8 EVALUATION IN A SOCIO-TECHNICAL CONTEXT

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1. Introduction

The socio-technical approach to managing business and organizational change has been around for about half of the 20th century. Ever since the pioneers of the approach at the Tavistock Institute for Human Relations published the outcome of their study of the attempts by the National Coal Board in the UK to improve productivity by the introduction of mechanization (Trist 1981; Trist and Bamforth 1951; Trist et al. 1963), socio-technical methods have been discussed and used in the implementation of change and in particular for the introduction of new technologies. Advocates of the socio-technical approach can be found over the entire industrialized world (Coakes, Lloyd-Jones, and Wills 2000). Indeed, the philosophy that underlies much of the thinking of IFIP's Working Group 8.2 rests firmly on socio-technical foundations.

Nevertheless, as Enid Mumford, one of the pioneers, laments in her paper at this conference, socio-technical design is an enigma. It has offered so much and produced so little and we need to know why. There are many case studies demonstrating both the successful use of socio-technical methods and studies which show clearly that paying attention to the social issues as a complement to the techno-economic issues produces results that satisfy managerial aspirations (Land, Detjearuwat, and Smith 1983; Mumford and Henshall 1979; Mumford and MacDonald 1989). Her paper discusses the problem and searches for fresh approaches to revitalize the unfulfilled promise of socio-technical design to come to fulfilment in the 21st century. Those who believe in the market system and its ability to select from a portfolio of innovations the ones that will lead to competitive success will argue that if, over a 50 year or so life span, the market system has failed to select socio-technical design methods, than perhaps those methods have less to offer than their protagonists claim.

This paper attempts to make a contribution to the discussion by offering its own diagnosis, suggesting some research agendas and concentrating on the role of evaluation.

2. The Socio-technical Dilemma

The socio-technical philosophy rests on two perhaps contradictory premises.

The first can be called the *humanistic welfare paradigm*. Socio-technical methods focus on design of work systems to improve the welfare of employees. The prime aim of redesigning work systems is the improvement of the quality of working life (Cherns 1976; Davis and Taylor 1972). Designers seek to develop ways of organizing work that result in improvements of job satisfaction in a number of ways often based on contradictions to the design precepts of the Tayloristic School of Scientific Management. High on the list of desirable attributes can be found concepts like autonomy, self-actualization, self-regulating teams, empowerment, and reducing stress at the work place.

Diagnostic analysis of existing work situations by socio-technical researchers found evidence linking productivity and performance failures to the neglect of many of the attributes listed above. There is much anecdotal and case study evidence demonstrating that there is a link between concern for employee welfare and the effective operation of the organization including the smooth implementation of, often, far reaching change programmes (Land, Detjearuwat, and Smith 1983; Mumford and Henshall 1979; Mumford and MacDonald 1998). Hence those who uphold the Humanistic Welfare Paradigm could claim that although they valued improvements in the quality of working life, the realization of these improvements had a direct beneficial impact on the performance of the organization reflected in its bottom line.

The value system based on ethical principles is illustrated by Mumford's often repeated statement that she would not work with an organization that included forced redundancy among the targets of a change in system (Mumford 1981).

The second can be called the *managerial paradigm*. All change (designed change) is instrumental and serves to improve the performance of the organization. The performance measures are illustrated by the concepts used: adding to shareholders' values, making the business more competitive, improving the bottom line, making the organization more responsive to changing circumstances.

To the extent that socio-technical by its concentration on concepts such as the quality of working life leads to a more contented workforce, and a more contented workforce leads to improved performance as measured by the above attributes, socio-technical methods will be used. And many advocates of the socio-technical approach came to it via the managerial paradigm rather than the social welfare paradigm. Nevertheless, the burden of proof rests with the advocates of socio-technical design methods.

3. The Problem of Evaluation

The general problem of evaluation can be illustrated by the difficulties encountered by researchers and practitioners in accounting *ex post* for the benefits accruing to the organization from the deployment of information systems based on computer and communication technology. For many years researchers failed to find any positive correlation between investment in such systems and improvements in profitability, competitiveness, and productivity (Brynjolfsson and Hitt 1993; Landauer 1995; Strassmann 1985, 1990). Only recently have researchers been able to provide evidence

that investments in information and communications technology (ICT) yield positive increases in productivity far beyond that produced by alternative investment strategies (Brynjolfsson and Hitt 1996). Even these findings are still subject to argument and controversy.

Researchers have tried to overcome the problem by using surrogate measures. Of these, the most widely accepted are measures that attempt to assess user satisfaction with the implemented system (DeLone and McLean 1992; Garrity and Sanders 1998). However, user satisfaction is not an output measure and it is doubtful whether is would convince hard-nosed accountants that it proves the value of an investment.

The special case of evaluating the contribution of social elements presents an even greater challenge.

Neither classical economics nor traditional accounting practice recognize that the social elements of a business have a value and contribute to the worth of the business, or more widely to the worth of society. Labor, for example is treated merely as a factor of production, homogenous, replaceable or substitutable for or by other factors. Neo-classical economics or more modern approaches such as those based on transaction costs (Williamson 1986) or those using the theory of games (Binmore and Dasgupta 1987; Kay 1993) take us no further. Accounting practice has concentrated on the recording of directly accountable elements of cost and revenue, although more difficult elements such as "goodwill" have become components of balance sheets. More recent attempts to incorporate notions of human resource accounting are also limited in their recognition of social values. In the past, welfare economics recognized the importance of providing a balance between the costs and benefits attributable to the individual organization from an activity and the costs and benefits of that activity to the larger society, but today managerial economics pays little or no regard to the importance of "externalities."

Nor do the writers on industrial and corporate success, or those who write about business strategy pay much attention to social issues. The most widely read and espoused views on what makes a corporation successful, for example John Kay's (1993) Foundation of Corporate Success, do not include factors such as having a contented workforce as a critical enabling factor. Of the nearly 500 cited references in his book *The Foundations of Corporate Success*, there are none that relate to the importance of socio-technical change management. Porter's (1979, 1980) analysis of the forces which make a business competitive do not include the workforce and its attitudes and behavior. The furthest most writers go is to point to "resistance to change" as an inhibiting factor to "progress," which has to be dealt with in one way or another (Keen 1981). Business school courses, which indoctrinate large numbers of the decision makers of the future , tend to pay scant attention to social factors nor do they attempt to debate values other than those stemming from the managerial paradigm.

Hence it is not surprising that the advocates of the socio-technical approach are faced with problems of evaluation not necessarily faced by the advocates of alternative approaches. Other approaches to organizational change, for example, the more recent phenomenon of business process reengineering (BPR) (Davenport 1993; Hammer and Champy 1993), by appealing directly to the values inherent in the managerial paradigm, have had little difficulty in gaining acceptance. Despite a reported failure rate of between 50% and 70%, a very large proportion of corporations in the industrialized world have

made some attempt to use BPR. The promise of BPR can be demonstrated directly using conventional and well understood tools of accounting and evaluation.

To gain a wider acceptance of the socio-technical approach, the evaluator has to demonstrate its value or worth in terms relevant to the managerial paradigm. The evaluation takes two forms:

Ex ante to demonstrate that the expected outcome of a socio-technical inspired change program meets the instrumental expectations of the business and does so with less risk and more certainty than alternative approaches.

Ex post to provide evidence acceptable to the financial management that the desired outcomes have been achieved.

But the evaluation method, too, has to prove acceptable to the decision makers within the organization. And in the typical organization, evaluation is regarded as a purely technical process, carried out according to rules that make it possible to compare evaluations of very different projects on a single scale. Hence the introduction of methods of evaluation deemed suitable for socio-technical designs, which attempt to define the value of other sets of variables previously neglected, face severe difficulties. The problem is perhaps exacerbated by the socio-technical premise that the evaluation process itself should be a socio-technical process and not merely a technical exercise.

To satisfy the humanistic welfare paradigm, the evaluator has to demonstrate that the proposed changes will result in improvements of individual and societal welfare and, once the changes have been implemented, that the improvements have been attained. As has been suggested above, it may not be possible for any proposed change to meet both managerial and humanistic criteria.

An early set of case studies sounds a more optimistic note. In 1957, the London based think tank, PEP (Political and Economic Planning), published an account of three case studies in automation: the manufacture of bearing tubes, an oil refinery process control application, and the application of the LEO computer to business data processing (PEP, 1957). The overall assessment concludes,

> Perhaps the most important theme running through these three case studies is, in fact, the new type of team work which is needed when automatic methods are used. In this there is hope that automation may result not in social loss for the sake of economic gain but rather in social gain hand-in-hand with economic advance.

It is interesting to note that, in the case study of LEO computers, the study cites management's motivation for deploying the computer as including "the hope that something might be done to minimize the drudgery of clerical work." The detailed costings published as part of the case study, however, provide no entry for reduction of drudgery.

4. Evaluation Methods

Conventional evaluation methods provide limited possibilities for including social elements in cost/benefit assessments. These require the evaluation of the second order impacts of social changes. For example, if a socio-technical design reorganizes the work situation to provide, as a direct outcome (first order impact), an increase in job satisfaction, the expected second order consequence might be a reduction in absenteeism, an improvement in health, and hopefully an increase in productivity. Each of these has a measurable impact on the cost/benefit equation. But the *ex ante* assessment of the scale of these effects is difficult and tends to rely on an act of faith by the evaluator rather than a rational calculation. Relying on the usual statistical standby of prior experience does not work well because the impact of the changes is highly situational. In principle it should be possible to check *ex post* the extent to which predictions of second order effects have been realized. But few organizations carry out rigorous *ex post* studies (Kumar 1990).

Evaluation methods are themselves assessed in a number of studies (Farbey. Land and Targett 1993; Hirschheim and Smithson 1988; Wilcocks, 1994).

A promising approach is that based first on the recognition that organizational change, and in particular large scale change, addresses a range of problems and targets a number of objectives (Kenney and Raiffa 1976; Land 1976; Zangemeister 1970). Some outcomes follow directly from the change, for example, the saving of staff; others are the second order consequence of the direct impact. For example, a second order consequence of making staff redundant may be resistance to further change. In that case, the second order effect is a negative one. The economic consequences may be readily measurable by conventional costing techniques, i.e., they are tangible, as is the saving of staff, or more difficult to measure, i.e., they are intangible, as is the increased resistance to change in the example above.

Second, it is recognized that different stakeholders can attach quite different values to the objectives even though the objectives themselves may be shared. But there are objectives which are not shared and some stakeholders attach a negative value to them while others regard them as beneficial. Thus to the senior management in the example above, the saving of staff is ranked as an important objective, while to the personnel department it may be regarded as dysfunctional.

Third, values are measured in the natural units of the goals. Thus a measure of improved responsiveness will be the expected change of response time (*ex ante*) or the achieved change of response time (*ex post*). This is also one of the major drawbacks of this type of evaluation. Instead of reducing all values to the commonly accepted money value, multi-objective, multi-criteria methods reduce all values to a common utility function.

Fourth, the evaluation process is ideally a socio-technical one. That is, it is an iterative process of discovery involving all classes of stakeholders. Technical and social considerations are equally acceptable. Evaluation is regarded as a mutual exploration of the issues, not as a mere recording of technical data. It is recognized that evaluation is a political process (Hawgood and Land 1988) and is seen as an arena for fighting for cherished objectives or alternatively for denying other's objectives that are seen as

harmful to one's own interests. Potential conflicts' are exposed and steps can be taken to resolve difficulties arising from the conflict.

A number of evaluation methods are based on the articulation of the multiplicity of objectives that lie behind the designed change and the multiplicity of values that are attached to each objective by different stakeholders. The generic term for such methods are multi-objective, multi-criteria (MOMC) methods. Information economics (Parker and Benson 1987) and the balanced score card (Kaplan and Norton 1992) are variations of the MOMC concept. Some of these will be discussed below.

In the 1970s, an action research project involving a group a savings banks in the UK used MOMC techniques to help the banks evaluate alternative strategies for reorganization. Acting as facilitators, the researchers introduced MOMC to the banks. The outcome was that the banks selected and implemented a program of reorganization that, up to that point, had been rejected because it did not meet conventional cost/benefit criteria. The program incorporated a number of objectives derived from a socio-technical design exercise. Despite the apparent success of the evaluation and the subsequent reorganization, the new methods did not become accepted as part of the normal apparatus of design and evaluation in the banks. Without the presence of the research team, the new methods were seen as outside the accepted norms of accepted (or acceptable) practice in the business.

There are many similar examples of apparently successful socio-technical interventions (Land, Detjearuwat, and Smith 1983; Mumford and Henshall 1979; Mumford and MacDonald 1989). Nevertheless, socio-technical methods failed to get imbedded in those organization as part of standard practice.

6. Other Evaluation Methods

Information economics recognizes that the benefits (and costs) from IS based organizational change include elements with which conventional cost/benefit analysis cannot deal with. It permits the evaluator to "account" for a range of intangibles such as improved customer service and the predicted consequential changes following from the initial change—"value linking" in the terminology of information economics. Benefits and risks are separated into two domains, a technical domain and a business domain, which are evaluated independently. No explicit guidance is given relating to the benefits, costs, and risks associated with the social component of the organization. But the conceptual basis of information economics and the suggested evaluation process could be adapted to incorporate an explicit valuation of the social elements. However, although acknowledged for its potential in assessing the value of IS, information economics has not been widely implemented. Perhaps its focus on IS evaluation rather than as a general tool of evaluating change projects has inhibited its acceptance by management.

A general evaluation methodology that has gained a measure of acceptance from corporations is the balanced scorecard (Kaplan and Norton 1992, 1993; 1996a, 1996b), first reported in *Harvard Business Review* in 1992. Because it appears to be congruent with the requirements of the corporate financial establishment, it might prove to be an acceptable method for evaluating the worth of the socio-technical approach. More recently, a version tailored specifically for the evaluation of IS projects has been

suggested in decision support systems (Martinsons. Davison, and Tse 1999). However, the methodology in the form in which it has been presented both by its originators and by its adapters does not explicitly include the value of social elements in the scorecard.

The balanced score card sets out to overcome the weakness of traditional return-on-investment measures of performance by adding measures that reflect customer satisfaction, internal business processes, and the ability to learn and grow. Its orientation is toward future potential as a complement to measures of historic performance. The scorecard is designed to maintain a balance "between short- and long-term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external perspectives" (Kaplan and Norton 1996b).

Kaplan and Norton (1992, 1996a, 1996b) propose the following four perspectives in a balanced scorecard:

1. The customer perspective: Are we satisfying customers needs? How do we look to customers? **Mission:** To achieve our vision, by delivering value to our customers.

2. The financial perspective: How do we look to shareholders? **Mission:** To succeed financially by delivering value to our shareholders.

3. The internal perspective: Are we working effectively and efficiently? What must we excel at? **Mission:** To satisfy our shareholders and customers by promoting efficiency and effectiveness in our business process.

4. The learning and growth perspective: How can we continue to improve and to create value? How can we serve customers better in the future? **Mission:** To achieve our vision by sustaining our innovation and change capabilities through continuous improvement and preparation for future challenges.

The four perspectives are linked. Thus internal efficiency (perspective 2) plus customer satisfaction (perspective 3) leads to financial success (perspective 1).

For each perspective, the evaluator is expected to draw up a table of goals and their appropriate measures. Thus under the customer perspective, a goal might be "reduce delay between an order arriving and it being delivered." The appropriate measure might be the average time taken to make a delivery, and perhaps a measure of the standard deviation. Selecting the measures is itself a process in which the evaluator consults relevant stakeholders. The goals within each perspective have to be ranked in accordance with both their perceived importance to the organization and the degree of risk involved.

Critics can point to the absence of a number of other important perspectives. Thus it would be possible to introduce a perspective relating to the relationship between the business and its partners: how do we look to our suppliers, subcontractors, and so on? As set out above, these perspectives are designed for the business corporation operating in a competitive market. However, it is relatively straightforward to define perspectives that are more suited to a public service enterprise, or indeed to the peculiarities of specific business units such as an IS department (Martinsons, Davison, and Tse 1999) or a research department.

The balanced score card approach lends itself to the addition of a further (socio-technical) perspective:[1]

5.   The employee perspective: Are we improving the quality of working life? How do we look to our employees? **Mission:** To achieve a contented, highly motivated workforce at all levels in the organization.

Achieving the mission links with all the other perspectives. Thus a highly motivated, enthusiastic workforce links with the customer perspective in that customers are more likely to want to do business with the firm in question if they are met with an enthusiastic service. Note that the contrary also applies. Unmotivated staff are less likely to encourage customers to return. Again, a highly motivated workforce is more likely to contribute to a learning organization.

   The balanced scorecard can also be used to arbitrate between the working of the managerial and the humanistic welfare paradigm by making explicit the values attached to both sets of precepts.

   The socio-technical experience will help to define the goals and measures relevant to the employee perspective. These will include goals such as improving job satisfaction, reducing stress, increasing autonomy, increasing participation by the work force, becoming more open with the work force about future plans, and many others. The measures can include direct first order measures such as changes in job satisfaction, or indirect second order measures such as the reduction in absenteeism and ill health.

   The process of defining goals and measures can be treated as a socio-technical process, that is, as an exploratory learning activity involving stakeholders and attempting to resolve conflicts through a process of negotiation.

7. Research Agenda

The challenge for those of us who believe that socio-technical design methods are valid, and that they uniquely have the capability of satisfying the value criteria of both the humanistic welfare paradigm and the managerial paradigm, is to provide the evidence in a manner that will convince all affected stakeholders. There have been ample demonstrations that methods which offend specific groups of stakeholders are more likely to fail to achieve their goals. The following research strategies are designed to help in establishing a new case for the socio-technical approach:

1.   Identify organizations that in the past have used socio-technical design methods. Trace the history of the application and its operation. Gauge the perceptions of stakeholders on how they viewed socio-technical methods then and now. What caused perceptions to change? Evaluate the degree of success of the application, perhaps by using the modified form of the balanced scorecard outlined above, both in term of meeting techno-economic objectives and social objectives. Find out if socio-technical design methods have been used elsewhere in the organization, whether they are still used, and if not, why not. The research methodology selected

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[1] A fuller exploration of the use of the balanced score card method is under preparation by B. Farbey, F. F. Land ,and D. Targett, "The Balanced Score Card as a Basis for Socio-technical Evaluation."

for such studies can include interpretive and hermeneutic case studies and techniques from the classical school of empirical research.

2. Search for organizations willing to try out socio-technical design for a real change program. The research team can act as tutor to the organization and observe and monitor the progress of the experiment. Or it can intervene actively, as part of an action research program, and like Mumford in her numerous cases (for example Mumford and Henshall 1979; Mumford and MacDonald 1989) act as the facilitator. Ideally the research team should chronicle the history of the project through all its phases including operation. Stakeholder perceptions and achievements in relation to techno-economic and social goal should be monitored.

3. Although there is little evidence that socio-technical methods as such have been widely used, there is also some evidence that socio-technical precepts have become a part of the language related to the management of change. Socio-technical ideas may have become incorporated in other approaches. Thus, much is made in the literature on business process reengineering that one of the explicit goals of business transformation is "employee empowerment." A research project could look at the most widely lauded methods of strategic management, management of change, and IS development methodologies to check the extent to which these incorporate explicit socio-technical concepts, how these are developed in actual projects, and how they are perceived by stakeholders.

4. A related research project could examine the possibility of relevant aspects of other approaches being merged into socio-technical design methods. In other words, ask the questions "What can the socio-technical school learn from other schools?" and "How can the socio-technical school influence other schools to adopt socio-technical principles?"

5. A major focus of this paper is on finding methods of evaluation acceptable to decision makers—methods that are capable of valuing both social and techno-economic goals. Such methods must fit in with the preconceptions of the established financial community. This paper suggested the possibility of using a modified version of the balanced scorecard. More work needs to be done on the definition of the new form. This will need to be tested in a number of situations. This suggests action research projects that aim at introducing organizations to the new form of the scorecard, monitoring its use, testing its effects, and checking on stakeholder perceptions. Ideally there should be a number of such projects working in different environments, and a meta project that carries out comparisons.

6. Research into other types of evaluation methods and procedures may also be investigated, including in particular methods used to evaluate "problem" areas such as the value of human life in a hospital or on the battlefield.

To those of us who have faith in the value and values of the socio-technical approach, a rich seam of research findings based on the above agenda would be most welcome.

8. Conclusions

Many reasons have been suggested for the failure of the socio-technical approach to gain more general acceptance. It is well established in academic circles, including the academic IS community, but it is not well known among practitioners or even consultants. In business schools, it may make an appearance, but it tends to be a token appearance. This paper attempts to make some contribution to the discussion of these failures and to suggest in particular the importance of finding acceptable ways of evaluating the worth of the social elements to the running of an organization. It proposes the modification of an established evaluation methodology and further research into evaluation methods and evaluation practice. Finally, the paper outlines the kind of research that is needed to bridge the gap between the academic and the practitioner.

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