GRADUATES IN INDUSTRY

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INTRODUCTION

Two major, and in some respects distinct and unconnected, developments in the life of this country converge in the recruitment of university graduates by industry. There is, on the one hand, the extension of public education in successive stages to the present provision of free secondary education for all children and of substantial financial help for the increasing numbers going on to a university. On the other, there have been immense advances in scientific and technological knowledge and its application to industry. These could not have been achieved without an army of administrators and managers, of scientists and technologists with their supporting technicians, many of whom have, and must have, graduate or roughly equivalent professional qualifications.

These two developments, academic and industrial, have proceeded side by side: they have accelerated at much the same time, they have converged and are now inextricably intertwined. But industry has had relatively little time in which to get to understand the objectives and methods of its new partner. It is faced with major questions of educational policy and of the right use of qualified manpower. What kind of graduates does it need? And in what numbers?

Although it is essential, if this country's standard of living and position in world affairs is to be maintained, that industry should get the kinds of men it needs in the right numbers, it is equally essential that it should recruit no more graduates, or any other qualified men, than it needs. In other words, it should use graduates only for work that calls for the qualifications they have acquired and should employ them fully and effectively in this work, if only because other employers, as vital as industry to the well-being of the country, must also be able to get the graduates they need.

This new relationship between universities and industry calls for close and continuous study: the speed and direction of its development is of outstanding importance, not only to the universities and to industry, but to the country as a whole.

It was with these thoughts in mind that P E P decided to undertake a survey of the partnership between the universities and industry, as it had developed after the years of reconstruction immediately following World War II. Three separate enquiries

seemed to be called for: one into the employment entered by university graduates; one into the views of the universities on the whole question of education for industry; and a third into industry's views on this question and into the developments that were taking place in industry in the recruitment and employment of university men.

The investigation into the employment entered by graduates has already been carried out and a report on it was published in October 1956.* The ascertaining of the views of the universities on education for industry has been postponed, with great reluctance, because of shortage of time and of staff. It is, however, P E P's intention to return to this. The third enquiry is the subject of the present report.

A fairly considerable mass of material had already appeared on the subject of the graduate in industry. This consisted to a large extent of the expression of views and opinions or of exhortations or of surveys devoted to particular problems or aspects of industry. What seemed to be needed was an attempt to get at the facts of the situation as a whole, as it existed at some given juncture—how many graduates, and what sort of graduates, were going into industry; why it was that industry recruited graduates at all; how far those it recruited were what it wanted; what steps were taken by employers to equip their graduate recruits for work in industry by training and so on, and to use them effectively and intelligently.

The terms of reference

The terms of reference governing the present enquiry, as approved by the Department of Scientific and Industrial Research, for whom it was carried out, were:

> To investigate the policy and practice of British industrial undertakings in respect of the recruitment, training and employment of university graduates.

It seemed important to seek information not only from those who formed and those who carried out graduate employment policy but also from graduates who experienced the policies in practice. By this means it was hoped it would be possible to see in the round the way in which the policies were working out in fact, their impact on graduates, and the impact of management

* *Graduate Employment: A Sample Survey* (P E P), 1956. 30s.

and graduates on one another. Procedure by way of random samples seemed best; by this means it would be possible to achieve a picture, or at least a sketch, showing how the recruitment and employment by industry of university graduates had developed in the country as a whole.

Scope of the enquiry

In the terms of reference, "British" was taken to mean an undertaking operating solely or mainly in the United Kingdom. Industry was defined (as for the preceding survey on graduate employment) as comprising mining and quarrying; oil extracting, refining, distribution, etc.; manufacturing; building and contracting and civil engineering; public utilities—gas, electricity, water, and transport by rail, road and air.

"University" was taken to mean the universities in Great Britain. For reasons that seemed decisive, the enquiry as a whole, including the surveys that are the subject of the present report, was limited to men graduates. The reason most relevant to the present report was that the attitude of many employers to the employment of women graduates is very different from their attitude towards the employment of men. This is particularly marked in industry. Broadly speaking, it is true to say that industrial firms do not regard women graduates as possible recruits for management and, as yet, are prepared to employ them only, if at all, in specialist posts without promotion prospects comparable to those offered to men.

"Recruitment" and "training" are reasonably precise terms; they presented little or no difficulty. "Employment", on the other hand, lent itself to various interpretations, the most ambitious of which would have meant investigating how university graduates were employed in industry from their first day at work to their retirement. This was clearly out of the question within the scope of a single enquiry. But in any case, fairly rigid limits to the interpretation of employment were necessarily imposed by the procedure adopted, as explained below. None of the men who would be interviewed would have worked in industry for much more than four years since graduating; some would have worked for an even shorter period, if after graduating they had done other work or had completed their national service before going into industry.

It was thought desirable, as far as possible, to raise with members of management only those subjects which would be within the experience of their graduate recruits. In investigating employment, it was therefore decided to take things no farther than the stage of the work first undertaken, either on entry to the firm or after training, as the case might be. This meant that, among other things, policy and practice regarding "executive development"—that is, the deliberate and sustained coaching of members of management for senior positions—which has rightly been receiving increased attention in recent years, fell outside the scope of the enquiry. Even so, a considerable range of subjects remained to be examined within the bounds of a questionnaire that should not be made intolerably long.

In considering recruitment, a fundamental question of policy came first: why employ graduates? Some investigation of managements' views on this prior question was clearly needed. Their attitudes to it and the policy they adopted would vary; and might be expected to colour much else in their practice in employing graduates. After strategy come tactics: having decided to employ graduates, what steps were taken to recruit them—advertising, for example, application to university appointments boards, or some other method or methods? Finally, what methods of selection were adopted in choosing the candidates that presented themselves?

Training, again, had three aspects, or phases. In theory, at any rate, training on entry into a firm could not be undertaken without reference to the education that had preceded it. How far was the graduate recruit already equipped to play his part? Some questions were clearly needed on the relationship between university education and training in industry. Training itself seemed to have two sides: the introduction (sometimes mysteriously dubbed "induction") of a graduate to the firm as a whole, to enable him to grasp the structure and organisation of the firm and its place in the industry of which it was a part and his own place in the firm; and his training, in the strict sense, for the work upon which he was to be set.

With an assessment of the situation at the stage when the graduate was settled in his first job (whether or not after introduction and training) the other end of the span of this research is reached. But in order to have some means of assessing the value

placed on graduates at this stage in their career, as compared with other recruits, and of the graduate's views on his employment and prospects, some information was also sought on the question of salaries.*

The methods employed

Both the decision to proceed by way of random samples and the nature and scope of the samples taken were determined by an earlier decision to investigate the employment entered by graduates, the subject of the preceding enquiry already mentioned, by means of a random sample. This is the "main" sample. The two samples taken for the present enquiry are sub-samples of this main sample. There was, indeed, no other means of obtaining representative samples relating to the employment of graduates in industry. There was no reliable and comprehensive information about what firms employed graduates, nor about the employment, whether in industry or elsewhere, entered by graduates. A considerable amount of information was in the hands of university appointments boards, of course, but it would have yielded a biased sample, since graduates also can, and do, obtain employment in industry through channels other than their appointments board.

The main sample

In the investigation of the employment entered by graduates, questionnaires were sent to one in two of the 13,500 men who graduated in an arts subject or in science or technology in the academic year 1949-50. Six thousand eight hundred and forty-one questionnaires were issued. About 1,500 probably failed to reach their destination and 4,535 completed forms were returned, though some came in too late to be used. This was a response of 66 per cent. The final sample consisted of 3,961 men, that is, some 30 per cent of all the men graduating in the three faculties already mentioned.

As background to the present report, the figures of employment entered, set out in *Graduate Employment* (Table 23), are reproduced here in full.

* A P E P broadsheet devoted to the salaries received has already been published: *Salaries of Graduates in Industry*, PLANNING No. 408, March 1957. 2s. 6d.

TABLE I

FIRST PAID EMPLOYMENT AFTER GRADUATING IN 1950

First career employment	*Graduates entering*	
	No.	%
Civil Service	124	3·1
Civil Service/scientific	218	5·5
Local government service	141	3·6
Teaching (maths. and science)	265	6·7
Teaching (other)	660	16·7
Universities	166	4·2
Commerce	296	7·5
Industry, as defined for the purpose of the enquiry:		
Mining and quarrying	44	1·1
Oil	49	1·2
Manufacturing industry	929	23·4
Building and contracting	78	2·0
Public utilities	68	1·7
Consultant engineers	50	1·3
Research associations, etc.	53	1·3
Armed Services	62	1·6
The Churches	172	4·3
Law	164	4·1
Cultural occupations	61	1·5
Others	128	3·3
All career employments	3,728	94·1
No career employment*	233	5·9
TOTAL	3,961	100

* These men had spent the period between graduating and the time of the survey in a number of ways, including studying for a higher degree and in national service. The number unemployed for any period was extremely small.

It will be seen that 1,168 of the 3,961 men went into industry, as defined for the purpose of the enquiry. As these 3,961 represent some 30 per cent of the actual numbers graduating in the three faculties in 1950, the actual numbers of men who went into industry after graduating must have been some 4,000.

From this main sample, which was representative in the statistical sense, it was possible to draw the two sub-samples decided upon for the present enquiry.

The sample of industrial undertakings (the case studies)

There were some 700 industrial firms,* other than nationalised industries, to which the graduates in the main survey went. A sample of one in nine was drawn, making a total of seventy-seven, and out of these it was possible, in the time set aside for this purpose in the winter of 1954-55, to study forty-seven out of the fifty-seven which were good enough to agree to being interviewed. This is, of course, a small sample, being only some 7 per cent of the total number of firms, as defined, to which graduates in the main sample had gone. Metal and metal goods manufacturing, electrical engineering, motor vehicles, food, and building and contracting are over-represented as compared with the seventy-seven firms drawn; non-electrical engineering and textiles somewhat under-represented. There was also no opportunity of ascertaining how far, if at all, the firms interviewed varied in their policy and practice from the sample from which they were drawn. It is, however, at least a random sample, in that no element of choice entered into its selection.

Of the forty-seven firms studied, which were in all parts of the country, 9 were electrical engineers; 9 produced consumer goods of various sorts (4 of these were in the food industry); 7 were metal manufacturers or made metal goods; 6 were in the building, contracting and civil engineering industry; 4 produced vehicles or aircraft; 4 were in the chemical and allied trades and the remaining eight were in five other categories. These firms ranged in size from three with less than a hundred employees to two with more than 30,000.

In addition to these forty-seven firms, all of which were in the private sector of industry, it was decided to study one of the nationalised industries. The gas industry was chosen for this purpose. The twelve area gas boards into which it is divided are to a large degree autonomous in regard to staffing policy, and the four selected for study, after consultation with the Ministry of Fuel and Power, as it then was, all agreed to co-operate.

A total of fifty-one undertakings, therefore, forty-seven firms and four area gas boards, were studied. For convenience, they are called collectively "the case studies" although, as will be seen, it

* As defined in Appendix B.

was not possible, within the time available, to go into anything like the detail normally involved in the conduct of case studies.

One hundred and thirty-four people were interviewed at the management level, of whom 54 were directors of a firm or members of an area gas board, and 206 graduates, all of whom had been to a university since World War II.

The graduate interview sample

The second of the two surveys is of a random sample of graduates who had worked in industry after graduating, though not necessarily immediately after graduating, in 1950, and who were still in the country. This sample will be referred to as "the graduate interviews". Seven hundred and fifty were selected at random for interview and 594 were successfully contacted in the winter of 1954-55. This is 80 per cent of the sample. Five hundred and seventeen of these graduates, 87 per cent, were still in industry when they were interviewed. They were all questioned about the first industrial undertaking in which they had worked, whether or not they were still in it.

About a fifth of these men went into the chemical and allied trades, and nearly a quarter into electrical engineering. Nine per cent went into firms manufacturing metal or metal goods; and another 9 per cent went into firms producing consumer goods in the widest sense—textiles, clothing, food, for example. Some 60 per cent of the men were still with the firm about which they were interviewed.*

Their distribution among the branches of industry faithfully reflects that in the main sample, as shown in the industrial sections of Table 1, except that mining (other than the National Coal Board) and electricity supply are a little under-represented. Both are such small categories that a deviation of this order could have arisen by chance, though the low figures for mining might be accounted for by the fact that a large proportion of graduates going into mining were abroad at the time of the interviewing.

The graduate interview sample also faithfully reflects with very minor variations the other characteristics in schooling, university record and so on, of the graduates in the main sample. It is, in short, a representative sub-sample.

* Further details of this sample are given in Appendix A and of the branches of industry entered in Appendix F.

Relationship of the two samples

Although the two sub-samples are not strictly comparable, the replies from the 594 graduates in the larger, graduate interview, sample serve as a check on those from the graduates in the case studies. The results suggest that the firms studied constitute a reasonably representative cross-section of those recruiting graduates in the period 1950-55 and can be used to fill out and to illustrate the more impersonal information derived from the graduate interview sample.

Interviewing procedure

Two rather different methods were adopted in collecting the information needed. The 594 men in the larger sample were all interviewed at home by the Social Survey, acting on behalf of P E P, in accordance with the Social Survey's normal procedure. In effect, this meant that these graduates were required to answer questions (which they had not previously had an opportunity of considering) put to them verbally by an interviewer; and they were given an opportunity to expand what they had said, or to make any comments on the questions put or on any subjects raised in their minds by them, only at the end of the interview. As none took advantage of this opportunity, these interviews were, in the event, limited to answers to the questions put and were straightforward "set" interviews.

A somewhat looser method was adopted in the studies of industrial undertakings. Each interview, whether of a member of management or of a graduate, was a compromise between a "free" interview, in which the ground to be covered is in the control of the person being interviewed, and a "set" interview, in which the ground to be covered is to a very large extent determined beforehand by the questions to be put and answered. It was thought that this procedure would be more likely than the set interview to establish the actual policy and practice of each firm in employing graduates and would also lend itself more readily to the seeking of opinions relevant to the subject. It also had advantages over the free interview in providing a certain minimum of information on each firm from which to draw comparisons.

A number of questions was therefore asked, but a break was made at eight points, that is, at the end of each group of questions,

to allow the person being interviewed to make any comments he chose. Members of management and, although to a much smaller extent, their graduate recruits took advantage of these breaks and their remarks were taken into account in analysing replies to the set questions. The conduct of these interviews and their analysis called for considerable experience. They were carried out by three members of the P E P research team and were recruited for the purpose.

The questionnaires

The 594 graduates who were interviewed by the Social Survey were asked the questions set out in the questionnaire reproduced in Appendix C. The 206 graduates who were interviewed in the firms and gas boards that were the subject of case studies were asked questions closely similar to these, but because of the freer method of interviewing adopted no provision was made for the pre-coding of answers, and the two series are not absolutely identical. They are, nevertheless, so very similar that replies to them can be considered together. These questions fall under one or other of the heads of the enquiry, such as selection methods, or training.

Members of management in the fifty-one case studies were asked a series of questions which also fall under these heads. These are set out in Appendix D. It was not necessary to put all these questions to every member of management in any one firm. Once the questions seeking information on purely factual matters had been answered, only those questions seeking opinions were put to the remaining members of management. The interviews with managements preceded those with their graduate recruits.

The graduates themselves

As a result of the way in which the sub-samples were necessarily taken and of the scale upon which it was decided that each should be conducted, the emphasis of the present enquiry is on graduates. Before going on to consider the results of these interviews, some notes on the background of the eight hundred graduates in the two sub-samples might be useful.

They all filled in the questionnaire about their schooling, university record and post-graduate career which was the basis

of the material reported on in *Graduate Employment*.* The 594 graduate interview men were rather older than the others. Twenty-one per cent of them were twenty-six years old or more on graduating in 1950; 49 per cent were twenty-three to twenty-six years old. The graduates interviewed in the case studies were not confined to the year 1950 for graduation. (Had this been done, there would in many cases have been too few or no graduates to interview.) They had, however, all graduated since the war. Only 17 per cent were twenty-six years old or more in 1950 and 38 per cent were twenty-three to twenty-six years old. The number of men who were rather older than the normal run reflects the interruption of the war.

Of the graduate interview men, 27 per cent, and of the case study men, 19 per cent, had been educated in an independent or public school included in the Headmasters' Conference, and 61 per cent of the graduate interview men and 68 per cent of the case study men had been educated at a grammar school not a member of the Conference or at its Scottish equivalent, a Scottish senior secondary school.

In both groups there were about two science graduates and two technology graduates for each arts graduate. They came from a representative cross-section of universities in Great Britain. About a fifth came from Oxford or Cambridge; 10 to 17 per cent were London Internal graduates and about a third were at other English universities or university colleges; 14 to 16 per cent had obtained a London External degree through a technical college or by other means. About one in ten had obtained a First and four in ten a Second Class Honours degree. The remainder got a Third or Fourth Class degree or a Pass or Ordinary degree. Almost all had studied full-time. All the 594 men in the graduate interview sample had graduated in 1950. Fifty-seven of the 206 men in the case studies had done so. Of the remainder, 28 had graduated between 1947 and 1949 and 112 between 1951 and 1954. Nine did not answer. Some 6 per cent of them all had gone on to take a higher degree.

* The 594 in the graduate interviews had of course already filled in this questionnaire, as they were part of the main sample. The 206 graduates in the case studies did so at the time the survey was made in the winter of 1954-55. The questionnaire is set out in Appendix A of *Graduate Employment* and is therefore not reproduced here.

Presentation of the evidence

The evidence falls under six broad heads: the major policy decision to recruit or not to recruit graduates; education for industry; the selection of graduates; their introduction; their training; and an assessment of the situation as seen by members of management and of graduates three or four years after the graduates' entry to the firm. Each chapter is devoted to one of these. Each starts with an introduction to the subject treated, goes on to a detailed review of the answers to the questions put and ends with a summing up of their outcome.

The emphasis of the enquiry as a whole was on graduates, and, as is usually the case in interviewing, the more critical, though as objective in their judgments, often replied to questions more freely than the others. This gave rise to some difficulty in maintaining a balanced presentation of the evidence. If some loss of perspective has been incurred at times in quoting criticisms and suggestions, it is compensated for in the summaries of the outcome of the answers given.

CHAPTER I

WHY EMPLOY GRADUATES?

THE question whether to employ university graduates is part of the wider question what amount and sort of labour is needed to carry out the work to be done and what amount and sort of labour is available. In industry an increasingly larger proportion of jobs needs to be filled by men with academic achievements beyond those of the secondary school and Higher National Certificate, or with above-average capacity for administration and leadership, or both.

Side by side with this higher standard has gone the increasing proportion of school children reaching a university. Before the war there were some 50,000 full-time students; now there are some 88,000. It would not be true to say that every young man with the makings of a good manager or a good scientist gets swept into the stream. For a variety of reasons, this does not happen. Some are too eager to start earning in their teens, or their parents want them to do so. Some public school boys of good calibre give up the idea of going to a university if they fail to get into Oxford or Cambridge. Some children, mainly of professional people, though well able to profit by going to a university, cannot get to one because their parents' income is above the modest upper limit within which grants may be made. Again, a long period of professional training, for example to be an accountant or solicitor, may make it difficult for parents to provide for a university education as well. It is true, nevertheless, that a larger proportion than ever before of the more intelligent children of university age in fact go to a university and this proportion is still increasing.

There is, however, no exact correspondence between the proportion of the population going to a university and the proportion of work that needs to be done by university people either in industry or elsewhere, nor between the qualifications acquired at a university and the qualifications sought by employers. The present shortage of scientists and technologists, for example, is too well known to need stressing, and it is complicated by shortages at lower levels—of technicians and laboratory assistants.

Reactions to this situation are likely to vary widely between different industries and different firms: the outlook of each will be governed by different considerations. There is, first, the nature of the work to be done. It may be highly complicated, as much of the work in electrical engineering or in the manufacture of aircraft, or it may be comparatively simple. Secondly, the nature of the work may be fairly stable, or it may be undergoing, or about to undergo, fundamental changes either in the end-product or in the process of production.

The size of the undertaking is another matter of considerable importance. Size will be governed to some extent by the nature of the product and by the effect and assessment of competition both at home and abroad. With increases in size may come increases in the responsibilities and problems of management.

Moreover, the nature and the amount of work to be done may not be adequately sized up. The firm may underestimate the effort it must make to maintain or to improve its relative position, and, as a consequence, it may underestimate the quality of the men it should recruit and also, therefore, its dependence, in the present situation, on the universities as a source of recruitment. That this may be true of some sections of industry at any rate was suggested in a White Paper on the recruitment of scientists and engineers by the engineering industry.* Shortage of labour at all levels may inhibit a firm from setting itself a standard higher than that determined by market conditions.

Even if the facts of the present and future situation are correctly assessed, the subsequent reactions to them may not be entirely uniform. A firm may realise that management succession will not be secured unless a certain proportion of recruits is capable of being promoted to higher posts. In spite of this, it may resist recruiting from the universities because it feels that the graduate is not as well fitted for its purpose as the young man who joins as a schoolboy and acquires his academic or professional qualifica-

* Advisory Council on Scientific Policy. Committee on Scientific Manpower. *Report on the Recruitment of Scientists and Engineers by the Engineering Industry* (H.M.S.O.), 1955. 1s. 6d. The committee suggested that the figure of 25 per cent shortage of university graduates estimated by the firms examined (mostly in the aircraft industry) "may well be an underestimate. The demand for such men is rising all the time with the increase in the general level of industrial activity, and the increased awareness of firms of their need for trained technologists". Paragraph 9.

tions by studying part time. On the other hand, a firm which may not have grasped the implications for its management succession of the universities' near-monopoly of intelligent young people may nevertheless recruit graduates for the sake of "being in the swim"—it may recruit in the right market but for wrong reasons.

The answers of the fifty-one undertakings studied to the question why they employed graduates, with which the present chapter opens, are, indeed, as diverse as might be expected from this brief review of the sort of reactions that could be made to it.

Old and new employers of graduates

Perhaps the first thing to note is how many graduates these undertakings had on their books at the time of the survey and how long they had been recruiting from the universities as a matter of deliberate policy.* The number of graduates in any undertaking naturally influences outlook on such things as further recruitment, on the measures to be taken to attract graduates, and on the need for the introduction of formal training schemes. Eighteen "old" employers had been employing graduates since before 1945—one had done so for forty years. Twenty-five "new" employers had recruited graduates only since the end of the war. These firms, at the time of the survey, could not have had more than nine years' experience of employing graduates as a deliberate policy: one had had only a few months'. The four gas boards have been included among the new employers as a more positive policy towards the recruitment of graduates was introduced after nationalisation in 1949, though graduates, most of them with degrees acquired after part-time study, had in fact been employed before then.

Eight firms, a sixth of all the private enterprise undertakings studied, had decided, either as a deliberate policy or because of the special circumstances in which they were placed, to recruit no graduates. But it happens that they had all, incidentally or unwittingly, taken on a man who had graduated in 1950. A return will be made later in this chapter to these eight firms: their attitude is of particular interest.

This distribution of old and new employers is itself worth some consideration, though the number of firms is small. Among the eighteen old employers none had fewer then 500 employees; ten

* See also Appendix F, Table F3.

employed at least 5,000 people. Two had under ten graduates and ten had a hundred graduates or more. (One, which did not or could not say how many graduates it had, was in fact a heavy recruiter. It certainly had many more than a hundred graduates and is therefore grouped among those with a hundred graduates or more.) Among the twenty-five new employers, six had less than 500 employees, and another eleven employed under 5,000 people. Ten had less than ten graduates altogether, and only four had a hundred or more.

Seventeen firms, a third of all these forty-three undertakings, had less than twenty-five graduates each, twelve had less than ten. There were nearly twice as many new firms as old ones among employers of less than twenty-five graduates. No firm with less than 2,000 employees had as many as twenty-five graduates. Only two out of the thirteen graduate-employing firms with between 2,000-4,999 employees had a hundred graduates but four out of six with 5,000-9,999 employees had a hundred graduates or more; and (excluding the area gas boards, which had well below this number) all those with 10,000 or more employees had at least a hundred graduates. Six firms, all with several hundred graduates, have been classed as giant employers of them.

Generally speaking, therefore, the larger the firm the larger the number of graduates employed. Equally, the heavier concentrations of graduates were also to be found in those industries with relatively complicated products or processes. Two out of three of the chemical firms had a hundred graduates or more, and six out of the eight electrical engineering firms. On the other hand three out of five of the firms in the metal manufacture and metal goods category had less than fifty graduates. Six of the nine consumer-goods firms had under twenty-five graduates.

Reasons for employing graduate scientists and technologists

In examining the replies to the question why graduates were taken on, no clear-cut divisions emerge. Many firms qualified their remarks in one way or another and in some firms the members of management interviewed were divided in their views. Opinions on the need for or the desirability of employing graduates shade off from positive to negative and are complicated and influenced by such things as geographical situation, the relative newness of the recruitment policy and the experience of members