flexible working the traditional individual commitment to many particular occupations has been weakened. In some cases human resources staff are consciously trying to reshape the focus of commitment more towards the team. Identification with the company is encouraged, but often not to the extent of in the past (where workers expected to work with the same employer for a lifetime). Employers are trying to achieve balances between autonomy and control and identification with the company without over-identification (and dependence).

The interviews with engineering employers that are making greater use of graduate labour show that occupational identities are undergoing significant change, partly in response to 'competitiveness' and changing patterns of work organisation. Changing occupational identities in this area are being driven by:

- more people working in multi-functional teams;
- the development of new roles such as team leaders and team coaches;
- some staff being given responsibility of supporting changes in work organisation, such staff sometimes being formally identified as designated as 'change agents';
- the greater intellectual demands associated with many roles;
- a shift from direct manufacturing to the provision of engineering services - this has major implications for the type of work undertaken and the mix of skills required.

Many engineering companies in the UK have undergone huge changes in the last ten years, and many of the greatly reduced workforce could be viewed as having more flexible occupational identities (than in say Germany) and could be seen as representative of certain Anglo-American trends. In the German case studies current occupational identities for both graduates and skilled workers showed much clearer linkages with the occupational identities of the more recent past. Here employers were therefore trying to shape work identities in more subtle ways, while maintaining the traditionally strong linkages to both company and occupation.