

# Information systems/technology evaluation practices: evidence from UK organizations

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The evaluation of information systems technology (IS/IT) investments has been a much debated issue in the IS literature. This paper adds to that debate by discussing the IS/IT project evaluation practices of a sample of the top 1000 UK companies. The study sheds light on a number of evaluation issues, including the extent to which formal procedures of evaluation exist within organizations, and the extent to which consultation with stakeholders takes place, in addition to identifying the problems inherent in evaluating IS/IT investments. The implications of the findings are discussed, where possible in the light of previous research, in addition to identifying a number of key issues where further research is needed.

## Introduction

The level of information systems/technology (IS/IT) spend, both in the UK and the US, is such that it now represents a substantial element of capital expenditure, and is on a par with that expended on research and development activities. According to Willcocks (1992), IT spending in the UK during 1992 exceeded £10 billion or an equivalent of 1.2% of annual turnover. More recently the 1993/94 and 1994/95 *Information Technology Reviews* (Price Waterhouse, 1994, 1995) indicate that expenditure on IT continued to rise by a healthy 9% and 15%, for 1992 and 1993 respectively. In the US, comparable spending levels are found. For example, Maglitta and Sullivan-Trainor (1991) quote a figure of 2.7% of corporate turnover spent on IS/IT investments, while Ian (1989) estimates that US firms spend somewhere between 1.5% and 3% of their revenue on IT (see also Weill and Olson, 1989). However, Keen (1991) contends that only 20% of the cost of IT investments is actually visible (see also Davis, 1989), hence actual spending levels are likely to be higher than those reported by organizations.

Increasing IS/IT spending levels, coupled with the global economic and competitive climate which organizations face today, gives concern over the measurement of IS effectiveness, cost justification and cost containment. These concerns have been found to rank among the top key IS issues in a number of studies carried out between 1984 and 1996 in the US, the UK, the Gulf and the Republic of China (see Dickson and Nechis, 1984; Niederman *et al.*, 1991; Badri, 1992; Clark, 1992; Galliers *et al.*, 1994; Kelly *et al.*, 1994; Price

Waterhouse, 1994; Wang and Turban, 1994; Pollard and Hayne, 1996).

Given the above concerns and rising levels of IS/IT expenditure, this paper seeks to provide further insights into the IS/IT evaluation process in order to understand it more fully. A review of previous empirical work examining the evaluation of IS/IT investments is first presented. The results of a survey carried out in the latter half of 1993, investigating the IS/IT evaluation practices of a sample of the top 1000 UK companies, are then discussed. It is hoped that the findings of the study will add to our existing knowledge of IS/IT evaluation practices.

## Context

The evolutionary use of IS/IT within organizations is well documented, and can be seen as moving from one of automating to informing (see Zuboff, 1988), and more recently to transformation. In line with this, the role of evaluation has also changed from one of measuring efficiency gains to improvements in effectiveness, to assessing the contribution that IS/IT can make to the way organizations do business. Thus as the role of IS/IT has changed from one of support to one of strategic importance, the process of evaluation has become an increasingly complex one. Coupled with increasing complexity, Remenyi *et al.* (1993) recognize changing attitudes towards investment in IS/IT in the 1990s with even 'greater cynicism about IT benefits than ever before' (p. 25). Similar concerns are voiced by Hochstrasser and Griffiths (1991) who report that IT often fails to deliver acceptable returns (these concerns ema-

nate from a range of studies carried out between 1987 and 1990). For example, their research indicates that only 24% of firms claim to earn above average return on capital for investments in IT (see also Farbey *et al.*, 1995).

The IS/IT evaluation issue is clearly an important one given the concerns of organizations. Reflecting this, much research has already been conducted in the IS/IT evaluation area (see for example, Lucas and Moore 1976; King and Schrems, 1978; Hamilton and Chervancy, 1981; Chandler, 1982; Klein and Beck, 1987; Hawgood and Land, 1988; Hirschheim and Smithson, 1988; Parker *et al.*, 1989). However, despite the existence of an extensive literature, the IS community appears to be no nearer a solution to the problems of IS/IT evaluation. For example, concerns regarding the difficulty of evaluating the costs and benefits of such investments in a meaningful way have been frequently identified as a major problem for organizations (see for example Ginzberg, 1979; Farbey *et al.* 1993).

Setting the difficulties of evaluation aside for the moment, why do organizations evaluate IS/IT investments? According to Farbey *et al.* (1992), evaluation serves a number of objectives: as a means of justifying IS/IT investments; to enable organizations to decide between competing projects, particularly if capital rationing is an issue; as a control mechanism over expenditure, benefits, and the development and implementation of projects; and as a learning device enabling improved evaluation and systems development to take place in the future. Others identify similar reasons why IS/IT investments should be evaluated: to gain information for project planning; to determine the relative merits of alternative projects; to ensure that systems continue to perform well; and to enable decisions concerning expansion, improvement, or the postponement of projects to be taken (see Dawes, 1987; Etzerodt and Madsen, 1988; Ginzberg and Zmud, 1988; Angell and Smithson, 1991).

### Previous empirical studies

The evaluation of capital investments has been widely reported in both the accounting and IS literature. The majority of studies reported in the accounting literature, however, do not generally distinguish between the evaluation practices of IS/IT and other capital investments. Furthermore, many of these studies have tended to concentrate on the financial techniques used to evaluate investments, largely to the exclusion of discussing the problems inherent in the evaluation process itself. For example, past research has sought to establish whether a relationship exists between the use of specific techniques and organizational characteristics (such as

size); developed comparisons of national and international practices; and investigated whether or not the use of specific techniques has changed over time (see for example, Bower, 1970; Klammer, 1972; Petty *et al.*, 1975; Carsberg and Hope, 1976; Gitman and Forrester, 1978; Schall *et al.*, 1978; Sundem and Geijsbeek, 1978; Kim and Farragher, 1981; Scapens and Sale, 1981; Pike, 1982; Moore and Reichert, 1983; Mills, 1988; Pike, 1988; Sangster, 1993; Ward *et al.*, 1995).

On the other hand, the IS literature has tended to report on the evaluation practices of IS/IT investments exclusively. Table 1 summarizes the key findings of a number of empirical studies (carried out in the late 1980s and early 1990s), reported in the IS literature, which have addressed the issue of IS/IT evaluation. Whilst some of the studies have concentrated on examining the financial techniques used to evaluate IS/IT investments, the majority have considered many of the wider issues of IS evaluation, including the identification of problem areas.

### The current research

This paper considers some of the wider issues of IS/IT evaluation alluded to above in order to add further to our knowledge of practice. The findings of a study (carried out in the latter half of 1993), which aimed to document the current state of IS/IT evaluation practices within a sample of UK organizations, are presented. In particular the paper addresses the following issues (additional findings of the study regarding the use of investment criteria and their importance in the evaluation process can be found in Ballantine *et al.*, 1995):

- (1) How widespread is the practice of IS/IT evaluation within organizations?
- (2) Why are IS/IT investments not always evaluated at the feasibility stage?
- (3) To what extent do problems arise with the evaluation process?
- (4) To what extent does evaluation depend on organizational factors, such as project cost and level of organizational turnover?
- (5) Where does responsibility for evaluation exist (corporate or business unit level), and within that area, who is specifically responsible for evaluating investments?
- (6) To what extent does consultation take place with internal stakeholders during the evaluation process, and which stakeholders could usefully have been consulted, but were not?
- (7) To what extent do formal evaluation procedures exist?

In addressing the above issues, the study serves two

**Table 1** Empirical studies on feasibility evaluation

Study	Nature of research	Key issues addressed by study	Key findings
Blackler and Brown (1988)	54 semi-structured interviews with well informed 'opinion leaders' (including management, trade unions, manufacturers, consultants, academics)	Addresses the adequacy of evaluation research in terms of dealing with prior and post evaluation of new information technologies (CAD/CAM)	Evaluation research has become distanced from actual evaluation practice. Considerable emphasis was placed on prior justification. Criticism of short term cost benefit calculations of evaluation was also identified. Bulk of evaluation is carried out by non-specialized management
Bacon (1992)	Survey of 80 companies (25 American, 23 British, 11 Australian, 21 New Zealand)	The use of financial, management and development decision criteria in selecting information systems/technology investments	Criteria such as the support of explicit business objectives and response to competitive systems are becoming more important in selecting IS/IT investments
Tam (1992)	Survey of 134 senior IS US executives	The use of capital budgeting techniques for evaluating, terminating and auditing information systems investments	Capital budgeting techniques are used in IS development, but have little impact on the evaluation, termination and post-audit of IS projects. Problems with estimating costs and returns are identified. A shift in decision authority to corporate level is identified when project costs increase
Farbey <i>et al.</i> (1992)	16 IT projects which had been implemented or were about to be implemented in UK organizations	Consideration of the investment decision process and evaluation techniques used to justify investments in IT	No consistency to cost justification, very few evaluation techniques were used to justify investment. Just over 50% of organizations had a formal justification procedure
Wilner <i>et al.</i> (1992)	Survey of 100 US organizations	Consideration of the capital investment decision processes used for high technology projects	Discounted cash flow techniques were mainly used to evaluate high technology investments. However, numerous non-quantitative factors were also included in the analysis process
Willcocks (1992), Willcocks and Lester (1993)	Survey of 50 UK organizations (and follow up interviews in 32)	Evaluating IT investments at the feasibility stage and at subsequent stages of the development life cycle	Considerable problems with the evaluation process exist, financial criteria are primarily used during evaluation, evaluation was more widespread during feasibility, users of the system and trade unions were not widely consulted during evaluation

objectives: first it enables us to see if evaluation practice has changed from that reported in earlier studies (see Table 1); and secondly it enables us to obtain a broader picture of a number of important evaluation issues.

### Research methodology

In the latter half of 1993 a systematic random sample of companies was chosen, using the Times' Top 1000 companies as the sampling frame, to take part in a survey. The use of a systematic sample ensured that the size distribution of companies in the sample correctly

reflected that of the sampling frame. All companies other than public limited companies were deleted from the list of companies before sample selection took place, as it was considered that smaller private companies may not have a separate IS/IT function within their organization, and therefore their participation in the study would not be appropriate.

The selected companies were telephoned prior to mailing the questionnaire in order to identify the appropriate individual to whom a questionnaire should be sent (Allen *et al.*, 1980) and to gain commitment to returning the questionnaire, and therefore encourage a high response rate. This generated 179 firm commitments to participate in the research. Prior to distribution, the

questionnaire was subject to a pilot study in which it was sent to individuals (20 in total) who were actively involved in the IS/IT evaluation process within their particular organizations. In addition to written comments received, those involved in the pilot study were contacted by telephone to discuss any problems or ambiguities which they believed were present in the questionnaire. This provided valuable feedback on the design of the questionnaire which subsequently led to some minor changes before the final version was distributed. The questionnaire primarily consisted of closed questions. However, where appropriate a small number of open-ended questions were adopted to address the more difficult aspects of evaluation, for example, to enable us to elicit the reasons for adopting a particular practice. Responses to open-ended questions were subsequently manually coded. In order to boost response rates, prepaid reply envelopes and follow-up telephone calls were used. A total of 98 responses were obtained, giving a response rate of 55%; of these, 97 provided responses suitable for analysis (this compares favourably, for example, with response rates of 39% found by Bacon (1992) and 13.4% found by Tam (1992)).

The respondents' organizations represent a wide range of industrial sectors (see Figure 1) with the largest number of responses from the manufacturing, construction, electronics and engineering, and wholesale/retailing sectors, which accounted for 54% of the total sample. The reported turnover of the respondent organizations (for 1992) ranged from a minimum of £9 to a maximum of £10 000 million, with a mean and median of £589 million and £170 million respectively, reflecting, as one would expect, the positively skewed distribution of company size.

In order to validate that our sample was representative of the population, we compared the sample mean turnover with the mean turnover of all companies in the population (excluding those in our sample). There was

found to be no significant difference in the means at the 5% level (and no significant difference in medians at 5%). Additional tests revealed that the distribution of turnover cannot be regarded as anything other than identical.

In addition to obtaining information regarding the nature and size of respondent organizations, we were interested in obtaining details about the individuals who completed the research instrument. To this end the following were sought: position held, where in the organizational structure they were employed (i.e., corporate level or business unit level) and the number of reporting levels existing between the respondent and the chief executive. The majority of respondents are employed within IS/IT related positions (see Table 2). Only 12% hold finance related positions, and these tended to come from the smaller organizations who responded. A total of 57% respondents are employed at corporate level, whilst 33% are employed at business unit level. The results also show that respondents are employed within reasonably high managerial levels, with 57% within one reporting level, and 86% within two reporting levels of the chief executive, and just over 10% reporting directly to the chief executive.

Whilst Table 2 indicates a wide variety of IS roles performed by the respondents, we do not believe this has introduced bias into the results as each of the respondents who took part in the study was actively engaged in the IS/IT evaluation process within their respective organizations (this was confirmed prior to distribution of the questionnaire). In addition, since the vast majority of respondents are employed within two reporting levels of the chief executive, we do not believe that this factor has introduced bias into the results. However, we should point out that some bias might arise due to the high percentage of respondents who are employed at the corporate, as opposed to business unit level, of organizations. Thus the results might tend to be slightly more representative of a corporate approach to IS/IT evaluation.

## Results

Before going on to discuss the detailed results of the study, one should reflect on the economic context within which the study was conducted. It was carried out during the early 1990s – the UK was still in the depths of a recessionary period. Pressure to cut costs led many organizations to focus on the concept of core competencies, which in turn had implications for outsourcing both IS and non-IS services. Against this bleak background there was a perception that IT was underperforming (Galliers, 1995), particularly in the context of the extravagant claims made in support of the strategic impact of IS/IT in the 1980s. Thus whilst the context

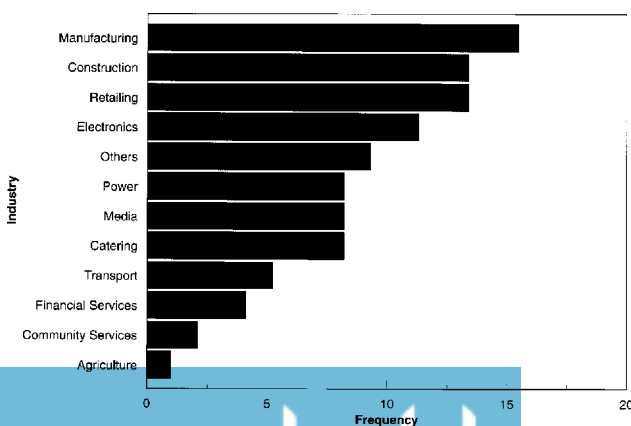


Figure 1 Respondents' industrial sectors ( $n=97$ ).

**Table 2** Positions held by respondents ( $n = 97$ )

Position held	Percentage
IS Director	14
IS Manager	31
DP Manager	6
Computer Related	21
Project Leader	3
Finance Related	12
Others	12
Total	100

within which the study was carried out may limit the extent to which meaningful comparisons can be drawn with earlier studies, it can, on a more positive note, be used to further explain some of the results found.

In order to address the evaluation issues outlined earlier, the study set out to identify the evaluation practices both for the most recent IS/IT project (defined as an investment which included the costs of hardware, software, development time, staff time, training, etc.) undertaken by the respondents' organizations, and for IS/IT projects in general within those organizations. The reason for asking about both of these was that in some cases we wished to relate responses concerning evaluation to specific aspects of the project (e.g., its size) and in other instances we wanted to ascertain what typically went on within organizations. However, it should be noted that asking individuals about the 'last time' they did something (i.e., the most recent project) may generate a response of what they typically do (i.e., projects in general – see Belson, 1964; Moser and Kalton, 1971) rather than what they actually did with the specific project in question.

Within the sampled organizations, the IS/IT budget allocation ranged from £0 to £160 million, with a mean allocation of £7.4 million (median allocation £1.3 million). Only two of the respondent organizations reported zero budget allocations during the 1992 period, stating that they had no requirement for investment in IS/IT in that particular year. The cost of the most recent IS/IT investment undertaken within the respondent organizations ranged from a minimum of £10 000 to a maximum of £5 million (with a mean and median cost of £404 800 and £150 000 respectively), giving us some idea of the significant size of projects concerned.

As a percentage of turnover, the mean cost of the most recent IS/IT investment was found to be 0.5% (median 0.1%), whilst the mean cost as a percentage of the 1992 IS/IT budget allocation was 58% (median 12.3%). In addition, the IS/IT budget for the sampled organizations was an average of 1% of 1992 turnover (median 0.7%), which is marginally lower than the levels of spend reported in earlier studies (see for example Willcocks,

1992). In addition, it is perhaps worth noting that just over 40% of the sampled companies had less than 0.5% of their turnover allocated to the IS/IT budget in 1992. The low levels of expenditure found here might well be reflective of the recessionary period (the mid 1990s) during which the study was conducted. However, an alternative explanation is that the reported budget allocations may, as Keen (1991) suggests, include only the more visible costs of IS/IT investments. Additional analysis, using analysis of variance, indicated no relationship (at the 5% level of significance) between the average size of the IS/IT budget and the industrial sector within which the company was primarily engaged ( $p = 0.133$ ).

## Discussion

### The extent of feasibility evaluation

Amongst other things, the study attempted to ascertain whether the most recent IS/IT project and IS/IT projects generally were subject to feasibility evaluation, where evaluation was defined as 'the process of establishing by quantitative and/or qualitative means the worth of IS/IT projects to the organization' (Willcocks, 1992, p. 245), and feasibility was defined as 'evaluating the financial and non-financial acceptability of a project against defined organizational requirements, and assessing the priorities between proposed projects' (Willcocks and Lester, 1991, p. 287). In addition we wanted to determine the extent to which evaluation depended on organizational characteristics such as turnover, size of IS/IT budget and size of project concerned.

Table 3 indicates the extent of feasibility evaluation reported. Evaluation was found to be significantly more widespread (at the 1% level of significance) for the most recent project than for projects generally. The results also indicate a lower incidence of feasibility evaluation than that indicated by Willcocks (1992), who reported all organizations in his sample (50) evaluating at the feasibility stage. In contrast Farbey *et al.*, (1992) (again in the UK) found only 56% of the (16) projects they investigated were subject to evaluation. However, there appears to be some indication of over-reporting of evaluating the most recent project in our findings. In order for the figure of 87% to be valid it would require

**Table 3** Extent of evaluation ( $n = 97$ )

Evaluate?	Most recent project (%)	Projects generally (%)
No	9	9
Yes	87	62
Don't know	4	2
Some projects	N/A	27
Total	100	100

those people evaluating some projects to evaluate 92% of them, so that combined with the 62% who evaluate all projects, we obtain our total of 87% (i.e.  $62\% + (0.92 \times 27\%) = 87\%$ ). This seems to suggest that the 87% identified here is overstated. However, it may well be the case that, when providing information about the most recent project, individuals are supplying information about the most recent **significant** project, where significance refers to the project's size in either absolute terms or in relation to the IS/IT budget. As we report later, it is the more significant projects that tend to be evaluated. However, an alternative explanation is that feasibility evaluation is now more important to companies than has historically been the case, especially given the concerns over cost justification and containment cited earlier, and therefore, that evaluation of the most recent project is more common than is true for projects historically.

The principal reasons given by respondents for not evaluating all projects at the feasibility stage are summarized below, together with the number of organizations who quoted them:

- (1) Some projects have to be undertaken in order to keep the business moving ( $n = 8$ );
- (2) Evaluation depends on size, value and risk of the project involved ( $n = 6$ );
- (3) Operational urgency does not always permit time. Projects driven by corporate restructuring sometimes allow insufficient time and choice ( $n = 4$ );
- (4) Some projects go straight into functional design, i.e., no feasibility stage ( $n = 2$ );
- (5) Lack of importance of project or enthusiasm to carry out evaluation ( $n = 2$ );
- (6) Evaluation depends on the requirements and general support of key personnel at the time ( $n = 1$ );
- (7) Evaluation depends on how obvious the benefits of the system are ( $n = 1$ ); and
- (8) There is a lack of organizational structure, i.e., no defined responsibilities ( $n = 1$ ).

The first two reasons seem to indicate that feasibility evaluation is clearly not relevant for all IS/IT investments. These findings are supported by Farbey *et al.* (1992) research which identified that the decision to go ahead with a number of projects (44%) was taken at a high level on a 'got to do' basis, or that 'the organization had a formal justification procedure which was bypassed because the project could not fit into it' (p. 113). However, taking the remaining reasons together (constituting 11% of the sample), a somewhat disturbing picture emerges in that organizational problems such as a lack of time, management support, and organizational structure appear to hinder the evaluation process within organizations.

One might expect that it is the larger IS/IT projects (in

absolute terms) which are more likely to be the subject of evaluation. However, analysis (using the student's t-test) indicated that for the most recent projects there was no statistically significant difference in average cost for those that were evaluated and those that were not. However, those companies that did evaluate their most recent project had significantly greater (at the 1% level of significance) IS/IT budgets (mean £8 million) compared to those that did not (mean £1.1 million). One might expect this to be the case since 'large' budgets are much more likely to be the subject of review and scrutiny than 'small' budgets. The results also show those companies that did not evaluate the most recent project tend to be smaller (mean turnover of £274 million) than those who did evaluate (mean turnover of £626 million) – these results are statistically significant (at the 10% level, but not at the 5% level). Whilst the likelihood that an organization would undertake evaluation was not related to the absolute size of the most recent project, companies, who evaluated their most recent project had a significantly higher project cost as a percentage of the IS/IT budget allocation for 1992 (an average of 62%), than those that did not evaluate (an average of 29%). Again we would expect this relationship to hold, since projects consuming large amounts of large budgets are the ones most likely to be scrutinized and reviewed and in this sense it is the significant projects that appear to be the subject of evaluation.

In summary, the findings indicate that feasibility evaluation is relatively widespread within the respondent organizations, particularly for the most recent project undertaken. Evaluation was found to be associated with companies who had higher levels of turnover, and for larger projects, when measured relative to the total IS/IT budget allocation. However, the absolute cost of the IS/IT project did not affect whether or not evaluation was carried out.

### Responsibility for evaluation

The study also identified who was responsible for evaluating the feasibility of IS/IT investments (see Table 4). The results show that responsibility rests in roughly equal proportions at both corporate and business unit level, with external sources rarely being responsible for evaluating feasibility. Only a small percentage of organizations (5.2%) generally shared responsibility for evaluation between the corporate and business unit level.

Comparing the most recent project for which responsibility for evaluation lay principally at the corporate level with those where principal responsibility lay at the business level, no significant difference exists (at the 5% level) in the average project cost. This is in contrast with Tam (1992) who found that responsibility for evaluation

**Table 4** Responsibility for evaluation

Responsibility area	Most recent project (%) (n = 96)	Projects generally (%) (n = 96)
Corporate level	52	46
Business unit level	45	48
External source	1	0
Corporate and business unit	1	5
Corporate and external source	1	1
Total	100	100

lay at corporate level where project costs were higher. These contrasting findings might simply reflect differences in the extent to which decision-making authority is decentralized. However, since this study did not collect information relevant to this issue we are unable to collaborate this assumption. No relationship was found between the area of responsibility (corporate or business unit level) and whether or not the project was evaluated; that is, IS/IT projects were no more likely to be evaluated at corporate, as opposed to (say) business unit level. However, the mean level of turnover is significantly less for those evaluating at the corporate level (£314 million) than at the business unit level (£724 million). This suggests that corporate responsibility for evaluation lies within the smaller companies, possibly because it is more likely that the smaller companies involved in the study do not have a business unit level. It is therefore not surprising to find that the mean IS/IT budget for those evaluating the most recent project at corporate level is (statistically at the 5% level) significantly lower (£3.4 million) than those evaluating at the business unit level (£12.4 million).

Where there was a difference in responsibility level for evaluating the most recent project and projects generally, the following reasons were given by respondents:

- (1) The nature of the project determines where responsibility for evaluation lies, i.e., if projects are corporate, they are evaluated at the corporate level (n = 9).
- (2) Responsibility depends on the cost of the project. Those projects exceeding a given expenditure level are normally authorized by the finance director and evaluation will take place at corporate level (n = 3).

Respondents were also asked to indicate which groups, within the level of responsibility identified above, were specifically responsible for evaluating the most recent project (Table 5). As one would expect, the results indicate that the IS/IT department is more likely than any other group to have responsibility for evaluation, at both corporate and business unit level. User depart-

ments are much more likely to have responsibility for evaluation if they work at the business unit level of the organization. The finance/accounting function, however, is unlikely to assume responsibility for IS/IT evaluation at either the corporate or business unit level. These results largely support Hochstrasser and Griffiths's (1991) argument that while responsibility for all investments, including IT, has traditionally remained with the finance director 'this tradition is being questioned . . . as IT involvement has grown in size and begun to affect a wider range of business functions, it has become increasingly difficult for any single person to fully appreciate the complexity of issues involved' (p. 21). External sources, in the form of auditors, accountants and consultants, were rarely responsible for evaluation of IS/IT projects.

The majority of organizations sampled had more than one group responsible for evaluation at the corporate or business unit level: 40.6% had one group responsible, 32.3% had two departments responsible, and 25.1% had three or more groups responsible. The issue of joint responsibility for evaluating IS/IT investments has

**Table 5** Responsibility for evaluating most recent project (n = 96)

Responsibility – most recent project	Percentage of respondents
Corporate level:	
IS/IT department	48
Finance/accounting	26
User departments	17
Internal audit department	5
Business unit level:	
IS/IT department	32
User departments	31
Finance/accounting	17
Internal audit department	6
External auditors/accountants	5
External consultants/bureaux	3
Others	5

received little attention in the IS literature to date. Of the few authors who address it, Hochstrasser and Griffiths (1991) argue that 'split responsibility, if uncontrolled, can lead to confusion of who is responsible for the timeliness and accuracy of data and to the danger that information is not collected and distributed effectively'. Whilst their conclusions are discussed in a wider context than the evaluation of individual investment proposals, it obviously has implications that are germane to the issue here. Furthermore, if problems exist with split responsibility, this study shows that they may be of relevance to over half the respondent organizations in this study.

Although the research presented here did not seek to identify the nature, or existence, of problems associated with joint responsibility, it has identified that this is potentially a widespread issue. The extent to which joint responsibility has implications for organizations in terms of ultimate responsibility and accountability for IS/IT investments, and in terms of how evaluation practices are coordinated across diverse groups, and how feedback and control of IS/IT project expenditure is monitored within organizations, are clearly issues which need to be further explored by future research.

### Consultation during evaluation

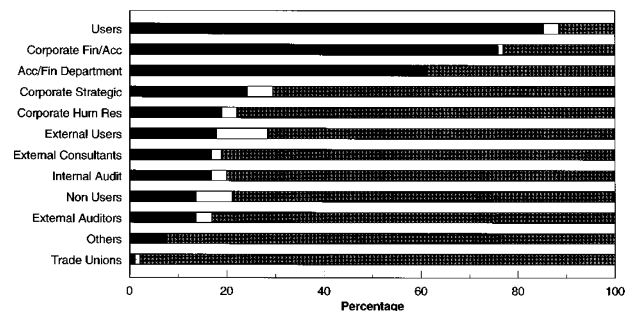
In carrying out the study, we were also interested in identifying the extent to which consultation with a variety of stakeholders, both internal and external to the respondent organizations, took place when assessing the feasibility of the most recent IS/IT project. In order to ascertain this, respondents were asked to indicate which groups were consulted, in addition to which groups could usefully have been consulted but were not, when assessing the feasibility of the most recent project. For those companies who evaluated their most recent project, Figure 2 summarizes the extent of consultation. The findings suggest widespread consultation with the users of the potential system in particular (85% of companies). These findings are far in excess of figures quoted by others. Willcocks (1992), for example, found only 36% of the organizations he studied consulted users about evaluation during the feasibility stage of IS/IT project development. A possible reason for the high levels of consultation with users found here might be explained due to the nature of the IS/IT projects evaluated. Alternatively, it may be that organizations are over time recognizing the importance of user participation in the IS/IT investment decision making process, especially given the concerns voiced earlier that such investments often fail to deliver acceptable returns. Unfortunately this study did not collect data regarding the nature of the most recent IS/IT project or the attitude of organizations towards user participation (this being one of the limi-

tations of the study), which might enable us substantiate these assertions.

Widespread consultation with the finance/accounting function, particularly at the corporate level of the organization, is also evident. This might be explained as a result of pressures to control costs during the recessionary period during which the study was conducted. Consultation with the corporate strategic planning/logistics group or the human resources/personnel group is comparatively rare. The lack of consultation with corporate strategic planning may indicate inadequate integration of IS/IT projects with strategic planning, and the consequent problems associated with evaluating such projects in the context of business objectives (Galliers, 1987).

Of those organizations who evaluated the most recent project, 6% consulted with one group only, 17% with two groups, 25% with three groups, and 25% with four groups. There was no relationship between the number of groups consulted and the size of the IS/IT budget allocation ( $r=0.1016$ ), or company turnover ( $r=0.1525$ ). However, as one might anticipate, there was a slight tendency for more departments to be consulted regarding feasibility when the cost of the most recent project was high (significant correlation coefficient of 0.3518 at the 1% level). This is possibly because small projects are less likely to impinge on large numbers of groups than is the case for large projects, or alternatively it may be related to project type.

What is also apparent from Figure 2 is that the respondents themselves feel that, in the main, the appropriate groups, both internal and external to the organization, were consulted during evaluation. There is little indication that, even with the benefits of hindsight, they thought that there were additional groups who could usefully have been consulted but were not. For example, only 10% indicated that they could usefully have consulted external users regarding feasibility (e.g., customers, suppliers); only 6% stated they could usefully have consulted the strategic planning/logistics group at the corporate management level; and a mere 5% indicated that they could usefully have consulted non-users



**Figure 2** Degree of consultation ( $n=84$ ) ■ = consulted; □ = those groups who the respondent thought could have usefully been consulted, but were not; □ = not consulted).



of the potential system. Whether or not these groups would agree with the present levels of consultation is a separate issue. However, it would appear that respondents themselves are generally satisfied with current consultation levels and as a result, they are unlikely to broaden this process in the future.

### Formal evaluation procedures

Hirschheim and Smithson (1988) make the distinction between formal and informal evaluation procedures; the former they argue might be considered an objective and rational mechanism which improves communication and learning within organizations; whilst the latter might be viewed as ill-informed, hasty and largely involved subjective judgements. Marsh *et al.* (1988) discuss the role and impact of formal evaluation systems in the context of strategic investment decision making (they do not, however, specifically discuss formal systems in the context of IS/IT investments). A formal process they argue, provides 'a clear paper trail, showing the proposals submitted at each stage, the minutes of committees and meetings, and a record of the point at which capital was officially committed' (p. 13). They go on to present two conflicting views of the usefulness of formal systems of evaluation. The first argues that formal systems are the all-important factor in decision making, while the second argues that they are merely ritual, and therefore of limited use. In the context of their research, Marsh *et al.* (1988) observe that 'while the formal systems (used) are ritualistic, they are nevertheless necessary' (p. 28). They also argue that despite being ritualistic, formal procedures do influence reality. 'They force the players to be more explicit about their assumptions, both to themselves, and in order to justify them to others' (p. 57). The formal systems 'helped to set deadlines, and thereby force the project pace. They facilitated the movement of information up, down and sideways within the organization, generating awareness of, and commitment to, the project. At the same time, they provided a scheduled set of occasions for face-to-face communication across multiple levels of the hierarchy thus giving the chance to debate the specific project' (p. 28).

The present study identified the extent to which formal procedures of evaluation were in place within the respondent organizations, in addition to identifying what those procedures consisted of. Table 6 shows that just under half (44%) of the respondent companies have clearly defined procedures for evaluating IS/IT investments. Comparing the extent to which formal procedures of evaluation exist (Table 6) with the extent to which evaluation is carried out by organizations (Table 3), it would appear that informal evaluation seems to play an important role in IS/IT investment decision

making within the respondent organizations. This pattern is largely confirmed by Farbey *et al.* (1992), who report that just over half of the organizations they studied had a formal justification procedure for evaluating IS/IT investments.

Table 6 also shows the nature of the formal procedures which organizations have in place to assist in the evaluation process. The 'others' group includes the following activities: monthly customer progress reviews; ad hoc, informal meetings and minutes; project board meetings; formal preparation, demonstration and business presentation; and detailed technical review of projects.

What does come as something of a surprise is that there is no association between whether or not companies evaluated their most recent project and whether or not they have clearly defined procedures for doing so. Of the 43 companies having clearly defined procedures, 91% (39) evaluated the most recent project, 5% (2) did not evaluate, and 5% (2) did not know whether they evaluated or not! This compares with 51 organizations who did not have clearly defined procedures, of which 86% (44) evaluated the most recent project, while 12% (6) did not. The results not only show that evaluation is just as likely to take place whether or not there are formally defined procedures in place, but that a large percentage of organizations evaluate IS/IT projects despite the lack of clearly defined procedures. However, as one might expect, those companies with clearly defined procedures tended to have (statistically) significantly larger IS/IT budgets than those with no such procedures ( $F = 11.973$ ,  $p = 0.001$ ). The mean budget for those organizations with evaluation procedures was £15.7 million, compared to £0.9 million for those without formal procedures.

These findings suggest a fairly widespread lack of formal procedures despite the fact that evaluations of IS/IT investments are still undertaken. If, as indicated by the findings of Marsh *et al.* (1988), benefits are found to be associated with the use of formal evaluation systems,

**Table 6** Defined procedures of evaluation ( $n = 97$ )

	Yes (%)	No (%)	Don't know/missing (%)
Defined procedures	44	53	3
Financial reviews of cost/savings	94	5	1
Regular meetings	69	30	1
Reporting of costs and performance	56	43	1
Distribution of minutes	49	51	1
Project team workshops	42	57	1
Other activities	9	90	1

despite being perceived as ritualistic in some instances, then many organizations evaluating IS/IT investments without the aid of formal systems are likely to be missing out on such benefits. Clearly further research is required to ascertain the extent to which formal procedures facilitate improved evaluation practices within organizations, and whether the lack of procedures found here is a corporate wide, as opposed to information systems, issue.

### Problems with evaluation

Whilst we did not ascertain the respondents' opinions as to whether or not the existence of formal procedures aided or hindered the evaluation process, we did ascertain the problems encountered during the evaluation process. These were classified into three groups: information requirement problems, knowledge related problems, and organizational problems. The frequency with which these problems are encountered during the evaluation of IS/IT projects generally is summarized in Table 7. It is worth pointing out that no respondent identified the existence of formal procedures as a problem although, similarly, no one suggested that a lack of formal procedures was a problem either.

The findings indicate that problems with the evaluation process within the respondent organizations are widespread. Only two companies reported no problems occurring during the evaluation of IS/IT projects in general; 60% of respondents indicated problems in two or more of the areas shown in Table 7; and 31% indicated problems in three or more areas. A total of 55% respondents encountered some form of organizational problem, with lack of time being the most frequently cited of these. The number of problems encountered

was unrelated to the cost of the most recent project and unrelated to either the size of the IS/IT budget allocation or turnover. Consequently, small companies experience just as many problems as large ones, small projects have just as many problems as large ones, and larger budgets appear to have no greater number of 'headaches' than small budgets. This is not to say that there are not instances when the problems are more problematic, but only that the breadth of problems does not differ.

Information requirements problems – that is, obtaining relevant information for decision making purposes – are by far the greatest cause of concern for organizations during the evaluation process. In particular both the identification and quantification of relevant benefits are widespread problems, as is the problem of identifying and quantifying costs. Few organizations experience knowledge related problems, with the exception of difficulties encountered with interpreting the results of evaluation (17.3% of respondents) – this perhaps reflecting the backgrounds of the respondents themselves. Organizational problems, such as a lack of time to carry out evaluation, together with a lack of data/information, were also quite widespread among the respondent organizations, confirming some of the earlier comments for not evaluating all IS/IT investments.

These findings serve to confirm the continued existence of a range of problems identified by previous studies. Willcocks (1992), for example, identifies a number of problems which are frequently encountered during evaluation practice: a lack of understanding of the full range of costs associated with IS/IT investments, overstating costs, not fully investigating risk, failure to devote time and effort to evaluate major capital assets, and neglecting intangible benefits. Tam (1992) also identified that estimating returns and costs were significant problems when evaluating IS/IT investments. Given the relatively high percentage of companies here who suffer similar problems to those identified in earlier studies, it would appear that aspects of evaluation still remain particularly problematic for organizations.

In addition, given that the respondents of this study are generally happy (or would appear to be so) with present consultation levels, the existence of problems identified here would suggest that they are inherent in the evaluation process itself, and are unlikely, from the viewpoint of the respondents, to be solved by involving additional groups in the evaluation process. Additional research is clearly needed to address the major problems experienced here, as they would appear to be no less a problem now for organizations than they have been in the past. An associated and further interesting research question is whether such problems are characteristic of IS/IT investments only.

**Table 7** Problems encountered during evaluation ( $n = 75$ )

Nature of evaluation problems for projects generally	Problem
Information requirements:	
Quantifying relevant benefits	81
Identification of relevant benefits	65
Quantifying relevant opportunity costs	36
Identification of relevant opportunity costs	35
Identification of relevant costs	31
Quantifying relevant costs	27
Knowledge related:	
Difficulty with interpretation of results	17
Unfamiliarity with project evaluation techniques	12
Calculation of discount rate	3
Organizational problems:	
Lack of time	37
Lack of data/information	19
Lack of interest	15
Others	8

## Conclusions

The results of this study shed additional light on the IS/IT evaluation practices of UK organizations, in some respects confirming earlier empirical evidence. In addition, however, the findings add to our knowledge by providing a rich picture with respect to a number of evaluation issues. While the results of the study indicate a slight decrease in the level of IS/IT expenditure reported over those of earlier studies, this is in contrast with the findings of the most recent *Information Technology Review* (Price Waterhouse, 1995), which suggests that expenditure on IT has increased over the same period. As suggested earlier, however, this might be explained in that the respondent organizations reported only on the 'visible' aspects of IS/IT expenditure.

More importantly the study shows that the majority of respondent organizations evaluate IS/IT investments (this is particularly so for the most recent project), again confirming earlier empirical studies. In addition, evaluation was found to be associated with larger IS/IT budgets, large companies in terms of turnover levels, and larger projects when measured as a percentage of the IS/IT budget. However, the study also highlighted a lack of formal evaluation procedures within organizations. Whilst the existence of procedures was found to be associated with larger IS/IT budgets, a lack of formal procedures did not in any way deter organizations from evaluating the feasibility of investments in IS/IT. Clearly further research is needed to examine the extent to which formal evaluation procedures benefit the IS/IT decision making process, or whether they simply retard decision making. Case study research would seem to be the most appropriate mechanism for addressing this issue.

Responsibility for evaluating IS/IT investments was shared equally between corporate and business unit levels. Within those levels, the IS/IT department, user departments and the accounting and finance function have a relatively high level of responsibility for evaluation. However, the findings indicate a relatively high percentage of companies assigning joint responsibility for evaluating the same project, which has implications for organizations in terms of coordinating evaluation practices, monitoring, controlling and providing feedback of IS/IT project performance. This is clearly an additional area which future evaluation research needs to address.

Consultation regarding the feasibility of IS/IT projects was found to be widespread with the users of the potential system and the accounting and finance function in particular. This might be explained, as suggested earlier, due to the nature of the project concerned, or increasing recognition of the importance of user participation in the decision making process. The high levels of

consultation with the finance/accounting function might be explained as a result of pressures to control costs during the period of the study. In contrast, consultation with the corporate strategic planning group was comparatively limited, which is perhaps reflective of the lack of integration between IS strategy and business strategy. Overall, the findings suggest that current patterns of consultation, from the perspective of the respondents, are unlikely to change in the future.

The study also highlighted the continued existence of a number of problems with the evaluation process, suggesting important avenues for future research. By far the greatest problems encountered during evaluation were the identification and quantification of relevant benefits and costs. However, problems of an organizational nature, including a lack of time and management support, were also found, perhaps reflective of the climate within which evaluation was carried out at the time of the study. A lack of interest in the evaluation process and a lack of data/information were also cited as noteworthy problem areas. In addition, problems of evaluation were found to exist irrespective of IS/IT project size, IS/IT budget allocation, or size of organization.

From the above discussion, a number of key research issues emerge. First, more research is needed to examine more fully the problems commonly faced when evaluating IS/IT investments, with a view to proposing measures by which such problems might be resolved, and to ascertaining whether or not these differ in nature to problems encountered when evaluating other capital investments, not just those of an IS/IT nature. In particular, the issue of benefits identification and quantification needs to be further examined in the context of the use of evaluation techniques. In addition the role of formal procedures in the IS/IT evaluation process needs to be more closely examined to identify whether their use results in any significant benefits. Additionally, the extent to which problems arise as a result of joint responsibility for evaluation needs to be investigated more fully. Finally the perspectives of a wider range of stakeholders, both internal and external to organizations, are needed with respect to ascertaining their satisfaction with current IS/IT evaluation practices.

Evaluation of IS/IT expenditure is a key issue. Senior executives have come to expect value for money from such investments, and given the year-on-year improvements in the cost-performance ratio of IT, expectations are bound to increase, especially while cost containment is high on the management agenda. This research has attempted to provide additional evidence as to current IS/IT evaluation practices. Clearly there is room for improvement.

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