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Information Systems Investment and Evaluation: Mini-Track Introduction

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Introduction

The ubiquitous nature of Information Systems (IS) and its ever-changing underlying technology is demanding organisations to keep abreast of technological innovations. Yet, companies are becoming more aware that a competitive advantage cannot be achieved, or even maintained simply by utilizing the latest technology. Indeed, it is becoming more apparent that a strategic competitive advantage will not be achieved through embracing each new technology as it arrives but in the way companies exploit their technology assets. The management approach to evaluation is critical in this endeavour and needs to embrace the spectrum of human, organizational and technology based assets and infrastructure.

Information Systems Evaluation

The adoption of new technology remains a prime driver for organizations seeking to improve their short, medium and long-term performance. Yet, the adoption of all-embracing ISs that can be 'rolled-out' throughout the organization and adequately integrate functionally isolated activities often remains a management panacea.

Much of the resistance to the adoption of new technology can be attributed to the legacy of failed intra-organisational (Irani and Love, 2001), and inter-organisational ISs (Sumner, 1999). Such failure is often evident through the inability of the new IS to deliver the business benefits that were used to justify its adoption in the first place.

Organizations are also beginning to recognize the plague of indirect costs associated with the adoption of ISs (Irani et al., 1997; 1998; Ryan and Harrison 2000). Indeed, decision-makers and project managers once ignored such costs, often for political reasons that centred on the need to secure management support. Consequently, these costs were absorbed by the company as a whole and lost within the general overheads. However, increased accountability and robust project management techniques have together placed cost identification, management and control on the agenda of managers.

Why an AMCIS Mini-Track?

Information systems evaluation has only been an explicit topic in the recent AMCIS mini-track organized by Irani et al., (2000;2001;2002), although isolated papers on IS evaluation have appeared in several AMCIS proceedings. These papers have been dotted across different mini-tracks, preventing the IS evaluation community and interested researchers from following developments in this dynamic and emerging field.

The idea for organizing a mini-track on evaluation originated from a lack of forum to debate the issues associated with IS evaluation outside Europe. Much of the research community feels frustration with having to look through many conference programmes [including those of AMCIS] to find papers that relate to the evaluation area.

We [the mini-track chairs] believe that this year's specific mini-track on 'Information Systems Evaluation' will continue to be highly beneficial to both AMCIS and the IS evaluation community. It will enable new and different insights into evaluation to be viewed in a more holistic and integrated manner.

Table 1. Barriers to Evaluation

Barriers to Evaluation	References
Assessing IT value impact, performance indicators and measures.	Chircu and Kauffman (2000); Sircar *et al.,* (2000) Irani *et al.,* (2001)
Organisational risk, technical infrastructure management uncertainty.	Alshawi *et al.,* (2000); Broadbent *et al.,* (1999)
Learning, communication, and business processes design and reengineering.	Love *et al.,* (2000); Laurillard (1999).
Governance, project; size, management and structure, market needs, learning ability and complexity.	Wilcocks and Lester (1994); Marosszekey *et al.* (2000) Raymond *et al.,* (1995)
Techno-ware: devices and tools, orga-ware: technology institutions, info-ware: know-how and technical / technological knowledge, and human-ware: human skills, expertise.	DIST (1998) Vandenbosch and Ginzberg (1997)
IT culture gap, strategic IT challenge and alignment, traditional IT delivery, emphasis on output rather than outcome.	Garfield and Watson (1997);
Motivation, ability or execution breakdowns.	Remenyi *et al.* (2000); Love *et al.*, (2000)
Management's motivation towards the short-term, limitations and generic nature of traditional appraisal techniques, changing portfolio of benefits and costs.	Lefley (1994); Irani *et al.,* (1999; 2001)

Barriers to Carrying out an Evaluation

It would therefore appear that the efficient and effective management of technology-related costs and benefits are seen as enablers for strategic, tactical and operational business 'success'. However, many companies continue to overlook the importance of evaluating their techno-centric investments and instead, favour a more ad-hoc, and risky, investment strategy that is often nothing more than an 'act of faith' (Kaplan, 1985).

Although there is a clear need to justify investments in information systems, empirical evidence from Irani and Love (2001), Khalifa et al., (2000) and Serafeimidis and Smithson (2000) points to the lack of widespread evaluation processes, financial or otherwise. Table 1 summarizes the barriers that tend to frustrate the investment evaluation process.

The increased complexity of information systems combined with the uncertainty and unpredictability associated with assessing the system's benefits and costs clearly point to the need for appropriate evaluation procedures. Farbey et al., (1993) suggest that the search for a single 'best' approach is fruitless due to the wide variety of complex interacting variables. Yet, in a hope to find the panacea for the 'evaluation paradox', which organizations clearly face, researchers are constantly proposing new evaluation methods.

One reason for the wide range of different approaches to evaluation is that it is not an end in itself. The purpose of evaluation is to provide management and stakeholders with concise information enabling them to make informed decisions about the future direction or prospects for the organisation in question. The nature of the impending decision is a key factor in choosing an appropriate and effective evaluation strategy. IS evaluation is inevitably context dependant.

This year the mini-track deals with evaluating and measuring effectiveness of IS. The need for such evaluations arises in a variety of circumstances ranging from internal post implementation reviews of a single system to external reviews addressing the "heath" of an organisation in the light of its complete portfolio. Based on the 12 papers selected for presentation we have tried to weave a coherent story to expose some of the underlying issues within the area of IS evaluation.

Evaluation of Information System Impact

When senior management questions the value of an IS it is because they perceive a need to decide whether to promote, change or scrap the system in question. Looking directly at an IS, and the people who use it, reveals a lot about what is does, how well it works and the immediate costs of running the system.

However, the system is rarely an end in itself and general systems theory tells us that optimising a component (the IS) does not lead to an optimal system (the organization).

In this context the "value" of the IS is its contribution to the effectiveness or value of the organisation as a whole. Our first group of papers examine this issue.

The first paper from Kohli, R. entitled 'In Search of Information Technology Business Value: Do Measurement Levels Make a Difference?' starts from the historical failure to provide a meaningful result, by simple aggregation of benefits to direct users, and exemplifies the difficulties of linking the use of an IS to its impact on the organization. In the preface to this case study of decision support system impact the paper looks to general organizational studies to inform the debate about organizational effectiveness. Their empirical study tests Huber's theory of advanced IT (1990) and shows the value of process and organizational measures of effectiveness.

The effect of an IS investment is often to leverage the value of other non-IS resources, particularly with cross function and infrastructure investments. In their study of reaping a return on IT investment, Nayal, A. and Kanungo, S. report on an empirical study to try and tease out the business value of a system. Rather than taking direct financial measures they address perceptual measures of payoffs and derive a causal model of system impact. The main lesson being that the more comprehensive the IS evaluation the better the organisation is able to control and maximise return on investment.

Jeffers, P. and Muhanna, W. also presents a causal model of organisational performance. This draws on a resource-based view, which treats IS resources as catalysts in realising the potential of non-IS resources and uses a customer centric focus to assess outcome. The model is then tested in an empirical case study of the third party logistics industry where customer responsiveness is a critical success factor.

The notion of what constitutes good performance or organizational effectiveness is difficult to capture. Process theories, in which outcomes develop over time, are complex and there is debate about whether organizational effectiveness is even a measurable concept (Mohr 1982). Nevertheless without some attempt to assess performance, management cannot maintain an appropriate IS portfolio.

The last paper in this group by Ranchhold, A. and Hackney, R. looks at the relationship between performance and market orientation (or strategic mission) within a single industry sector. The survey results indicate that the requirements for IS resources follow from the corporate orientation. Setting IS evaluation against this background not only emphasises the need to address the organisation holistically but again shows the extent to which effectiveness is context dependant.

Using Perceived Benefits and Values

The predominant research methodology in IS evaluation is survey or case study work. Given the complexity of determining organisational effectiveness or performance these investigations use sampled perceptions as their principle source of data, see for example the paper by Nayal, A. and Kanungo, S. 'Reaping Return on Information Technology Investment: An Empirical Study'.

This raises the question of whether there is a gap between the perceived value and some intangible but "real" value. It could be that perceptions, which support act of faith commitment to IS projects, also report benefits or payoffs in a way that puts the IS in a better light than some more objective evaluation. In Jeffers, P. and Muhanna, W. 'Information Technology and Process Performance: an Empirical Investigation of the Complementarities Between IT and Non-IT Resources' warned of the danger that internal management perceptions of customer satisfaction may not agree with their view of the logistics service, However, the issue is not whether perceptions are right in some absolute sense but whether they provide a sound basis for contemplated decision.

If, as in the first paper of this group by Imai, A. and Roztocki, N. entitled 'An Exploratory Study of the Impact of Information Technology Investment Announcements on Companies' Values in Japan' the issue is the impact of IS assets on corporate value, then a perception-based measure clearly reflects the way many investment decisions are made. External investment decisions, either by merchant bankers or stock trading on the open market, are made on the basis of investor's perception. In this paper Imai, A. and Roztocki, N apply an empirical approach to assessing the value of IT investments by matching the project announcements to changes in the share price. Although the number of cases is small this is a promising approach where external perceived value critically affects some decision making process.

Another example of the validity of perception measures is presented in 'The Impact of Knowledge Sharing and Rational Planning on IT-Based Organizational Performance: an Empirical Analysis'. Based on Tallon's *et al.* (2000) work Grover, K argue that CIO perceptions strongly parallel more objective, but difficult to access, data. This paper examines the knowledge sharing culture of an organisation and, through rational planning, its impact on organisational performance.

The model was tested through a survey of chief information officers (CIO) perceptions of the issues and showed knowledge sharing predicted rational planning and improved organizational performance.

It could also be argued that in a culture that perceives knowledge sharing to be valuable, greater emphasis will be placed on rational use of that shared understanding. Perceptions drive behaviour and therefore represent sound measures in organisational studies.

In many situations, such as that reported by Ranchhold, A. and Hackney, R. in 'Evaluating IT in the Independent Financial Services (IFA) Sector in the UK Taking into Consideration Marketing Orientation and Strategic Typology' and the next paper the decision to implement an IS is mandate by market pressure or government policy. In these circumstances post implementation evaluation is often aimed at institutional learning – making decisions about how to do better next time. The public sector, despite concern for the public purse, has significantly different perceptions of what constitutes appropriate or effective performance (Bannister 2001). This embodies notions of Best Value and seeks to foster collective learning across parallel implementations of similar systems.

Jones, S. and Irani, Z. in 'IS Evaluation in the UK Public Sector: Emerging Research Theme Issues' develop this theme in their review of existing UK public sector practice. The inevitable conservatism of public audit agencies leads to concentrate on "well understood" financial measures. Unfortunately, in the IS area they fail to capture an appropriate notion of value and current practice tends to be a ritual with little real significance. Further research into interpretivist evaluation techniques is suggested as the way forward.

Evaluating the effectiveness – or cost effectiveness – of an IS tries to balance the investment or cost of an IS project or asset against some measure of value to the organisation. In some contexts perceived value equates, such as Imai, A. and Roztocki, N. in 'An Exploratory Study of the Impact of Information Technology Investment Announcements on Companies' Values in Japan', to net value but in others, it equates to perceived benefits, which may then need to be set against costs.

The last paper in this group by Ghoneim, A. and Irani, Z. entitled 'Confirming, Identifying and Categorizing IS Lifecycle Costs' switches to other side of cost effective equation and looks at cost taxonomies. Taking a purely monetary view Ghoneim, A. and Irani, Z. review and identify the weaknesses in current approaches. Although many are academically acceptable they present practical difficulties because many organisations do not have accounting mechanisms sophisticated enough to identify and attribute such costs. As with organisational outcome the estimation of lifetime costs is non-trivial. However, we cannot escape this demand when trying to decide how to contain or reduce IT overheads within the organisation.

Evaluation Models: The Paradox of Diversity

This problem of context dependency has spawned a diverse range of evaluation techniques. Even in we accept Farbey's argument that there can be no one 'best' approach (Farbey *et al.*, 1993) the IS evaluation discipline still needs a unifying framework of knowledge. The problem is to see how a technique proposed in one context can be adapted and applied in another.

The first paper in this group by Chen, A. Shao, B. and Sen, S. 'Identifying Factors to Improve Effective XML Adoption in Electronic Businesses' looks at this issue by examining the dynamics of underlying technology change (in this case introduction of XML) and simulating the effect of different adoption strategies. The proposed model presents a multi dimensional space for the degree of new technology penetration. Given the organisations current position in this space and the level of IT sophistication guidelines on how to target investment for maximal benefit are proposed.

The next paper 'Architecture-Based Systems Evaluation: Lessons Learned' by Griman, A. Domvnguez, K. Mendoza, L. and Pirez, M also develops guideline for IS development strategy. Unlike the others papers, which evaluate mature or operational systems, this one is targeted at the early stages of development. The architecture of an IS is argued to be critical in achieving its longer-term objectives and Griman, A. Domvnguez, K. Mendoza, L. and Pirez, M examine two approaches to evaluating the design at this stage. Based on an the results of a case study where two different techniques were applied to a KMS project they present guidelines for the conditions where each can be expect to be most effective.

In Melville, N. and Ron, R. 'Assessing IT Value within Interfirm Business Processes' describe work in progress to construct a taxonomy cross organisational IS systems. Using a matrix that classifies systems by function and impact, Melville, N. and Ron, R. proposes a model for relevant value creation mechanisms.

These three papers all seek to aid IS professionals in selecting an appropriate strategy to maximise the impact of IS investments.

In each case they propose models for different contexts in an attempt to draw out general guidelines. In the last group the paper by, Jones and Irani, illustrated the extent to which evaluation will always be context dependant with significant differences between public and private sectors.

Given the diversity and complexity mapping organisation wide results onto their IS predicators, general guidance for IS evaluators is going to be a hard won prise. The last paper of this group 'Evaluating Information Technology Investments in an Organizational Context' confronts the diversity paradox head on. In this contribution Tuten, P proposes the notion of a meta-methodology to guide the practitioner in creating the appropriate context dependent IS evaluation strategy. The paper discusses the issues being addressed as this research in progress unfolds.

Conclusions Tuten's, P. paper, with its overview of the evaluation process, brings this year's mini-track to a fitting conclusion. In addressing the theme of evaluating and measuring effectiveness of information systems we have received a wide range of high quality contributions from which we have tried to draw some common issues.

Evaluation, as a discipline, has to face diversity of context and the wide range of managerial and strategic questions that depend upon the information it provides. However, the contributions have shown several underlying threads that draw them together:

- The need, despite the difficulty, to look to the distant consequences of IS deployment.
- The need, again despite the difficulties, to develop a shared framework for IS evaluation theory and practice.
- The need to look away from fiscal measure to more interpretivist evaluation strategies. In particular the importance role perceived attitudes and values can play in evaluation.

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