IS Evaluation in Practice

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Abstract: IS evaluation exercises continued to engender scepticism. The evaluation of IS investment is considered a 'wicked problem' and there are good reasons for this judgement. The topic has attracted many researchers. There is a substantial body of literature on the problems of measurement and the inadequacies of traditional investment appraisal methods. A wide range of alternative tools has been proposed to replace these approaches. But many surveys of actual practice have established little evidence of their use. Reported IS evaluation practice appears to be relatively unsophisticated or absent in many organisations.

This paper draws on existing literature and case material to analyse the problem facing organisations when planning an IS evaluation exercise. It argues that the factors that can undermine the effectiveness of IS evaluation projects pose major problems. Management apathy may be a rational response to a complex and difficult exercise that often yields little benefit to the organisation.

Keywords: IS evaluation; Failure-prone decision process; IS Business value; IS evaluation project

1. Introduction

IS evaluation has been the subject of intense interest for the IS research community since the early 1990s. There are good theoretical arguments for its value. It is claimed that IS evaluation enables organizations to manage their investment in ICT more effectively by for example, prioritising new investment, enhancing organizational learning and monitoring systems business performance (Smithson and Hirscheim, 1998; Farbey et al, 1999; Irani and Love, 2001). If this is so, the importance of this activity can only increase. From the debate on the level of economic return achieved from ICT investment (Brynjolfsson, E. and Hitt, L., 1996) it appears that the levels of business value obtained vary significantly between sectors and firms (McKinsey Global Institute (MGI), 2002; OECD, 2003) There is considerable scope for improvement in the business exploitation of ICT applications. Achieving this becomes an ever more important if investment in ICT continues to grow at the rate of the last two decades (McKinsey Global Institute (MGI), 2002; Hundley et al 2003).

Nonetheless one of the most persistent results of field work on evaluation practice, whatever the original aim of the study, is the continuing relatively unsophisticated and low level of evaluation activity in all types of organisations (Bacon, 1992; Farbey et al, 1993; Balantine et al, 1996; Smithson and Hirschheim, 1998; Farbey et al, 1999; Irani and Love, 2001; Jones and Hughes, 2001; Frisk and Plantén, 2004). Data from a recent survey carried out for the Australian Government into the value achieved from ICT by Australian organisations (Department of Communications Information Technology and the Arts, 2005) showed that less than a third of all respondents routinely carried out appraisals or post implementation exercises for ICT investments. Over half reported that they almost never carry out either type of exercise. The activity continues to attract cynicism (Jones and Hughes, 2001). The theoretical basis for IS Evaluation projects has been well established, but organisational practice seems to support the judgement that it is not worth the effort – it is perceived to yield too little value.

As Smithson and Hirscheim (1998) state 'evaluation is difficult'. It is a 'wicked problem' (Farbey et al, 1999). Research has been very effective in demonstrating the inadequacy of evaluation exercises. It has been particularly effective in identifying the many weaknesses in existing tools and methodologies - the problems of estimation of the costs (Bannister et al, 2002) and benefits and the drawbacks of using techniques such as ROI for IS investment (Hochstrasser, 1990; Symons, 1990; Hochstrasser and Griffith, 1991;Bacon, 1992; Balantine et al, 1996; McAuley et al, 2002). This has resulted in the development of many alternative more sophisticated tools, measures and methodologies for estimating the value of proposed new information systems applications, designed to overcome the problems perceived with the traditional methods (Parker et al 1988, Kaplan & Norton, 1992; Farbey at al, 1992; Remenyi et al, 1995; Ward, Taylor and Bond, 1996; Smithson and Hirschheim, 1998; Remenyi and Sherwood-Smith, 1998; Farbey et al, 1999; Renkema, 2000).

More recent work has provided several reviews of the current state of IS evaluation. Farbey et al (1999) analysed their case material on IS evaluation practice to identify the most serious problems and proposed these as suitable subjects for future research (the five learning themes). Smithson and Hirscheim (1998) carried out a literature review and proposed a general three-stage framework

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that would capture the most significant aspects of an ICT application by which evaluation methods and practice could be improved. This literature seeks ways to improve current practice by working on the constituent elements of IS evaluation.

There has been little research on the value to be obtained by organisations from IS evaluation exercises. Management lack of interest in this activity suggests that it is low. This paper argues that the factors that can undermine the effectiveness of evaluation projects pose major problems. Management apathy may be a rational response to a complex and difficult exercise that often yields little benefit to the organisation. The next section, 2, uses ideas on the decision making process to demonstrate the significance of the wider context for evaluation exercises. Section 3 suggests some of the reasons for the new methodologies to remain largely unused. Section 4 discusses the concept of IS Business Value and the difficulties that the elusive nature of this quantity poses for IS evaluation.

2. The decision process

Evaluation is an important component of decision-making. The skill with which an organization manages the decision making process will be a major factor in the ultimate value, effectiveness and relevance of its evaluation exercises. Nutt's (2002) research into major decisions (Tough Decisions) was concerned with the process that tended to lead to failure. Nutt proposed a model of failure-prone decision-making, in which the misuse of evaluation is a typical result. Many decisions about ICT applications would qualify as Tough Decisions and if subjected to failure-prone decision processes would exhibit similar characteristics.

2.1 Tough decisions and the failure-prone decision process

According to Nutt (2002) organizations have a poor record on important decisions that are critical to their continued success. These are "Tough Decisions" on the future direction of the organization and the development of those factors that make up the organisation's business model, such as its customers, products, strategy and operations. They are pivotal decisions of the go/no-go type, for which it is costly and difficult to reverse and exhibit characteristics of 'ambiguity, uncertainty and conflict' (Nutt, 2002, page 8). Decisions exhibit ambiguity, when there are differing possible interpretations of the underlying problem. Each of these interpretations would lead to differing forms of analysis, which in turn might point to different directions and alternative actions. Uncertainty implies that the outcome of the decision is dependent on critical events beyond the control of the decision maker. Conflict between individuals or groups that have opposing aims and alternative interpretations of the situation frequently occur and further obscure the significant issues of relevance to the organization as a whole.

Decisions that involve uncertainty will always carry some risk of failure. Poor results can follow from good practice, as can good results from poor practice. Nonetheless in Nutt's view many poor decisions are due to failure-prone practices and the risk of failure could have been reduced through using better decision-making practices. 'Decision-making processes with a good track record are commonly known, but uncommonly practiced' (Nutt, 2002, page 4).

The key difference between good and failure-prone decision practices is in the time spent on identifying the basic problem (Nutt, 2002, page 24). The failure-prone process tends to jump to the first obvious solution or course of action and devote much effort to making this work. Conflicting interpretations of the problem situation are ignored and no effort is spent on the search for solutions. As a result evaluation work can be directed towards marginal issues.

According to Nutt (2002) the misuse of evaluation is a major cause for failure in making major decisions. In his model of poor practice, evaluation tends to be used for political rather than investigative uses. In essence this process acts to reduce discussion of contentious or ambiguous issues. Little time is spent on discussing and assessing the problem or opportunity that sparked the need for a decision. Conflicts of interest between significant stakeholders are ignored. The results to be achieved may be unclear or inappropriate. In many cases the solution about which the decision is supposed to be, emerges early in the process. The decision process then becomes one of justifying and selling this solution rather than a genuine investigation. Decision makers take a defensive position in which evaluation is used to justify the chosen conspicuous solution, 'More time and money is spent doing this type of evaluation than all the other decision making activities combined' (Nutt, 2002 page 34). The potential value of evaluation that can be generated through analysis of objective data, the generation of alternative ideas and the analysis of risk is lost.

2.2 Tough decisions and IS

Many decisions on investment in new or existing large-scale information systems for organizations would fall into this category. They represent important choices that are of great significance to the organisation's future success and direction.

Information systems new to an organisation would be expected to yield a high level of business value may alter the organisation in major ways (Stefanou, 2001) or be part of a major change initiative. The pivotal decision is usually clear (to go ahead with a new IS, to accept one type of development option or to make major changes to existing systems). Abandoned or unused information systems are failures (Farbey et al, 1993; Myers, 1994; Collins, 1998; Sauer and Cuthbertson, 2003; Markus, 1983; Bussen and Myers, 1997; Seddon, 1997). Ambiguity, uncertainty and conflict are typical characteristics. The endemic complaint by system developers that users are far from clear what is wanted from a system merely underlines the ambiguity surrounding many new investments. All information systems incur risk and hence involve uncertain outcomes. There are three generic risks - technological, organizational and business (Williams, 2005). Information systems can fail due to inability of the development team to deliver functioning technology. They can fail to deliver any significant business value and they can fail due to lack of use by the staff of the organization.

If the failure-prone decision process is the one adopted for the tough decisions on ICT applications then the political manoeuvring that can occur around IS evaluation exercises (Farbey et al, 1999; Walsham, 1993; Jones and Hughes, 2001) is explicable. The research of Farbey et al (1999) suggests that this is very much the case in many decisions. Of their proposed five learning themes for future research that they believed 'would better inform both theory and practice', two (themes 2 on stakeholder theory and 3 on decision-making) identified characteristics of failure-prone decision process including conflicts and lack of clarity as to aims. Some of the frustration and cynicism exhibited about IS evaluation practice clearly stems from the flaws in decision making practices that lead to the misuse of evaluation work.

2.3 Case examples

The decisions described by Markus and Keil (1994) and Smithson and Hirscheim (1998) are good examples of the way evaluation exercises can be affected by the decision process.

In the case described by Markus and Keil (1994), the IS was an expert system (CONFIG) developed to support the sales staff in a computer company CompuSys. In fact two pivotal decisions are described in the case - the first to develop the original expert system and the second, several years later, to commit further substantial resources in redesigning the system to 'deploy a more usable version' (Markus and Keil, 1984, page 13).

This is an example of a tough decision in which the initial interpretation of the problem proved decisive. For the manufacturing staff the problem was the high level of configuration errors in the orders they received from sales for assembling and delivery to the customer. CONFIG reflected this interpretation. For the sales staff, the planned users, the problem was obtaining pricing information on the various options relevant to their customers needs fast enough to close a sale. Although never considered by the board at the time, another possible interpretation of the situation could have been that the business model was no longer viable and the problem was that of offering too many options to their customers. This is a typical example of ambiguity.

The decision makers in the CONFIG case (assumed to be the board) appeared to have accepted CONFIG without seriously considering any other option. The evaluation exercise focused on issues relating to the technology. At the early design stage any attempt to link the system to the most important factor for sales – component prices, is rejected on technical grounds In fact CONFIG was a technical triumph, but an organizational and business failure as few sales staff actually ever made use of it. After the failure of the first version of CONFIG, the evaluation turns to a detailed assessment of ease of use factors, which ultimately proved to be of marginal relevance. No effort was devoted to evaluating the business case for CONFIG, the business model of the company or to the organisational requirements for successful adoption of the system, any or all of which might have been more valuable subjects for study. All these issues were ruled out at the point when one interpretation of the situation was adopted – that the problem was the configuration errors created by the sales force.

The outsourcing vignette described by Smithson by Hirscheim (1998) fits the definition of a tough decision and illustrates another way in which a poor decision making process marginalizes IS evaluation. The decision makers (the board of Alpha) seized an idea (outsourcing) and spent little effort on considering the ramifications. The IS director admitted to the case writers that the outsourcing evaluation exercise had been carried out as a 'defensive manoeuvre' with the objective of demonstrating the weaknesses of outsourcing. The board ignored both this report and an independent benchmarking exercise that found the IS function at Alpha to be 'close to best of breed' and went ahead with the decision to outsource (Smithson and Hirscheim, 1998). The IS director came to the view that senior management had 'already made up its mind to outsource'. We see in this vignette two of the ways in which work on IS

evaluation is routinely misused – by its use to support partisan positions or by being ignored.

The aims, type and content of IS evaluation exercises in both cases were critically affected by the decision process. The results were wasted with very poor value being obtained from the work on the evaluation exercises.

3. Slow adoption of evaluation tools

The evaluation tools, techniques and methodologies developed over the last two decades for IS exhibit an extra-ordinary range and sophistication (Remenyi et al, 1995; Cronk and Fitzgerald, 1997; Bannister and Remenyi, 2000). Nonetheless little practical use has been made of these ideas so far (Smithson and Hirschheim, 1998; Farbey et al, 1999; Bannister and Remenyi, 2000).

There are a number of factors that tend to work against their adoption:

- The heavy demand on staff resources and the requirement for special skills
- The problems of change management if existing management process and organisational culture are not capable of applying these techniques

3.1 The problems of practical application

Many of the more sophisticated evaluation methodologies proposed for IS applications offer ways to combine the wide range of types of costs and benefits into one measure of return (Parker et al, 1989). Such methods are costly to apply and require staff with special skills. The method developed and applied by Magrill and Brown (1998) to evaluate new intranet applications demonstrates the amount of skilled effort that would be required for more sophisticated evaluation exercises.

The problem was that of choosing between competing applications for an intranet. The dominant costs and benefits were considered to be intangible or strategic and highly specific to the information system under consideration (intranet applications) and to the business of the host organisation. The paper developed a new evaluation methodology. The methodology – TEAM - had several unusual features. It drew together traditional financial measures and the ideas of Information Economics (Parker et al, 1989) to create a way to score each application for cost and overall value. The scoring mechanism was specifically designed for intranet applications and incorporated all the major types of intangible and strategic costs and benefits that theory and previous work suggested was significant for such IS. TEAM represented a composite approach (Bannister and Remenyi, 2000) as it developed a detailed set of actions by which all stakeholders that were thought to have an interest could contribute to the scoring process. The method proved effective in dealing with the example evaluation case discussed in the paper, but the results of applying this technique brought up some unexpected practical issues. There were stakeholders from many different parts of the company. Ensuring that all interested groups were represented was far from simple. The process of collecting the relevant data analysing and interpreting and then reproducing in a form suitable for the decision makers is also clearly labour intensive and requires special skills. The method is time consuming, costly in terms of staff time (evaluators, facilitators and stakeholders), administratively complex and produces results that are sometimes difficult to interpret

3.2 Barriers to changing evaluation methods

Each organization tends to develop its own methods and routines for making the decisions that shape its future (Grant, 1995). At any point in time organisations will have methods and routines that are accepted as the standard for evaluating IS. The tools and methods discussed above will find little support if they are not aligned to existing culture and organisational aims.

For example organisational learning has long been considered an important benefit of post implementation evaluation exercises. The learning is usually obtained through identifying mistakes (Dymoke-Bradshaw, 1999). But organizations tend to be reluctant to invest resources into this type of work (Farbey et al, 1999). As Jones and Hughes observe (2001) 'it was unusual for a mistake to be admitted – no-one wants to admit failure, a system goes in and is made to work.' An organisation not committed to learning will have little interest in post implementation exercises. For Nutt (2002) failure to learn is one of the characteristics of the failure-prone decision process.

Moreover evaluation methods are one among many organisational routines embedded as accepted practice. Existing practices will normally prove resistant to change. The case described by Serafeimidis and Smithson (2000, 2003) gives a graphic illustration of the problems that can arise when attempts are made to change accepted methods. The case company had decided that it's existing IS evaluation methods were inadequate. Serafeimidis and Smithson discuss the development of the new tools and approaches that would, in the company's view, improve the quality of evaluation of new IS projects. Their description of the failure of the attempt to get these methods accepted as standard practice is illuminating. This

turned into a major change project and hence was subject to all the problems and risks of managing organisational change. The sponsoring company for Magrill and Brown (1998) seems to be in a similar situation – willing to investigate new methods but not adopt them.

4. IS business value

The tools of evaluation, discussed in section 3 above, offer little value without credible realistic assessments of costs and benefits. Although cost estimation is far from simple, it is the benefits that constitute the business value that have proved the most challenging to assess. Organisations invest in and maintain ICT applications to create business value. They expect benefits like productivity gains or quality improvements or new facilities and functions that contribute to the organisation's strategic goals or operational performance. Evaluation exercises are concerned with the question of value. Will this application yield value for money and effort invested? Is the organization obtaining the planned for benefits? Ultimately it is the overall business impact of an IS application that matters to an organization.

Despite the wide scale agreement as to its significance by researchers and practitioners alike (Soh and Markus, 1995; Bussen and Myers, 1997; Davern and Kaufman, 2000; DeLone and McLean, 2003; Larsen, 2003; Melville et al. 2004), there has been comparatively little attention paid to the definition of IS business value (Cronk and Fitzgerald, 1997; Banister and Remenyi, 2000; Bannister 2001). Without a clear understanding of this concept estimation of benefits and hence evaluation are unlikely to contribute much to our understanding of the impact of ICT. This section proposes a definition of IS business value and explores the implications of this definition for assessment of ICT investments.

4.1 Definition of IS Business Value

Successful IS projects, the focus of factor research (DeLone and McLean, 1992; Garrity and Sanders, 1998; Larsen and Myers, 1999; DeLone and McLean, 2003; Larsen, 2003) are necessary but may not be sufficient for the creation of business value (Newman and Robey, 1992; Nandhakumar, 1996). In their analysis of the literature on IS Business value, Cronk and Fitzgerald (2002) demonstrated how the many measures that have been employed stem from differing philosophical paradigms and interpretations of the term.

The definitions proposed by Cronk and Fitzgerald (2002) 'if an investment is valuable, it will make a difference to organisational performance' and by Bannister and Remenyi (2000) 'Value in use' are inclusive but difficult to operationalise. Value in use is a concept that Orlikowski (1999) has explored - '. Technology is not valuable, meaningful or consequential by itself; it only becomes so when people use it' (Orlikowski, 1999, p253 of Marchand et al, 1999). She makes an important distinction between espoused technologies (those physically available for use) and technologies-in-use (those actually made use of) and describes the variety of levels of use to which one information systems application (Lotus Notes) has been put by different groups and organisations. Davenport et al (2001) cite examples of organisations that have installed advanced information systems to capture transaction data but have yet to make effective use of it. These organisations have invested in espoused technologies such as ERP systems and point of sale scanners, but by failing to turn the data these systems collect into useful knowledge, have obtained only part of their full potential business value. To investigate business value (or its lack) Orlikowski (1999) and Davenport et al (2001) focus on the specific information systems applications and the organisational context within which they are used. Business value is de facto considered a function of the individual information systems application and the particular context within which it is of applied.

If the business and organizational context exert such an influence, it becomes clearer why estimation or measurement of IS business value is proving difficult. Both the actual and potential value of each information systems application will vary from situation to situation and between stakeholders. The reality lies in a welter of detail on existing (and possibly future) business and organisational conditions and the interaction of these with each information systems application. Research based on case studies is the most appropriate method for understanding this phenomenon. Case research may form a relatively small part of published IS research (Dubé and Paré, 2003; Mingers, 2003; Chen and Hirschheim. 2004), but case descriptions can reveal much about IS business value even when this is not the main objective of the case research. The following investigation of IS Business value draws on a number of published IS cases.

4.2 IS business value and the business and organisational context

Case studies reveal a bewildering range of effects and interpretations. For many it is difficult to separate the impact of organizational factors like cultural norms from the fit to the business operations. Organisational context determines level and type of system use. The CONFIG case (Markus and Keil, 1994) discussed in section 2, for example,

fails to deliver business value because the users (sales staff) refuse to use it. Hence the actual business value can never be assessed. The case description however suggests that its contribution to the business operation was arguable and might have depended on the viability of the existing business model (subsequently brought into doubt).

Moreover even when applications do obtain user support the business value obtained can remain obscure. Different stakeholders may take conflicting views (Larsen and Myers, 1994; Smithson and Hirscheim, 1998; McAulay et al, 2002). Evaluators look for and tend to find the benefits assumed to be connected to the application (Belcher and Watson, 1993; McAulay et al, 2002). Each new type of ICT application poses a new challenge for evaluators.

Organisational context dominates the potential value to be obtained from ICT applications like Group Decision Support Systems (GDSS). GDSS is a tool for groups. The main business benefit expected is in the quality of the decisions made by the group using it. Its value derives from the way that the group puts it to use. This will depend on both the individual group member's attitudes and skills and on the social norms that govern the interaction of the group (Gopal and Prasad, 2000). Trauth and Jessup (2000) analyse a discussion carried out using a GSS. The package appears effective in enabling different groups to discuss a contentious issue in a more open way. However the level of the ensuing discussion suggested that it's use contributed little to improving the level of debate or achieving any meeting of minds.

The Decision Support System described by Kohli and Kettinger (2004) is of particular interest in that the first version was a technical success, designed around a clear business objective but failed to obtain user support and use. It was the second version that gained support from the users and began to deliver business value.

The organisation is a hospital and the case describes the attempts of the hospital management to introduce an information system aimed at improving the decision making of the physicians employed by the hospital. The hospital management was under pressure to reduce clinical costs, while continuing to improve the quality of patient care. It was accepted that the physicians controlled the clinical process that in turn determined the costs and quality achieved. The route to better practice was through 'informating' this group. The management had a clear business aim and their definition and measure of business value was relatively precise. This was to reduce costs per case and improve quality care. The improvement in care was interpreted as reduced variance in clinical activities, because this was thought to signal the adoption of best practice. A clinical DSS was developed 'to collect and process physician benchmarking information' (Kohli and Kettinger p370, 2004). The information system was designed to track individual physician's activities through his or her patient data on costs and quality measures like length of stay (LOS). The system produced reports that could be used by the various clinical specialities (departments) to monitor performance and hopefully improve the decision making of each physician. The central IT department who produced the reports sent to management and then physicians managed this first version. Physicians pay little attention to management but are sensitive to peer pressure from fellow professionals. The second version, redesigned to one in which the information could be delivered straight to each physician through his or her PC, and came under their own personal control to interrogate and use as they saw fit. This version appealed to existing group cultural norms of peer pressure and assessment to create the conditions within which physicians would view the system as a valuable tool to improve their own and their group's performance. The outcome of this second initiative was successful in terms of the management aims. For the first year following implementation both cost and quality indicators improved significantly.

The Kohli and Kettinger (2004) study considerably enhances our understanding of how IS business value is created, although this was not the original aim. Business value is defined in terms specific to the organisation (the hospital) to the time period (when cost was becoming a dominant concern) and to the information systems application type (DSS tailored to the very specific hospital activity of clinical choices). The organisational culture is shown to play a key role in value creation.

5. Conclusion

IS evaluation exercises involve several elements, all of which must complement each other if the exercise is to be a success in terms of creating greater understanding of the implications of ICT investment to an organisation. An ICT project has two key factors to assess and manage; the hard ones on the nature of the technology and what it can do and soft ones associated with the social and organisational consequences of implementing and using the technology. Success requires a high level of project management skills to ensure that all stages are completed to specification and time. IS evaluation exercises can also be viewed as projects that involve both the hard factors of

evaluation of the technology and soft factors like evaluation of the organisational impact of the technology and organisational processes for decisions. These exercises require as a high a level of project management skills as for ICT projects.

IS evaluation exercises have a high risk of failure, in which the results are perceived as irrelevant. Failure leads to the judgement that this is a pointless activity generating a poor return on the effort committed. Cynicism and pessimism follow. This creates a vicious circle. Pessimism breeds reluctance to execute an evaluation. Organisations fail to practice this most difficult of arts and lose the opportunity to learn and improve their technical methods and their management processes. Evaluations, when they are agreed to, are more likely to waste resources on ineffective approaches breeding further pessimism.

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