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# Skills, knowledge and competencies for managing construction refurbishment works

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An appropriate body of management skills and knowledge for construction refurbishment is established: a skills and knowledge inventory. Of the 75 types of management skill and knowledge, the six most important are leadership, communication (oral/written), motivation of others, health and safety, decision making, and forecasting and planning. Refurbishment managers' jobs as defined by their application of skills/knowledge are, on the whole, homogeneous, with some overlap across levels of management and types of organization, and this dispels the view that management tasks are totally different across management strata. A comparison of the relative importance of management skills/knowledge for refurbishment and management skills for general construction shows that the skills/knowledge associated with forecasting and planning, managing conflict and crisis, tenant welfare, team building, and decision making are higher than in general construction management; reflecting the uncertain nature and the relatively higher levels of risks associated with refurbishment works.

*Keywords*: Competencies, construction management, education and training, refurbishment, skills, and knowledge

## Introduction

Now, more than ever before, the acquisition of relevant skills, knowledge and competencies for the day to day management of construction activities, in an increasingly competitive environment, is the overriding concern. The matching of the skills to the job is desirable for construction organizations, for the career prospects of individual managers and for clients. The Latham (1994) report has identified the need to improve productivity and efficiency levels in construction and suggested that a 30% cost reduction could be achieved by the year 2000. To achieve this target, in any meaningful way, the 'right' skills and knowledge base for construction personnel is paramount. The *UK Technology Foresight* report (OST, 1995), in looking at the challenges facing the construction industry, emphasized the importance of the acquisition of relevant skills, knowledge and competencies for the future through appropriate education and training.

Within the last twenty-five years, there has been a significant increase in refurbishment work in relation to the total volume of UK construction output. There is a host of factors that have contributed to this, such as social, political and technological, planning constraints, large stocks of redundant and aging buildings, health and safety, and other statutory controls. In 1970, the repair and maintenance (R&M) sector, which accommodates refurbishment, accounted for £1109 m (or 22.46%) of total construction output (DOE, 1981). By the first quarter of 1996, this figure had increased to £21 087m (or 42.32%) of the total UK construction output (CCCIS, 1996). At the time of writing unfortunately, there are no official statistics on the actual value of refurbishment work. The DOE's statistics on the R&M sector, however, generally are accepted and used by practitioners, government establishments and academics as the basis for monitoring trends in the refurbishment sector (Quah, 1988; Egbu, 1994). The DOE's statistics do not take account of

'do-it-yourself' (DIY) work which is carried out by many house owners. The black economy is not represented either. Some major refurbishment works are included in new-build figures also (Boyd and Weaver, 1994). The actual value of refurbishment work and the R&M sector probably is much larger in view of the DOE's classification and unreported works.

In this paper, refurbishment means works such as improvement, adaptation, upgrading, renovation, rehabilitation, modernization, conversion, retrofit, and repair; carried out on existing buildings for a variety of reasons. This definition, however, excludes works carried out on a routine basis such as cleaning, painting and decorating, and also emergency maintenance work.

Despite the growth and the increasingly recognized importance of refurbishment, only a meagre amount of empirical studies has been conducted, in the UK, in the management domain (Quah, 1988; Young and Egbu, 1992, Egbu, 1994, 1995a, 1996a). In their review of what has been published in the international journal, *Construction Management and Economics* in the ten year period 1983–1993, Betts and Lansley (1993) noted that 'Given their importance in developed construction markets, the use, maintenance and refurbishment phases have received little attention'. Egbu (1994, 1995a, 1996c) also has shown that there is an under-provision of management education and training courses targeted at refurbishment, despite the need for appropriate courses by refurbishment managers. Douglas (1988) noted that '. . . there is concern within the building industry that for a sector such as refurbishment, rehabilitation, repair and maintenance, contributing a major proportion of the workload, all skills and management training are directed at new construction skills'.

There have been studies that have looked at skills for construction management (CITB, 1988b; Young, 1988). However, these construction studies have, in the main, concentrated on new-build works, with little or no attention given to the relative degree of importance of refurbishment management skills and knowledge. Mintzberg (1980) reminds us that there are some features that are common to each type of management job, and that there is also a level of uniqueness with each type of managerial activity. Burgoyne (1989) is in support of this view, noting that although managerial jobs are the same at a high level of abstraction, they are different at a detailed level of resolution.

The CITB (1988a) have suggested that any framework for skills and knowledge and for education and training for construction must take account of '. . . the particular problems and special nature of the construction industry such as the sector differences'.

Some writers have argued that refurbishment work is less predictable than new-build work, with a higher level of risk and uncertainty (Chapman, 1980; Quah, 1988; Teo, 1990; CIRIA, 1994; Egbu, 1994, 1995b, 1996b). Others have suggested that refurbishment processes are more difficult to manage than new build (Koehn and Tower, 1982; Willenbrock *et al.*, 1987; Egbu, 1994). Egbu (1996b) has identified thirty-two main characteristics and difficulties associated with refurbishment work. Also he has been able to establish the management tasks which refurbishment managers find difficult in the work they do (Egbu, 1995b). Then there are those who contend that refurbishment work demands a management approach and skills which are different from new build (BRE, 1990; Dixon, 1990). Quah (1988) in her study on evaluation of risks and tendering for refurbishment work pointed out that '. . . a study into the managerial and technical skill needs for refurbishment work would be the first step towards improving productivity in this [refurbishment] sector of the industry'.

The aims and objectives of the present work are (i) to establish an appropriate body of management skills and knowledge for construction refurbishment (a skills and knowledge inventory) and (ii) to compare the relative importance of management skills and knowledge for refurbishment work and those of general construction management.

## Methodology

The study on which this paper is based was sponsored by the Science and Engineering Research Council (SERC) and was conducted between 1990 and 1994 (Egbu, 1994). Thirty-two large refurbishment organizations (specialist and general) with regional offices spread throughout England, participated in the survey. The regional disparity (Table 1) broadly indicates the volume and concentration of refurbishment work across the country.

Semi-structured interviews (which lasted for 1½ hours each) were held with 32 training officers from

**Table 1** Number of contracting organizations that participated in the study by region

| Region | Number of organizations |
|---|---|
| South East | 12 |
| North West | 11 |
| West Midlands | 4 |
| East Midlands | 2 |
| Yorkshire + Humberside | 2 |
| South West | 1 |
| Total | 32 |

32 refurbishment organizations. In addition, postal questionnaires were distributed to practising refurbishment managers (senior, mid-level and junior) of the participating organizations. The senior level position consists of directors and area managers. Middle level managers are contracts and project managers. Site managers and site agents occupy the junior level position. In total, 142 completed questionnaires provided quantitative data for analysis, representing a response rate of 47.33%. Of the 142 responses, 108 (76.06%) were from managers of specialist refurbishment organizations and 34 (23.94%) were from managers of general refurbishment organizations. In specialist refurbishment organizations, refurbishment work accounts for 50% or more of the turnover of total construction work, and for general refurbishment organizations, refurbishment work accounts for under 50% of the turnover of total construction work.

The quantitative data, through postal questionnaires, was augmented by the qualitative information derived from semi-structured interviews with 22 practising refurbishment managers. These 22 managers also participated in the postal questionnaire phase of the study. Over 90% of the managers who participated in the study have worked for more than ten years in the construction industry. All the managers also have had experience of new-build work.

## Management skills and knowledge for refurbishment

The needs and benefits of management skills, knowledge and competencies to managers and enterprises are well recognized and documented. It is generally accepted that an appropriate body of skills and knowledge is fundamental, not only in demonstrating competence, but also in promoting a professional image in construction (Young and Duff, 1990).

In the context of this paper, management skills for refurbishment should be understood to mean the activities or patterns of behaviour which managers undertake in order to accomplish a given desired outcome. Knowledge, on the other hand, is the ideas, wisdom and facts managers acquire through experience, theory and practice; the acquisition of which gives them an ability to understand. Knowledge can be potential or manifested in performance. Management skills and knowledge should complement one another. Management competence is an underlying characteristics of a manager which results in effective or superior performance.

An analysis of management skills and of the knowledge base for refurbishment commences with data on managers' perceptions of the relative importance of management skills and knowledge in their present job, at the aggregate level. This is followed by an evaluation of the 'most important' skills and aspects of knowledge at senior, middle and junior management levels.

A list of management skills and a précis of the knowledge base needed for refurbishment were devised from a thorough review of literature on general management skills and knowledge, especially those of Constable (1988) and Whetten and Cameron (1991), from construction management skills/knowledge, notably the works of Young, (1988), CITB (1988b), Finnigan *et al.* (1987) and Faulkner and Wearne (1979, 1984), and from the literature on the general area of refurbishment (Charmer, 1985; Hanley, 1987; Douglas, 1987). The information obtained was then modified after the interviews with 32 training officers mentioned in the last section.

From this list, which comprised 75 management skills and items of knowledge, refurbishment managers were asked to identify those skills and areas of knowledge which they perceived to be significant in managing refurbishment work, on a scale of very important, important, fairly important and not important. A four-anchor rating system was adopted to avoid respondents aiming for the middle column. The categories very important, important, fairly important and not important were coded 1, 2, 3, and 4, respectively. Average scores were computed from ordinal coding of these data. As the mean score increases, the relative importance attached to management skills/knowledge decreases. Table 2 presents the data at the aggregate level.

At the dis-aggregate level, the categories very important and important were combined to form the skills and knowledge which managers perceived as 'most important', in managing refurbishment work. Tables 3, 4 and 5, relating to management skills and knowledge which senior, middle and junior managers perceived as most important, indicate that of the six most important skills or areas of knowledge for all levels of management, four were cited by managers at all levels. These are leadership, communication, motivation of others, and health and safety.

Leadership, communication and motivation of others are interpersonal skills. In refurbishment, with the increase in contract labour, together with a corresponding increase in fragmented specialized work and the difficulties associated with labour on site, the skills of leadership and communication become even more necessary. Also, with an increasing need for speed of response to address the issues arising from variations to the works, the skill of communication becomes vitally important. Supervision of others, which also is an interpersonal skill, is ranked highly in importance. This skill was ranked 9th by senior managers, 10th by middle managers and 7th by junior managers. In an

**Table 2** The relative importance of management skills and knowledge for refurbishment

| Job activity | Mean scores ($N$ = 142) | Very Impt (%) | Impt (%) | Fairly Impt (%) | Not Impt (%) |
|---|---|---|---|---|---|
| 1. Leadership | 1.197 | 81.0 | 18.3 | 0.7 | 0.0 |
| 2. Communication (oral/written) | 1.197 | 82.4 | 15.5 | 2.1 | 0.0 |
| 3. Motivation of others | 1.218 | 79.6 | 19.0 | 1.4 | 0.0 |
| 4. Health and safety | 1.246 | 78.9 | 19.0 | 1.4 | 0.7 |
| 5. Decision making | 1.338 | 71.8 | 23.9 | 3.5 | 0.7 |
| 6. Forecasting and planning | 1.359 | 66.9 | 30.3 | 2.8 | 0.0 |
| 7. Site organization | 1.394 | 68.3 | 25.4 | 4.9 | 1.4 |
| 8. Budgetary control | 1.408 | 63.4 | 33.1 | 2.8 | 0.7 |
| 9. Supervision of others | 1.415 | 63.4 | 32.4 | 3.5 | 0.7 |
| 10. Team building | 1.423 | 62.0 | 33.8 | 4.2 | 0.0 |
| 11. Quality control and assurance | 1.528 | 58.5 | 31.7 | 8.5 | 1.4 |
| 12. Managing time | 1.542 | 54.2 | 37.3 | 7.7 | 0.7 |
| 13. Materials planning and control | 1.549 | 57.0 | 33.1 | 8.5 | 1.4 |
| 14. Manpower planning and control | 1.563 | 51.4 | 41.5 | 6.3 | 0.7 |
| 15. Setting objectives and goals | 1.592 | 52.1 | 37.3 | 0.6 | 0.0 |
| 16. Conducting meetings | 1.606 | 43.7 | 52.1 | 4.2 | 0.0 |
| 17. Managing conflict/crisis | 1.606 | 50.7 | 39.4 | 8.5 | 1.4 |
| 18. Recruit/select: supervisor/foreman | 1.627 | 53.5 | 31.7 | 13.4 | 1.4 |
| 19. Delegating responsibilities | 1.634 | 45.8 | 44.4 | 9.9 | 0.0 |
| 20. Programme maintenance (update) | 1.641 | 53.5 | 31.7 | 12.0 | 2.8 |
| 21. Tenant welfare | 1.676 | 47.2 | 40.8 | 9.9 | 2.1 |
| 22. Public relations | 1.676 | 50.0 | 34.5 | 13.4 | 2.1 |
| 23. Recruit/select: subcontractors | 1.683 | 50.0 | 34.5 | 14.1 | 1.4 |
| 24. Employee training: supervisor/foreman | 1.683 | 44.4 | 45.1 | 8.5 | 2.1 |
| 25. Competitive tendering | 1.690 | 52.1 | 31.0 | 13.4 | 3.5 |
| 26. Analysis of project risks/uncertainty | 1.690 | 43.0 | 46.5 | 9.2 | 1.4 |
| 27. Programme design | 1.711 | 49.3 | 33.8 | 12.7 | 5.6 |
| 28. Identifying personal strengths/weaknesses | 1.725 | 45.1 | 40.1 | 12.0 | 2.8 |
| 29. Employee training: management | 1.739 | 43.7 | 43.0 | 9.9 | 3.5 |
| 30. Site security | 1.746 | 43.0 | 41.5 | 13.4 | 2.1 |
| 31. Productivity maintenance and control | 1.754 | 43.7 | 39.4 | 14.8 | 2.1 |
| 32. Negotiate: client | 1.761 | 47.9 | 33.8 | 12.7 | 5.6 |
| 33. Costing and estimating | 1.789 | 47.9 | 31.7 | 16.2 | 4.9 |
| 34. Competitor awareness | 1.810 | 47.9 | 30.3 | 15.5 | 6.3 |
| 35. Managing change | 1.831 | 35.2 | 47.9 | 15.5 | 1.4 |
| 36. Recruit/select: management | 1.831 | 48.6 | 28.9 | 14.1 | 8.5 |
| 37. Negotiate: main contractor | 1.859 | 38.7 | 42.3 | 13.4 | 5.6 |
| 38. Negotiate: subcontractor | 1.894 | 38.0 | 40.8 | 14.8 | 6.3 |
| 39. Organization of communication systems | 1.923 | 40.1 | 35.9 | 16.9 | 7.0 |
| 40. Managing job stress | 1.951 | 33.8 | 42.3 | 19.0 | 4.9 |
| 41. Recruit/select: manual labour | 1.993 | 32.4 | 39.4 | 22.5 | 5.6 |
| 42. Employee training: manual labour | 2.021 | 29.6 | 43.0 | 22.5 | 4.9 |
| 43. Plant planning and control | 2.028 | 31.0 | 38.7 | 26.8 | 3.5 |
| 44. Negotiate: supplier | 2.077 | 26.8 | 45.8 | 20.4 | 7.0 |
| 45. Creativity | 2.077 | 28.9 | 39.4 | 26.8 | 4.9 |
| 46. Career development and appraisal | 2.077 | 33.8 | 32.4 | 26.1 | 7.7 |
| 47. Decanting buildings | 2.183 | 23.2 | 40.8 | 31.0 | 4.9 |
| 48. Company accounting | 2.218 | 27.5 | 33.1 | 29.6 | 9.9 |
| 49. Company (strategic) planning | 2.239 | 28.2 | 30.3 | 31.7 | 9.9 |
| 50. Construction law | 2.246 | 23.9 | 35.9 | 31.7 | 8.5 |
| 51. Property insurance | 2.246 | 35.9 | 21.1 | 25.4 | 17.6 |
| 52. Organization structure | 2.261 | 24.6 | 33.1 | 34.5 | 7.7 |
| 53. Termination/dismissal: subcontractor | 2.282 | 23.2 | 35.9 | 30.3 | 10.6 |
| 54. Job analysis/specification | 2.303 | 19.0 | 40.1 | 31.7 | 9.2 |
| 55. Code of practice/working rule agreement | 2.331 | 21.8 | 34.5 | 31.7 | 12.0 |

*(continued)*

**Table 2** *Continued*

| Job activity | Mean scores ($N = 142$) | Very Impt (%) | Impt (%) | Fairly Impt (%) | Not Impt (%) |
|---|---|---|---|---|---|
| 56. Termination/dismissal: supervisor/foreman | 2.352 | 22.5 | 34.5 | 28.2 | 14.8 |
| 57. Contract drafting | 2.373 | 18.3 | 37.3 | 33.8 | 10.6 |
| 58. Sources of finance | 2.387 | 26.8 | 27.5 | 26.1 | 19.7 |
| 59. Employment legislation | 2.415 | 16.2 | 34.5 | 41.5 | 7.7 |
| 60. Client/consumer protection law | 2.472 | 20.4 | 25.4 | 40.8 | 13.4 |
| 61. Promotion and transfer | 2.472 | 16.9 | 27.5 | 45.8 | 9.9 |
| 62. Employee welfare/counselling | 2.479 | 13.4 | 36.6 | 38.7 | 11.3 |
| 63. Negotiate: government bodies | 2.507 | 19.7 | 29.6 | 31.0 | 19.7 |
| 64. Advertising and promotion | 2.521 | 19.7 | 27.5 | 33.8 | 18.3 |
| 65. Market research | 2.521 | 26.7 | 18.3 | 33.1 | 22.5 |
| 66. Termination/dismissal: management | 2.542 | 15.5 | 32.4 | 33.8 | 18.3 |
| 67. Negotiate: trade unions | 2.577 | 19.7 | 23.9 | 35.2 | 21.1 |
| 68. Termination/dismissal: manual labour | 2.592 | 12.0 | 32.4 | 39.4 | 16.2 |
| 69. Company law | 2.592 | 16.2 | 28.2 | 35.9 | 19.7 |
| 70. Use of computer technology | 2.599 | 15.5 | 25.4 | 43.0 | 16.2 |
| 71. Organization culture | 2.634 | 15.5 | 21.8 | 45.8 | 16.9 |
| 72. Planning law | 2.761 | 13.4 | 20.4 | 42.3 | 23.9 |
| 73. Managing other national culture | 2.873 | 12.0 | 19.7 | 37.3 | 31.0 |
| 74. Demotion and retirement | 3.049 | 4.2 | 19.7 | 42.3 | 33.8 |
| 75. Foreign language | 3.507 | 1.4 | 9.2 | 25.4 | 64.1 |

uncertain environment, as is the case with refurbishment projects, with variations/change orders to the works, the need for constant supervision of subordinates and co-workers is of immense importance.

Koehn and Tower (1982), in their article entitled 'Current aspects of construction rehabilitation', are of the view that refurbishment work demands greater supervision than new build work. They also noted that, for refurbishment, '. . . more time and effort are needed on the part of the superintendent (supervisor), project manager and the designer to enable rehabilitation projects to run smoothly and efficiently'.

The high degree of importance attached to supervision by respondents of the postal questionnaire, was supported also by the 22 managers who were interviewed as part of the study. These managers were also asked to rate the degree of importance of refurbishment management skills and knowledge as very important, important, fairly important or not important. All the 22 managers interviewed noted that supervision was either very important or important. Having had experience of new build work, all the 22 managers noted also that refurbishment work demands more frequent and closer supervision than new build work.

Willenbrock *et al.* (1987) are of the view that the nature of refurbishment work, coupled with a long working week and overtime work by construction personnel, leads to low morale and low productivity of refurbishment work. To this end, the skill/knowledge of motivating others is needed.

Health and safety received high ranking by all levels of management, being ranked 2nd by senior managers, 1st by middle managers and 4th by junior managers. This is not surprising, given the fact that refurbishment work is dangerous (HSE, 1988). More often than not, it involves demolition work and also can involve the disposal of hazardous substances such as asbestos and lead. As statistics from the Health and Safety Executive (HSE, 1988) show, the repair and maintenance sector, including refurbishment, accounts for about 43% of the total number of construction fatal accidents in the UK.

The need to understand and be able to control substances hazardous to health, such as asbestos and lead, especially by the site management team, is of the utmost importance. UK managers would need to be knowledgeable and conversant with the 1988 regulation on Control of Substances Hazardous to Health (COSHH) and, similarly, they would need to acquaint themselves with the Construction Design and Management (CDM) regulations which came into effect in March 1995.

Egbu *et al.* (1996) have argued that there is now a need to establish and profile the health and safety risks and hazards associated with refurbishment work, especially works carried out with tenants in occupation. In addition, appropriate management strategies to cope with such safety risks and hazards need to be developed.

Decision making also was rated highly by all levels of management. This skill was ranked 4th by senior

**Table 3** Skills and knowledge perceived as most important by senior managers in managing refurbishment work ($N = 23$)

| Job activity | Average score | V.impt/ impt(%) |
|---|---|---|
| Communication (oral/written) | 1.217 | 100.0 |
| Health and safety | 1.217 | 95.6 |
| Leadership | 1.261 | 100.0 |
| Decision making | 1.261 | 100.0 |
| Budgetary control | 1.304 | 100.0 |
| Motivation of others | 1.304 | 95.6 |
| Forecasting and planning | 1.348 | 100.0 |
| Costing and estimating | 1.435 | 91.3 |
| Supervision of others | 1.478 | 100.0 |
| Team building | 1.478 | 95.6 |
| Managing conflict/crisis | 1.478 | 91.3 |
| Identifying personal strengths/weaknesses | 1.522 | 100.0 |
| Managing time | 1.522 | 95.7 |
| Site organization | 1.522 | 91.3 |
| Analysis of project risk/uncertainty | 1.565 | 91.3 |
| Recruit/select: supervisor/foreman | 1.565 | 91.3 |
| Quality control and assurance | 1.565 | 86.6 |
| Conducting meetings | 1.609 | 100.0 |
| Manpower planning and control | 1.609 | 95.7 |
| Recruit/select: subcontractor | 1.609 | 87.0 |
| Materials planning and control | 1.609 | 86.9 |
| Employee training: management | 1.652 | 95.6 |
| Setting objectives and goals | 1.652 | 86.9 |
| Delegating responsibilities | 1.652 | 86.9 |
| Employee training: supervisor/foreman | 1.696 | 91.3 |
| Tenant welfare | 1.696 | 86.9 |
| Competitor awareness | 1.696 | 82.6 |
| Managing change | 1.739 | 87.0 |
| Recruit/select: management | 1.739 | 86.9 |
| Organization of communication systems | 1.739 | 82.6 |
| Competitive tendering | 1.739 | 78.2 |
| Programme maintenance (update) | 1.783 | 78.2 |
| Programme design | 1.783 | 82.6 |
| Public relations | 1.826 | 78.3 |
| Productivity control and maintenance | 1.870 | 78.2 |

managers; 6th by middle managers and 9th by junior managers. Refurbishment work is characterized by high risk, uncertainty and high numbers of variation orders to the works. Working under such situations, and at the same time attempting to achieve the stipulated time for project completion, managers would have to make impromptu and sound decisions. The skill of decision making therefore is of great importance at all levels of management. This view is supported also by most of the refurbishment managers who were interviewed. Of the 22 managers interviewed, 18 (81.82%) were of the view that it is most important (very important/important) that site managers, and any manager for that matter, involved in refurbishment should be entrusted to take decisions since the works demand quick and on-the-spot decisions. There was also a general consensus among all the 22 managers that the organizational structure at project levels needs to be decentralized, to allow for the flexibility and quick decisions and responses which refurbishment work demands.

In an environment of uncertainty, increased variation to the works, and costs likely to escalate at short notice, the skills and knowledge associated with forecasting and planning become very important. It is not surprising therefore that all levels of managers ranked the ability to forecast and plan very highly in importance. Forecasting and planning was ranked 7th by both senior and mid-level managers and 5th by junior managers. Managers would need to be able to plan and forecast the amount of labour, materials and plant resources needed for the works. Also, the effects of unavailability and/or insufficient resources on time for project completion, quality of workmanship and cost, also are issues that need attention.

Controlling the financial requirements of refurbishment processes is considered to be part of the duties of all managers, and more so for senior managers than junior managers. As was mentioned earlier, with costs liable to escalate at fairly short notice, managers would need to maintain firm control over finances. Budgetary control was ranked as the 5th most important skill or area of knowledge by both senior and mid-level managers and 15th by junior managers. Unlike junior managers who are responsible for their own individual operating departments, managers in the senior positions (i.e. directors and area and regional managers) take overall responsibility of their divisions or regions. It would be expected therefore that senior managers would attach more importance to budgetary control than would junior managers. A similar explanation can be offered for the high ranking of costing and estimating by senior managers as compared with middle and junior managers.

A view expressed by the 32 training officers who were interviewed as part of the study, that all refurbishment managers are close to the site, might also explain the high degree of importance attached to site organization by managers at all levels. This view was supported also by most of the 22 managers who were interviewed.

Tables 3, 4 and 5 show also that the need to work as a team is perceived to be of high importance by managers at all levels. Team building is ranked 10th by senior managers, 9th by mid-level managers and 10th by junior managers. The importance of team building in refurbishment has been expressed by Cole and Hutton (1987), who are of the view that 'Co-operation between architects and contractors – and for that matter the other members of the building team – is at a premium'.

**Table 4** Skills and knowledge perceived as most important by middle managers in managing refurbishment work ($N = 59$)

| Job activity | Average scores | V.impt/ impt(%) |
|---|---|---|
| Health and safety | 1.203 | 100.0 |
| Leadership | 1.220 | 98.3 |
| Motivation of others | 1.220 | 98.3 |
| Communication (oral/written) | 1.220 | 95.0 |
| Budgetary control | 1.288 | 100.0 |
| Decision making | 1.305 | 98.3 |
| Forecasting and planning | 1.356 | 94.9 |
| Site organization | 1.356 | 93.2 |
| Team building | 1.373 | 94.9 |
| Supervision of others | 1.424 | 93.2 |
| Recruit/select: supervisor/foreman | 1.492 | 94.9 |
| Conducting meetings | 1.508 | 96.6 |
| Delegating responsibilities | 1.525 | 94.9 |
| Recruit/select: subcontractor | 1.559 | 93.2 |
| Quality control and assurance | 1.559 | 88.1 |
| Managing time | 1.576 | 89.8 |
| Programme maintenance (update) | 1.576 | 86.4 |
| Setting objectives and goals | 1.593 | 91.6 |
| Managing conflict/crisis | 1.610 | 89.8 |
| Manpower planning and control | 1.627 | 91.6 |
| Employee training: supervisor/foreman | 1.661 | 91.6 |
| Recruit/select: management | 1.661 | 84.8 |
| Analysis of project risk/uncertainty | 1.678 | 89.9 |
| Site security | 1.678 | 89.9 |
| Negotiate: client | 1.678 | 84.7 |
| Negotiate: contractor | 1.712 | 89.8 |
| Materials planning and control | 1.712 | 86.5 |
| Programme design | 1.712 | 84.8 |
| Public relations | 1.712 | 84.8 |
| Competitive tendering | 1.712 | 83.1 |
| Competitor awareness | 1.729 | 84.8 |
| Negotiate: main contractor | 1.746 | 89.8 |
| Employee training: management | 1.746 | 86.5 |
| Identifying personal strengths/weaknesses | 1.763 | 83.1 |
| Tenant welfare | 1.780 | 83.1 |

The nature of refurbishment work with a high level of uncertainty in the works, lends itself to project time over-run. The skills and knowledge associated with managing time therefore are necessary. Managers would need to exert control over construction activities so that the time stipulated for project completion is not exceeded. To this end 95.7% of senior managers, 89.8% of middle managers and 91.7% of junior managers ranked it as being most important. The relatively high degree of importance attached to managing time is supported by Jothiraj and Fellows' (1986), who observed that time performance was the major factor in determining clients' overall satisfaction with commercial refurbishment projects.

Marston and Skitmore (1990), in accepting the importance of managing time in refurbishment, have identified the need to improve methods of time forecasting by using a resource based, non-deterministic approach. This would involve automating and simulating the planning process. The resource based approach should reflect actual production processes, while the non-deterministic approach would allow for uncertainties and risk assessment.

The ability to cope with the unexpected, changes, conflicts and crisis is needed in refurbishment work. To this end, the skill/knowledge of managing conflict/crisis is ranked relatively high in importance by managers at all levels of management; being ranked 11th, 19th and 19th by senior, middle and junior managers, respectively. As senior managers have overall responsibility for the outcome of refurbishment contracts, it is expected that their requirement for the skill/knowledge of managing conflict and crisis is greater than that of middle and junior managers.

Quality control and assurance also received relatively high ranking, i.e. 12th, 15th, and 17th by junior, middle and senior managers, respectively. Senior managers also have to be knowledgeable and conversant with the management of quality assurance. Similarly, they need to be conversant also with quality control, which involves the delivery of products and services. Moreover, clients are demanding a quality service, and BS EN ISO 9001 is becoming widely recognized as the standard. To this end, efforts would have to be made in achieving that aim.

The skill/knowledge associated with the analysis of project risk/uncertainty also is of high importance to all levels of management, with senior managers placing more emphasis on its importance. Also, competitor awareness and competitive tendering are ranked higher in importance by senior managers when compared with junior managers. Three areas of skills and/or knowledge, project risk/uncertainty, competitor awareness and competitive tendering, are used substantially in the securement of contracts which, in the main, is the domain of senior management. However, the high degree of importance attached to project risks/uncertainty by all levels of management reflects the high levels of risk and uncertainty associated with refurbishment works (Chapman, 1980; Quah, 1988; Teo, 1990). Refurbishment work therefore demands requisite skill/knowledge associated with being able to assess and analyse risks/uncertainty in construction work.

Clients of refurbishment contracts increasingly want to see that the contractor and members of the management team have the necessary expertise for the works, and thus middle and junior managers would need to show requisite skill/knowledge in being able to analyse and cope with the risks/uncertainties associated with

projects. As Cole and Hutton (1987) pointed out, '. . . more and more we interview not just the directors of contracting companies, but their contract managers and site agents – the individuals the contractor expects to put in as responsible for site development'. The importance of managing project risks and uncertainty for refurbishment work is supported also by Teo (1990). He advised on the necessity for refurbishment contractors to be able to manage risks in refurbishment work, and developed a decision support and risk management system model which provides a systematic and objective approach to risk management in competitive bidding for refurbishment work.

Mid-way down Tables 4 and 5 emphasis is placed on the importance of skills/knowledge in operational programming of the construction phases of projects by middle and junior managers. Such skills as manpower planning and control, programme maintenance (update), programme design, and site security are evident.

Tenant welfare also is recognized to be of great importance by 91.6% of junior managers, 83.1% of middle managers and 86.9% of senior managers. Since many refurbishment works are carried out with tenants still in occupation and businesses still in operation, the welfare of tenants and occupants of properties becomes significant. Also, being able to relate to the public is recognized to be of immense importance by all levels of managers, with the greatest emphasis being placed on the skill to relate to the public, on site, by junior managers. Site managers/agents are closer to site, and are more in contact with the public and tenants in occupation. Therefore they are more likely to require the skill/knowledge of public relations in their work than are middle or senior managers.

The importance of public relations and liaison with tenants is supported also by the 32 training officers who were interviewed as part of the study. To this end, of the 32 participating organizations, eight have employed public relation officers (PRO's)/tenant liaison officers (TLO's) to manage these important functions.

The study sought also to test if managers' jobs in refurbishment are totally different across levels of management as defined by the relative importance attached to skills and knowledge. By testing the null hypothesis that there is no significant correlation between the degree of importance attached to management skills/knowledge for refurbishment and levels of management, Spearman's coefficient of correlation ($r_S$) was found to be 0.01. This value was not significant at the 5% level. The null hypothesis was not rejected. This finding, in effect, means that there is no substantial evidence to suggest that managers' jobs in refurbishment are totally different across levels of management.

**Table 5** Skills and knowledge perceived as most important by junior managers in managing refurbishment work ($N = 60$)

| Job activity | Average score | V.impt/ impt(%) |
|---|---|---|
| Leadership | 1.150 | 100.0 |
| Communications (oral/written) | 1.167 | 100.0 |
| Motivation of others | 1.183 | 100.0 |
| Health and safety | 1.300 | 96.7 |
| Forecasting and planning | 1.367 | 98.3 |
| Materials planning and control | 1.367 | 95.0 |
| Supervision of others | 1.383 | 96.7 |
| Site organization | 1.383 | 95.0 |
| Decision making | 1.400 | 91.7 |
| Team building | 1.450 | 96.6 |
| Manpower planning and control | 1.483 | 93.3 |
| Quality control and assurance | 1.483 | 93.3 |
| Managing time | 1.517 | 91.7 |
| Productivity control and maintenance | 1.533 | 90.0 |
| Budgetary control | 1.567 | 91.6 |
| Tenant welfare | 1.567 | 91.6 |
| Setting objectives and goals | 1.567 | 88.5 |
| Public relations | 1.583 | 86.6 |
| Managing conflict/crisis | 1.650 | 90.0 |
| Programme maintenance (update) | 1.650 | 86.6 |
| Competitive tendering | 1.650 | 85.0 |
| Programme design | 1.683 | 81.6 |
| Conducting meetings | 1.700 | 93.4 |
| Employee training: supervisor/foreman | 1.700 | 86.7 |
| Delegating responsibilities | 1.733 | 86.7 |
| Site security | 1.733 | 85.0 |
| Analysis of project risk/uncertainty | 1.750 | 88.4 |
| Identifying personal strengths/weaknesses | 1.767 | 81.7 |
| Employee training: management | 1.767 | 81.7 |
| Recruit/select: supervisor/foreman | 1.783 | 73.4 |
| Negotiate: client | 1.800 | 80.0 |
| Managing job stress | 1.817 | 78.4 |
| Managing change | 1.833 | 78.3 |
| Costing and estimating | 1.833 | 76.6 |
| Recruit/select: subcontractor | 1.833 | 73.4 |

Similarly, the study explored the relative importance of skills and knowledge for refurbishment across types of refurbishment organization (specialist and general). Although, there were some subtle differences in perceptions across types of organization; such as managers from specialist organizations rating the analysis of project risks and uncertainty and the recruitment of supervisors/foremen relatively higher than their counterparts from general contracting organizations, in the main, there was general agreement about the skills and knowledge that are most important for managing refurbishment work. By using the Spearman's coefficient of correlation to test the null hypothesis that there is no significant correlation between the degree of importance

of management skills/knowledge for refurbishment and types of organization, the $r_S$ was found to be –0.06 at the 5% level of significance. The null hypothesis was not rejected. This means that, in this study, there was no substantial evidence to suggest that the management skills and knowledge which specialist refurbishment organizations perceive as important are substantially different from those in general refurbishment organizations. This dispels the view that skills and knowledge perceived as most important are totally different across types of organization.

In summary, the data presented above demonstrate clearly that refurbishment managers, at all levels, consider the interpersonal skills, i.e. leadership, communication, motivation of others and supervision, as most important for refurbishment. Health and safety also is a concern for managers at all levels. Forecasting and planning, managing time, and analysis of project risks/uncertainty are perceived as being of immense importance at all levels of management. The establishment of the management skills and a knowledge inventory for refurbishment shows clearly the similarity which exists in refurbishment tasks across all levels of management. It also confirms that there are skills and areas of knowledge that increase relatively across levels of management such as those associated with financial control, and securing jobs for the organization. The skills/knowledge which are associated with programming construction phases of projects are considered more important at lower levels than at higher levels of management.

Tables 3, 4 and 5 show that managers' refurbishment skills/knowledge are relatively homogeneous, and lend support to Mintzberg's (1980) theory of the nature of managerial work, that there is similarity in managers' work across all levels of management. The findings also support the proposition by segmented labour analysts Doeringer and Piore (1971), on the specificity of skills to an industry based on the premise that they are both similar and transferable. The findings, however, do not support the views of researchers and writers who argue that managers' work is totally different across all levels of management and types of organizations, as championed by Stewart (1976).

## Management skills and knowledge: comparison with other studies in construction

As no study has yet been conducted specifically on the relative importance of management skills and knowledge for refurbishment, a comparative analysis with studies in the area of refurbishment is not feasible. However, there have been some studies conducted in the general area of construction management skills and knowledge, and comparisons with some of these studies will be made. The selection of studies for comparative purposes will be based on one, two or all of the following three criteria: (i) Compatibility with the methodology of the present study; (ii) similarity in research objectives; and (iii) compatibility in statistical representation. Studies which have evaluated the relative importance of construction management skills and knowledge include those of Fryer, (1979), the Construction Industry Training Board (CITB, 1988b) and the Construction Industry Institute, USA (CII, 1990).

Fryer's (1979) study produced only five important skills which 29 site and contracts managers perceived as important. With so few skills/knowledge options to choose from, variation in rank order of importance is minimal. The narrowness of choice of skills/knowledge prevents any meaningful comparative analysis. Similarly, the CII, (1990) study produced only 10 skills/traits perceived as important by senior executives, mid-level executives, project managers and site superintendents.

The CITB (1988b) study included face to face interviews as well as interviews conducted by telephone with company representatives in senior positions. In addition, two sets of postal questionnaires were designed, each having different research objectives. One set of questionnaires was sent out to individual managers and supervisors, in order to elicit their views on the degree of importance they attach to their job activities. The other set of questionnaires requested the companies views of the training needs of their managers. For comparative purposes with the refurbishment study, the CITB data obtained from 180 usable questionnaires completed by managers and supervisors will form the basis for comparison. From a wide range of skills for managerial and supervisory staff , respondents were requested to indicate, according to each job activity, if they thought it was not applicable, vital, very important, moderately important or of little importance. Table 6 shows those job activities which the respondents considered to be vital or very important at the senior, middle and junior positions. From the original list of 23 job activities in the CITB study, there are 18 activities which more than 60% of senior managers perceived as very or vitally important in their jobs. This represents 78% of senior management tasks being significantly important. Similarly, for middle and junior managers, 65% and 47% of their tasks were perceived by 60% of middle and junior management, respectively, as very or vitally important. There are differences in the perceptions managers have about the job they carry out at each level of the management hierarchy.

Table 6 indicates that quality control is an activity which managers at all levels of management perceive as very or vitally important. Although majority percentages differ across management levels, in the main, there is general agreement on its importance.

Managing people received a high rating by 90% or more of the respondents at each level of management. Managing people includes such tasks as leadership, motivation and supervision. In the refurbishment study, leadership, motivation, and supervision of others are listed as separate skills/knowledge, and over 93% of managers at each level of management ranked each of these skill or areas of knowledge as most important for refurbishment work (see Tables 3, 4 and 5). Thus both studies confirm the value attached to the behavioural aspects of management in a construction environment.

In the CITB study, 93% of senior management reported financial planning/control to be very or vitally important in construction management, compared with 64% and 60% of middle and junior management, respectively. In the refurbishment study, 100% of senior and middle refurbishment managers reported budgetary control to be most important for refurbishment compared with 91.6% of junior managers. This result lends support to the view that managers in the senior management positions perceive the skills/knowledge associated with financial management to be 'more' important in their jobs than managers in the junior management positions. Financial management activities, it would appear, are more akin to senior than junior management positions.

Table 6 further shows that planning/programming of the works is perceived to be important by 90% of junior and middle management, compared with 83% of senior management. In the refurbishment study, 78.2% of senior refurbishment managers ranked programme maintenance (update) as most important, in comparison with 86.4% and 86.8% of middle and junior managers, respectively. Thus, both studies confirm that operational activities are considered 'more' important by junior management than by senior management.

It is evident also from Table 6, that the majority of respondents perceived health and safety to be significantly important: 65% of senior management, 84% of middle management and 86% of managers at the junior management positions. This is comparatively low in relation to the refurbishment study, where 95.6% of senior, 100.0% of middle and 96.7% of junior refurbishment managers ranked the skill/knowledge associated with health and safety as most important for refurbishment. The fact that refurbishment work is dangerous, with a relatively high incidence of fatal accidents (HSE, 1988), explains to some extent, the relatively high level of importance attached to health and safety issues by managers at all levels in the refurbishment study.

Surprisingly, the skills/knowledge associated with site organization was not ranked as very or vitally important in the CITB study, even at junior management positions. In the refurbishment study, site organization was ranked to be important by 95%, 93.2% and 91.3% of junior, mid-level and senior managers, respectively.

**Table 6** Very or vitally important job activities in construction management and supervision[a]

| Senior management | Response (%) | Middle management | Response (%) | Junior management | Response (%) |
|---|---|---|---|---|---|
| Financial planning/control | 93.5 | Quality control | 93.9 | Quality control | 94.0 |
| Managing people | 91.9 | Progress control of work | 92.2 | Managing people | 90.9 |
| Industrial relations | 92.3 | Managing people | 89.7 | Planning/programming of work | 90.4 |
| Employee recruitment/dismissal | 90.6 | Planning/programming of work | 89.7 | Progress control of work | 87.0 |
| Tendering | 90.0 | Negotiate: supplier/subcontractor | 84.6 | Negotiate: supplier/subcontractor | 86.0 |
| Quality control | 89.7 | Control of health and safety | 84.4 | Control of health and safety | 86.3 |
| Employee training | 87.5 | Financial planning/control | 78.6 | Materials management/control | 78.4 |
| Progress control of work | 86.2 | Forecasting staff/labour | 78.1 | Financial planning/control | 73.7 |
| Planning/programming of work | 83.3 | Materials management/control | 68.3 | Forecasting staff/labour | 70.6 |
| Forecasting staff/labour | 81.3 | Employee training | 66.1 | Cost estimating | 58.9 |
| Cost estimating | 80.8 | Employee recruit/dismissal | 65.0 | Negotiate all sources of finance | 60.0 |
| Measurement: valuation/bonus pay | 80.0 | Industrial relations | 65.5 | | |
| Negotiate: supplier/subcontractor | 80.0 | Tendering | 65.0 | | |
| Employee ass./design pay schemes | 76.0 | Cost estimating | 63.8 | | |
| Materials management/control | 76.2 | Measurement: valuation/bonus pay | 61.7 | | |
| Sales and marketing | 72.4 | | | | |
| Negotiate all sources of finance | 66.7 | | | | |
| Control of health and safety | 65.5 | | | | |

[a]Source: CITB (1988b) *Survey Of Supervisory And Management Training Needs In The UK Construction Industry*, Main Report, Vol. I.

Significantly, the skills and knowledge associated with forecasting and planning, analysis of project risk/uncertainty, managing conflict/crisis, team building and tenant welfare, which are ranked highly in importance in the refurbishment study, were not considered to be very or vitally important in the CITB study. Perhaps, this is a reflection of the nature of refurbishment work, and the skills/knowledge that it demands.

There are other studies which have evaluated the skills and knowledge required for construction management: these include Young (1988), Finnigan *et al.* (1987) and Faulkner and Wearne (1979, 1984). For reasons associated with compatibility of the methodology of the present study and statistical representation, a comparative analysis will be made only with Young's (1988) study, in which production managers from three small, six medium and two large UK building and/or civil engineering contractors were requested to indicate from a list of 56 job dimensions (skills/knowledge) those which they require in their present job, for construction management. In all, seventy-three managers (senior, middle and junior) responded whether they never, occasionally, often, or very frequently required the skills/knowledge. A decreasing mean score signifies less skill/knowledge requirement in manager's job.

For comparative analysis, only data concerning the most essential skills and areas of knowledge, at each level of management, will be discussed. These are presented in Table 7. The categories often and very frequently in Young's (1988) study are combined to form the most required skill/knowledge. Table 7 shows that the interpersonal skills, i.e. communication, motivation and leadership, are the most required skills/knowledge for construction management. This largely corresponds to the skills/knowledge which managers ranked very highly to be most important for refurbishment. A visual description, for comparison of the most required skills/knowledge for construction management and the most important skills/knowledge for managing refurbishment work across levels of management is provided in Figure 1.

There are noticeable similarities in the results of the two studies. The skills/knowledge which are mostly required for general construction management appear to be the most important skills/knowledge for managing in a refurbishment environment. Figure 1 shows the high degree of requirement and importance attached to interpersonal skills by managers at all levels in both studies, and show also that the relative degree of importance and level of requirement attached to skills/knowledge associated with financial planning/control, i.e. budgetary control, increases as management hierarchy is ascended. For operational tasks, e.g. programme maintenance (update), both studies show that the relative degree of importance and level of requirement

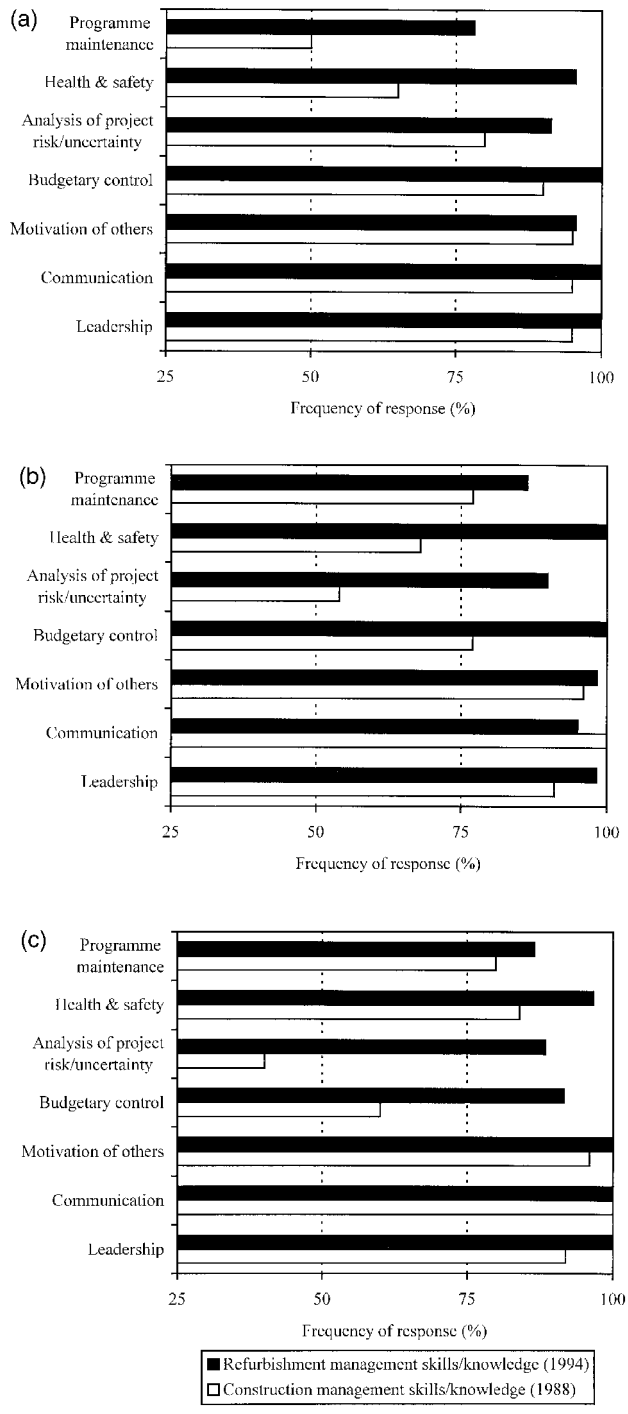


**Figure 1** A comparison of skills/knowledge most important for construction management with those most important for refurbishment management: (a) senior management, (b) middle management and (c) junior management

increases as the management hierarchy is descended.

Further, Figure 1 shows the following interesting results. Although the relative importance and level of requirement attached to budgetary control decreases as

**Table 7** Skills and knowledge most required by senior, middle and junior construction managers

| Senior managers | | | Middle managers | | | Junior Managers | | |
|---|---|---|---|---|---|---|---|---|
| Job activity | Average score | Freq $N = 20$ (%) | Job activity | Average score | Freq $N = 22$ (%) | Job activity | Average score | Freq $N = 31$ (%) |
| Communication | 2.75 | 95 | Communication | 2.68 | 100 | Supervision of others | 2.92 | 100 |
| Motivation of others | 2.75 | 95 | Motivation of others | 2.59 | 96 | Communication | 2.84 | 100 |
| Supervision of others | 2.75 | 95 | Leadership | 2.59 | 91 | Motivation of others | 2.80 | 96 |
| Leadership | 2.70 | 95 | Supervision of others | 2.59 | 91 | Leadership | 2.60 | 92 |
| Competitive tendering | 2.55 | 90 | Programme construction | 2.27 | 90 | Organization/site | 2.50 | 92 |
| Budgetary control | 2.50 | 90 | Organization/site | 2.20 | 86 | Health and safety law | 2.28 | 84 |
| Costing and estimating | 2.50 | 85 | Programme maintenance | 2.18 | 77 | Programme construction | 2.24 | 84 |
| Analysis of project risks | 2.35 | 80 | Budgetary control | 1.95 | 77 | Programme maintenance | 2.20 | 80 |
| Health and safety law | 2.05 | 65 | Management of quality assurance | 1.95 | 68 | Management of quality assurance | 2.12 | 80 |
| Programme construction | 2.00 | 75 | Manpower planning | 1.90 | 72 | Manpower planning | 2.00 | 84 |
| Company (strategic) planning | 1.88 | 60 | Negotiate/suppliers | 1.90 | 63 | Programme stock/materials distribution | 1.96 | 72 |
| Public relations | 1.70 | 60 | Negotiate/subcontractor | 1.81 | 73 | Negotiate suppliers | 1.76 | 64 |
| Recruit/select/man./professionals | 1.65 | 60 | Health and safety law | 1.77 | 68 | Budgetary control | 1.76 | 60 |
| Negotiate/client | 1.65 | 55 | Programme design | 1.77 | 59 | Organization of communication systems | 1.68 | 52 |
| Negotiate/subcontractor | 1.65 | 55 | Recruit/select:subcontractor | 1.72 | 64 | Negotiate/plant hire | 1.60 | 60 |
| Programme design | 1.55 | 55 | Analysis of project risks | 1.68 | 54 | Costing and estimating | 1.44 | 52 |
| Employee training: man./professionals | 1.55 | 50 | Negotiate/plant hire | 1.68 | 55 | Public relations | 1.40 | 48 |
| Contract drafting | 1.50 | 50 | Costing and estimating | 1.63 | 63 | Negotiate/subcontractor | 1.16 | 40 |
| Manpower planning | 1.50 | 50 | | | | Analysis of project risks | 1.12 | 40 |
| Appraisal/career development | 1.50 | 50 | | | | Programme design | 1.00 | 32 |
| Programme maintenance | 1.45 | 50 | | | | | | |
| Recruit/select: supervisor/foreman | 1.15 | 45 | | | | | | |
| Employee training: supervisor/foreman | 1.10 | 35 | | | | | | |

[a]Source: Young (1988).

the management hierarchy is descended, Figure 1(c) indicates that junior managers (91.6%) involved in the refurbishment study ranked budgetary control higher in importance than did the junior managers (60%) in Young's study, who indicated that it was often or very frequently required. Young's respondents are managers who are, in the main, involved with new build work, and from building and/or civil engineering contractors. The nature of refurbishment work, with high levels of risks, uncertainty, and costs likely to escalate at very short notice, explains to some extent the high response accorded budgetary control by junior refurbishment managers, who would need to bear financial matters in mind, especially as it involves cash flows, the achievement of equitable payment for work undertaken, i.e. bonus payments, considerations of the consequences of financial matters before decisions are taken, and profitability relating to site works.

Figure 1 shows in addition that the analysis of project risk/uncertainty is ranked highly by refurbishment managers compared with the managers in Young's study. Only 40% of junior managers (Figure 1(c)) in Young's study ranked analysis of project risk/uncertainty as most required skill/knowledge. Whereas over 88% of junior refurbishment managers ranked it as most important in their present job. The acquisition of the skills/knowledge needed to contend with the issues arising from the relatively high levels of risks and uncertainty associated with refurbishment work is vital.

Health and safety receives a relatively higher response, especially from senior managers in the refurbishment study when compared with the managers in Young's study. The dangerous nature of refurbishment work, and the increased safety precautions associated with demolition work and strengthening of building elements, mean that health and safety issues are of paramount importance in managing in a refurbishment environment.

In the refurbishment study presented in this paper there are five notable areas of management skills/knowledge which refurbishment managers cited as being of most important (Tables 3, 4 and 5) in their present job, and which do not appear as most required skills/knowledge in Young's study: 1, forecasting and planning; 2, managing conflict/crisis; 3, tenant welfare; 4, decision making; and 5, team building. In an environment, like the refurbishment environment where the total content of the works cannot be ascertained until work is commenced, and where there is a high level of variation/change orders to the works coupled with a high level of risk, the skills/knowledge associated with forecasting and planning, and managing conflict/crisis become necessary. Refurbishment managers would also need to take firm and impromptu decisions, especially where they relate to variation orders to the works.

Working as a team in refurbishment is vital. There is a need for a closer relationship not only between the design and construction teams but also among managers at all levels of management. If the issues arising from variations and cost escalation are to be addressed speedily, to the satisfaction of the client and contractor, then the clients' and contractors' quantity surveyors would need to work much closer together. The contractors' planners, estimators and the site management team also would need to work closer together in the planning and control of the works.

Tenants in occupation and the issues arising from their occupation in construction are characteristics of refurbishment work, but not of new build work. Therefore it is not surprising that skill/knowledge of tenant welfare does not appear as required skill/knowledge in Young's (1988) study. The five areas of skill/knowledge listed above would appear to be more akin to managing in refurbishment than in a new build environment.

The comparative analysis has further confirmed the view that, although construction management tasks are similar, there are differences in perception across management levels and across construction sectors on the importance of management skills/knowledge. The implication of this is that there are skills that are common to all construction management activities, and that there are skills that are needed and considered of high importance by the refurbishment sector. From the comparative studies it can be seen that skills/knowledge associated with forecasting and planning, managing conflict/crisis, tenant welfare, team building and decision making are perceived as of higher importance in refurbishment than in general construction management. Courses directed at the needs of refurbishment would need to take due cognizance of these important management aspects.

## Conclusions and recommendations

An appropriate body of management skills and knowledge, a skills/knowledge inventory for refurbishment, has been established. This should assist refurbishment organizations in recruiting and selecting the 'right' calibre of manager, and to reduce mis-matching of skills and jobs. The most important management skills/knowledge for refurbishment are: leadership, communication (oral/written), motivation of others, health and safety, decision making and forecasting and planning.

Following the importance attached to forecasting and planning, and the relatively high levels of risks and uncertainty associated with refurbishment operations, empirical studies are needed into both the forecasting

and planning and the risk management techniques which refurbishment contractors and clients adopt for refurbishment works. Such studies should aim to produce guidelines for best practice.

Evidence from this study suggests that there is a closer involvement of all parties associated with refurbishment (including managers, at all levels) many of which are closer to site than those involved in new construction. Empirical research studies need to be conducted to investigate the degree of involvement of the key functionaries to the refurbishment process in planning, control and decision making, and also the effects of their involvement on successful refurbishment outcomes.

Refurbishment managers' jobs as defined by their application of skills/knowledge are, on the whole, homogeneous, with some overlap across levels of management and types of refurbishment organization. This dispels the view that management tasks are totally different across levels of management and types of organization.

Refurbishment managers tend to attach more importance to the tasks associated with their day to day job activities by virtue of their positions within the management hierarchy.

It has been shown that the importance of some management skills/knowledge increases relatively across levels of management such as those associated with financial control, and securing jobs for the organization. The skills/knowledge which are associated with the programming of construction phases of projects are considered more important at lower levels than at higher levels of management. There are also some indications of skills/knowledge overlapping across management levels.

A comparison of the relative importance of refurbishment management skills/knowledge with those in general construction management shows that skills and knowledge of forecasting and planning, managing conflict and crisis, tenant welfare, team building and decision making are rated higher in refurbishment than in general construction management. For contractors, individual managers, training officers and course providers involved in refurbishment, the acquisition of these skills and areas of knowledge is vital for refurbishment work.

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