

Bulletin

Institute for
Employment
Research

SKILLS AND DYNAMIC PERFORMANCE

This Bulletin draws together a wide range of research relating to professional labour markets conducted recently by the Institute for Employment Research. A large part of this work has been concerned with key professional skills such as scientists and engineers (PSEs) and the effect that they have on the dynamic performance of firms and the economy. The debate about PSEs, which dates back to the Lyon Report in the mid 19th century, has focused particularly on shortages of PSEs from either a private or a social viewpoint. The Finniston Report at the beginning of the 1980s, for example, suggested that an inadequate supply of PSEs constrained the growth and performance of the UK manufacturing sector. Indeed, inherent in the Finniston Report is the implicit argument that an increased supply of PSEs creates its own demand as their dynamic contribution increases the demand for UK products and creates new employment opportunities.

Developments in the Labour Market for Professional Occupations

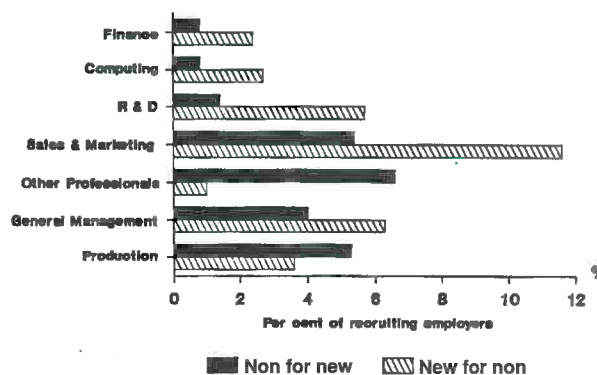
Taken as a whole, the professional group of occupations exhibited the most rapid growth performance over the period from 1970 to 1990. Between early 1971 and 1990, professional occupations showed a substantial rise in occupational share of total employment (from 6.4 to 9.6 per cent). In fact, the professional group had the highest average rate of increase in both the 1970s and 1980s.

Certain of the groups have seen rapid growth in the share of females, although in the case of PSEs, this started from a very low base. The growth of females in the PSE groups had been aided by the equal opportunities legislation and also by specific schemes such as Women in Science and Engineering (WISE). The professional occupations have also experienced relatively rapid growth in self employment and part-time working.

The results from a survey undertaken as part of an ESRC-funded project provided a considerable amount of

information about the distribution of employment of professional occupations by firm size and sector. While larger firms were significantly more likely to employ graduates (or equivalent), the highest densities of graduates were often in the smallest firm-size categories and often located in the service sector. Such firms included solicitors and lawyers etc. but also, more interestingly, high-technology, high-skill firms which provide specialist advice and services to other sectors.

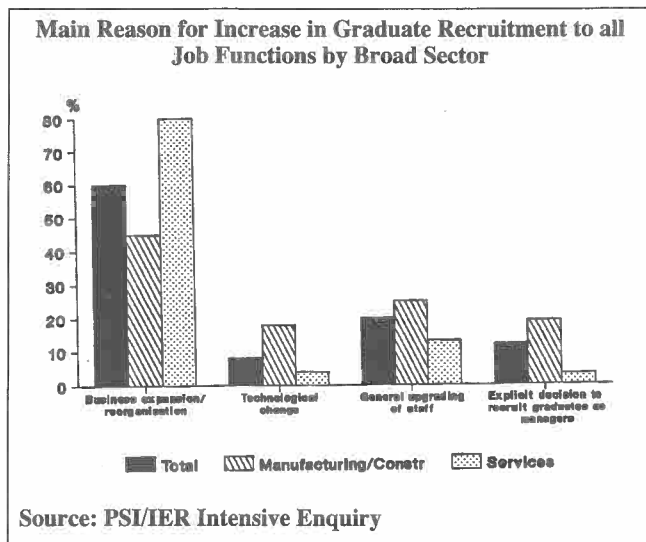
Functions Affected by the Substitution of New Graduates for Non-Graduates and Non-Graduates for New Graduates



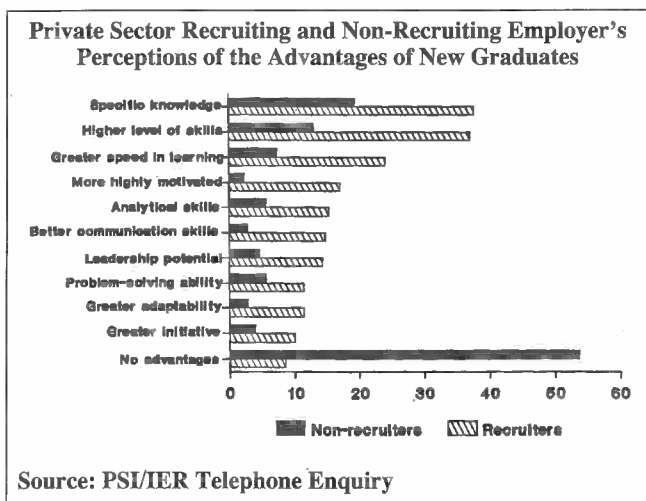
Source: PSI/IER Survey

Information about the underlying reasons for the growth in professional occupations can also be found in the results of the PSI/IER survey of graduate recruitment. The rapid growth of graduate employment has involved firms changing their technology, organisation and design of jobs. Thus, there has often been a switch in recruitment away from non-graduates and towards degree holders (or equivalent). Evidence of the switch in the balance between the two groups reveals a general move towards graduates in all functions except production and other professional

activities. The move towards graduates was particularly strong in finance, computing, R&D and sales and marketing.



While the main reason for new graduate recruitment was business expansion and reorganisation, this was significantly less important for manufacturing and construction than for the service sector. A significant minority of companies in manufacturing and construction attributed the new graduate recruitment to the general upgrading of staff, the explicit recruitment of graduates as managers, and technological change. In total, these three reasons were more important for manufacturing and construction than business expansion and reorganisation. The rationale for the switch towards graduate recruitment included their higher specific knowledge, greater skills, greater speed of learning and higher motivation.

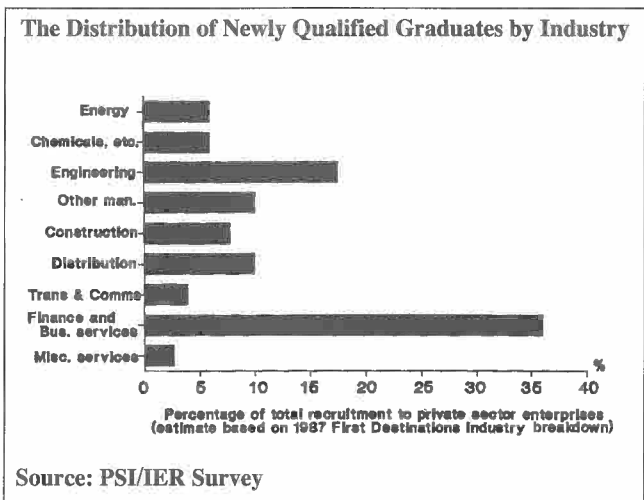


Graduate Labour Markets

The largest individual recruiting sector was financial and business services, although production and non-production

industries were broadly equal in terms of recruitment activity. The distribution of recruitment by functional activity was fairly equal, with the exception of other services. R&D has been a major area of activity for newly qualified graduates, confirming the first destination statistics published by the University Funding Council.

The performance of certain graduate labour markets, such as PSEs, depends heavily on the manufacturing sector. While manufacturing output eventually recovered to well above the levels of the early 1980s, the recession, centred on 1980/81, took a considerable toll of UK companies. Recovery was relatively slow (though prolonged) until the early 1990s, but productivity improvements meant that employment continued to fall more quickly than in most other sectors. Nevertheless, output growth was sufficiently rapid and sustained that a number of areas of shortage emerged by the end of the 1980s and early 1990s.



A recent Machine Tool Technologies Association (MTTA) project revealed that the trends and size of the UK manufacturing sector, relative to the whole economy, were more similar to the USA than to the more successful economies of Japan and West Germany. It was also shown that the UK demand for PSEs had been adversely affected by the reduction in the level of government support for R&D. By implication, greater government support for R&D might well have accentuated the skill shortage problem amongst certain of the most highly qualified groups such as PSEs, but it may also have pushed up their relative wages and status.

One source of stimulus for the manufacturing sector has been the growth in foreign ownership. The ESRC-funded study revealed that many of the fears concerning foreign ownership, which centre on the UK becoming an 'assembly nation', were unjustified. In practice, the foreign-owned companies were more likely to be employing more advanced technologies and more highly qualified workforces than their UK counterparts.

Skill Shortages

A number of pieces of recent work have touched upon the issue of skill shortages. Both the ESRC-funded project and the Institute's 1990 survey on the Skill Needs in Britain, funded by the Employment Department showed significant evidence of shortages at the beginning of the 1990s. Overall, about 40 per cent of companies reported problems with recruiting sufficient numbers in the ESRC survey, compared to just under 25 per cent of establishments in the Skill Needs survey. The ESRC results show clearly that the main problem was in the recruitment of individuals of a sufficiently high calibre, rather than inadequate numbers. Problems associated with numbers were lower, while those associated with ability were higher amongst graduates; the converse was true for non-graduates.

The fieldwork for the ESRC project was undertaken in two phases, the first being at Easter 1990 and the second in the Autumn of the same year. The questions on shortages, recruitment, firm performance, etc. not only revealed the extent of the downturn in the economy at that time, but also the greater levels of uncertainty amongst employers about what was happening to their company vis-à-vis their competitors. What was clear, however, was that companies increasingly saw the lack of demand and orders as the main constraint on their level of activity compared with, say, shortages of skilled or highly qualified labour, which had been relatively more important in the first half of the year. In fact, it is clear from the data that many employers simply switched off the 'recruitment tap' as the economy turned down.

The ESRC project indicated that shortages started at a higher level and seemed to be more persistent amongst the PSE group than for other graduates as the economy moved into recession. Shortages were more likely to be reported by firms using advanced technologies than by non-users and the proportion reporting a shortage rose with the number of advanced technologies being used.

These results regarding shortages of PSEs were largely confirmed by other research. A study based on the Skill Needs in Britain, 1990 survey clearly showed that PSEs were one of the occupation groups widely reported to be associated with hard-to-fill vacancies. In practice, the research revealed an important distinction between the 'spread' and 'depth' of skill shortages; those occupations which were most likely to be reported by companies were least likely to form a high proportion of the workforce. To some extent, this reflects the specialist nature of the skills in short supply.

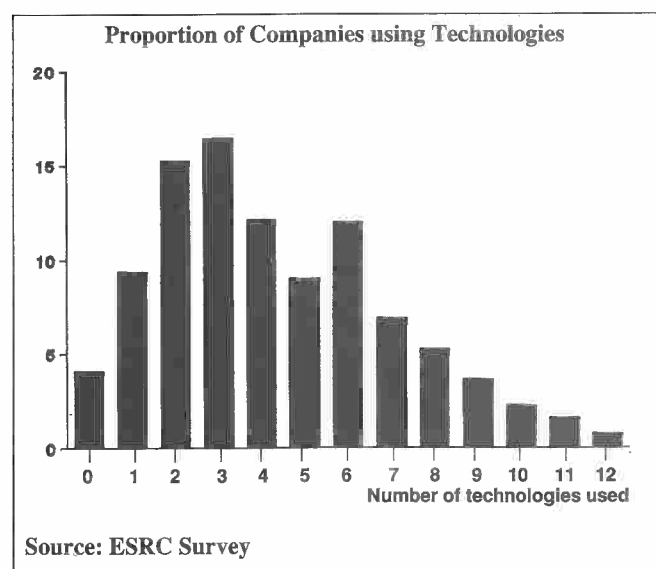
The general view formed in a recent study of the professional occupations, however, was that, overall, there were no major shortages over the period from 1970. Indeed, the rapid growth in the professional occupation group, taken as a whole, appeared to be to some degree supply led. There was some evidence, for example, of a spillover of the most formally, highly qualified groups from the professional into the associate professional and

technical occupations, as well as the more normal career progression of professionals into managerial and administrative occupations. Nevertheless, the study did highlight some evidence of shortages; for example, electrical and software engineers during the exponential phase of the diffusion of microelectronic technologies.

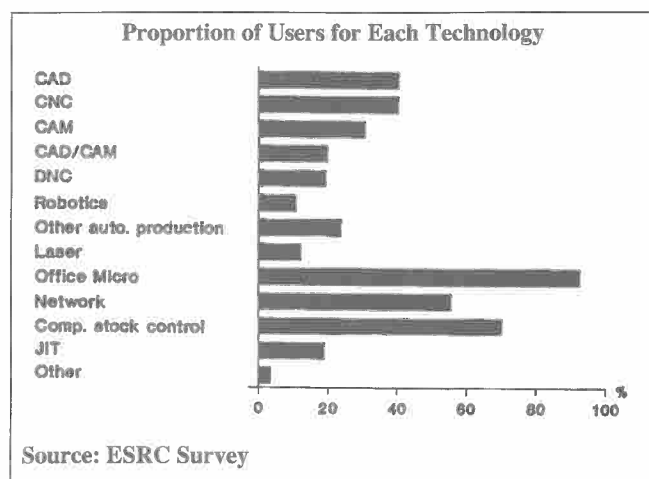
There is a clear contrast between the partly supply-led growth of formal educational qualifications and the decline in, for example, the traditional apprenticeship route to craft skills. Other researchers have clearly highlighted the relatively low skills and underinvestment in training in the UK at this intermediate skill level vis-à-vis its main international competitors. Research into higher level intermediate skills at the IER has indicated that despite the generally unfavourable job climate, the decline in supply has consistently outstripped the reduced levels of demand, often resulting in shortages.

Technical Change, Qualifications and Skills

Research at the Institute has also investigated the link between technology and skills. In particular, the MTTA project undertook case studies of engineering companies which had recently invested in CNC machine tools. While the focus of the study was on the decision-making process and a whole range of potential limiting and enabling factors, it rapidly became clear that skills and training were central to the successful introduction of the new technologies. One company, for which CNC was a fairly radical departure from existing technology, was worried that its workforce would not be able to cope. Following an intensive training course, plus back-up help provided by the machine tool supplier, the workforce rapidly developed the required new skills. Another company, already using CNC machines and employing more than the necessary skills to operate the existing system, rather underestimated the need for more training when it introduced a more sophisticated CNC system. The benefits from the investments in technology and skills were large for all of the case study companies.



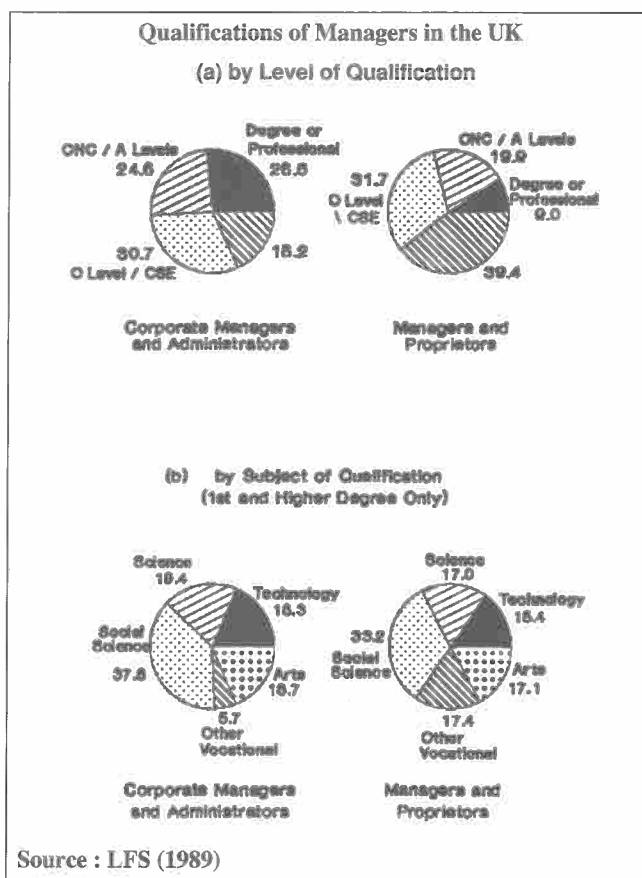
The ESRC-funded project collected information about the use of various advanced technologies from over 700 companies in the UK, across all sectors of industry and services. The extent to which companies had adopted different technologies varied widely with almost all firms reporting the use of office micros but a much lower proportion reporting the use of networking, robotics, laser technologies or JIT techniques. Clearly, the scope and incentive for the adoption of some types of technology depended crucially on factors such as industry and firm size. While the modal number of technologies was three, a significant minority of firms employed, say, eight or more. The results showed that the adoption and use of advanced technologies was not only correlated with the existence of an R&D department in the company (and the employment of graduates and, more particularly, PSEs in R&D) but also the qualification level of the workforce as a whole.



Graduates and Decision Making

A number of research projects at the Institute have uncovered tentative evidence that UK managers and administrators tend to be less well qualified than their counterparts in other countries. While the managers and administrators' occupational case study has revealed a considerable growth in formal qualifications held, by the end of the 1980s only about 26 per cent of corporate managers and 9 per cent of managers and proprietors held a degree (or equivalent) qualification.

The ESRC study was particularly concerned with the role of graduates in the decision-making process. It therefore examined the qualification level and discipline areas of board members and the qualification and background of the managing director (MD). About 39 per cent of companies in the sample did not have a graduate of any type on the board. In general, relatively few companies had high proportions of graduates on the board, although about 10 per cent of companies in the sample had boards wholly composed of graduates. As might be expected, a similar result applies with regard to PSEs, although a smaller number of companies is involved throughout, reflecting the specialist nature of PSEs and only 3 per cent of companies in the sample had boards wholly comprised of PSEs.



Just over 50 per cent of MDs in the ESRC survey were identified as formally qualified (although the sample was biased towards larger companies). Engineers and technologists were well represented (although, again, engineering companies were over-represented in the sample). In practice, MDs with an engineering or technology background were not restricted to the engineering industry; indeed, 10 per cent of service sector companies had this type of MD. Medium sized companies were relatively more likely to have MDs with an engineering and technology background, while the largest size group had a higher probability of an MD from a finance and accounting (social science) background.

Structure of the Board

% of each group on the board	% of total respondents		
	Technical	Graduates	PSEs
0	34.0	39.4	56.2
1-26	15.9	14.3	14.7
27-46	12.2	11.3	9.8
47-64	15.6	11.6	9.6
65-76	9.6	8.8	4.0
77<100	3.8	4.2	2.4
100	8.9	10.3	3.3
	100.0	100.0	100.0

Source: ESRC Survey

Graduates and Company Performance

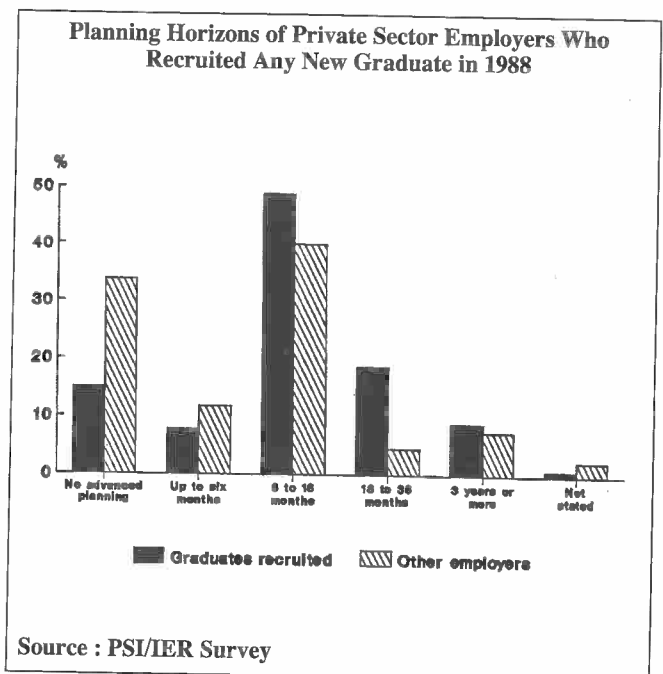
The results of the ESRC survey show that the goals set by companies vary systematically with the level of qualifications and the discipline area backgrounds of the board and, in particular, the MD. It is difficult to establish cause and effect here because the board and the MD are clearly selected by some process related to the underlying nature of the company and its activities. The most obvious feature is that companies with no graduates on the board have a significantly higher probability of not having a formalised goal for the company. The presence or absence of graduates on the board also affects the choice between goals, assuming that the company has a formal goal. A much higher proportion of companies report market share maximisation and growth maximisation when there are graduates on the board compared with, say, sales/output or profit maximisation.

In much the same way the level and type of qualification held by the MD appears to influence the goal of the company. MDs with no formal qualifications (the 'self-made' group) are less likely to specify a formal goal for the company, particularly compared with, say, companies run by an MD with an engineering and technology qualification. The results of the survey suggest that MDs with a business and finance background are significantly more likely to have a market share orientated goal than those with an engineering and technology background, while the situation is reversed in the case of sales or output maximisation.

It is clearly interesting to ask whether it is possible to trace differences in the actual performance of the companies to differences in the employment of graduates and/or PSEs. This is a difficult issue which can only be fully resolved (if ever) by means of multivariate analysis. It is made difficult by the way in which graduates at different levels may influence various kinds of decisions, such as the goals of the firm or investment in new technology, which will impact on firm performance in the long run. It is made more difficult still by the nature of the product market, where the outcome for one firm may depend crucially on the activities of other firms. Finally, there are many potential feedbacks in the system; while the MD may have a disproportionate influence on the employment of graduates and firm performance, the MD may be selected from existing graduates of the company where the choice depends on the past performance of the firm.

The PSI/IER survey revealed that companies recruiting graduates had longer planning horizons than other firms. The ESRC project revealed a number of systematic differences in terms of three main measures of performance: the growth in market share, profits and turnover. For example, foreign-owned companies, which were associated with a greater use of graduates and PSEs as well as a greater adoption and use of advanced technologies, did worse than UK companies in terms of UK market share but better in terms of turnover and, more particularly, profit. There were no substantial differences

in performance between companies that had an R&D department and the rest, but companies that had graduates in R&D did significantly better on all three measures of performance. The differences in performance were even more accentuated between companies that had PSEs in R&D and those that did not. While the relationship between graduates in the workforce and performance was quite complex, there was clear evidence that, for example, firms with some graduates (i.e. up to 5 per cent) performed better than those without. In addition, companies where more than 20 per cent of the workforce were graduates, significantly outperformed those with no graduates. This was not so clearly the case in terms of PSEs, although it is clear that a small proportion of PSEs (below 5 per cent) was highly beneficial to performance.



Conclusions

The employment of professional occupations has been growing more rapidly than any other group. The employment of such individuals represents an investment by the firm as the returns will generally accrue over future years. Thus, it seems sensible to explore the effects of such occupations on the dynamic performance of companies. In practice, this is a complicated issue as professional occupations will affect performance through the goals of the company, the introduction of new technology, organisational change, etc. Empirical evidence is beginning to accumulate that the skill and qualification mix of the workforce and, in particular, of individuals in decision-making roles, have significant effects on the performance of companies. In the main, the results indicate that the high-skilled companies tend to use more advanced technologies, to be more involved in organisational improvements and to perform better than less skilled and less qualified firms.

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The Institute

The Institute for Employment Research was established by the University of Warwick in 1981. The IER has a diverse portfolio of research projects funded by organisations which include the Employment Department Group, the Economic and Social Research Council, the Department of Social Security, the Commission of the European Communities, Training and Enterprise Councils and a number of local authorities.

Current research includes: forecasting occupational change and skill requirements at the national and local levels, the evaluation of employment policies and programmes, recruitment processes, international aspects of labour markets, and the likely labour market consequences of the European single market.

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