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South African Computer Journal (SACJ): Special Issue

Information Technology and Development

South Africa, as a developing country, needs to find ways to harness its enormous potential in a rapid and sustainable way. It is argued by some that the developments in information technology are increasingly creating opportunities for socio-economic development to be enabled by the diffusion of IT. If this is true, then these opportunities should surely be explored. Consequently, the editorial board of SACJ has decided to devote a special issue to this theme.

Some of the questions that the special issue might address are:

- To what degree can information technology enable (or accelerate) socio-economic development?
- How can the diffusion of information technology be achieved in order to maximize its contribution towards socio-economic development?
- What are the conditions required for such technology enabled development?
- Are there high leverage areas where quick returns can be achieved?
- Should the state play an active role and in what way?
- What are the experiences of other developing countries in information technology enabled socio-economic development?
- What are the moral and ethical issues involved in information technology enabled socio-economics development?

We invite *all* researchers in the field of information technology and other disciplines to contribute to this special issue. All contributions will be reviewed by three independent reviewers. Contributions should be sent in four copies to:

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Important Dates

Contribution deadline:	June 5, 1995
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Some Current Practices in Evaluating IT Benefits in South African Organisations

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Abstract

IT has a dynamic impact on organisations and little research has been done especially on the extent to which senior executives take the different system types into account when they appraise an IT investment. The aim of this paper is to identify current IT investment evaluation practices using the framework of system portfolios identified by McFarlan. Twenty four respondents were drawn from business organisations. Wherever possible, Chief Information Officers (CIOs) and Senior Business Executives (SBEs) were interviewed from the same organisation. Content analysis was used to identify fourteen major concepts from the interview transcripts.

The results of this study indicate that payback continues to be the most popular technique for appraising IT investments. CIOs tend to adopt rigorous cost benefit analyst techniques regardless of system type, whilst SBEs take cognisance of the system type and are comfortable with the informality of intangible benefits arising from strategic systems. Neither group regularly conducted post-implementation audits. The SBEs felt that customer response was a sufficient ex-post measure of the benefits from IT, CIOs gave lack of time as their commonest reason for omitting post-implementation auditing and felt that formalised post-implementation auditing would enhance the image of IT within the organisation.

Keywords: *IT benefits, evaluation, payback, intangible, post-implementation audit, system types.*

Computing Review Categories: *D.2.2, H.1.2*

1 Introduction

According to research into IT spending in the United States many organisations

“would have done better ... to have invested that same capital in almost any other part of their businesses.” [7]

This suggests a massive imbalance between IT investment and benefits derived from that investment, this imbalance has been referred to as the productivity paradox [6]. In order to understand this paradox it is necessary to consider the methods which are used to identify and evaluate the benefits of IT.

IT evaluation covers a very wide area which includes project selection, procurement, implementation testing and post-implementation evaluation studies. Hirschheim and Smithson [10] argue that IT evaluation should be thought of as:

“A continuum ranging from the highly objective or rational approaches to evaluation at the one end, to those which regard evaluation as very subjective or political at the other.”

At the highly rational or objective end of the continuum evaluation research concentrates on efficiency. Such studies concentrate on quality assurance, matches between reliability and specifications, and technical compatibility issues [15, 2, 22]. These approaches assume that the functions and goals of evaluation are non-controversial. Such measurement tools are primarily concerned with efficiency, which can be defined as performing a particular task well in relation to given criteria, whereas effectiveness is related to deciding which tasks need to be done [5, 12]. The limitations of focusing on efficiency when measuring IT has led to the concern that small savings may be gained

from completing meaningless tasks. Bjorn-Andersen [1] contends that

“we have overemphasised efficiency at the expense of effectiveness”.

Curran and Mitchell [4] make the worrying suggestion that the aspects of IT which are measured are those which are easy to measure, as opposed to those which are important.

There are clearly conflicting views as to how successful IT investment has been. Simply to inject cash into the ISD and buy hardware and software does not necessarily produce an acceptable return on the investment. Traditional accounting techniques for investment appraisal do not capture the full impact which IT can have on an organisation. There are several different approaches available for those organisations which do invest in IT to measure the benefits but not many people actually adopt any of these methods. Those benefits which are intangible appear to be written off as unquantifiable and thus beyond any effective measurement technique. However as IT evolves, the ripple effect which it has on the business activities becomes stronger and some form of measurement which directly attributes benefits to the IT investment is required.

This study explores the possibility that McFarlan's grid might offer a more holistic framework from which to apply benefit measurement techniques, since the purpose of the IT investment can be clearly identified as either supporting or maintaining the existing business functions, or creating competitive advantage or providing the organisation with the potential to maintain competitive advantage.

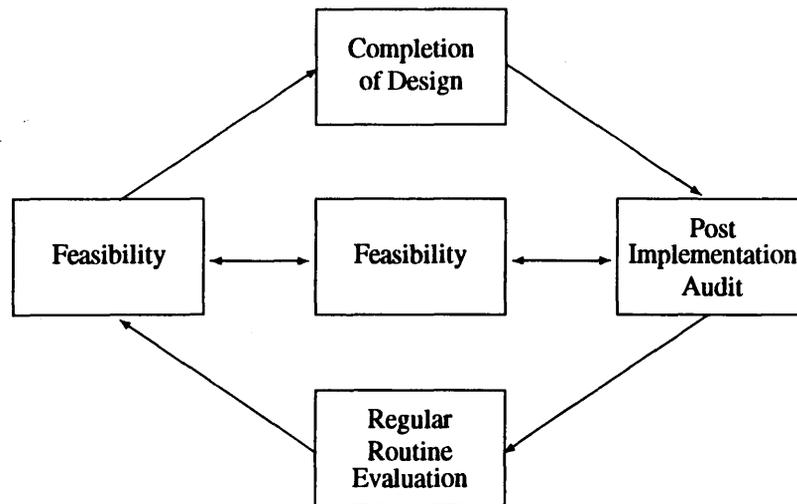


Figure 1. The measuring cycle

2 Identifying Current Practice

The focus of this research is on how organisations evaluate their IT investments and at what stage of the systems development life cycle the major effort is expended. The objective of this research was

To identify current practice in the evaluation of IT benefits in South African organisations; to consider the practical validity of McFarlan's grid as a framework from which executives can measure IT benefits; to explore any associations between IT system types and effective evaluation practices.

For this study two theories have been used to structure the research. Firstly, despite the findings of Schell [21], Hochstrasser and Griffiths [11] and others, it is generally accepted that IT benefits should be assessed several times during any project life cycle since it is impossible to understand all the costs and benefits before a new project begins. If this is not done, users may not understand all the benefits of the system. Also the users may be more involved in other aspect of the business and never take the time to explore all the benefits which are available [16].

Thus one would expect the organisation to appraise the IT investment at progressive stages of development and, perhaps most critically, audit the system at regular intervals after implementation. This would provide organisations with knowledge of the value of their IT, and the re-usable experience of assessing the feasibility of future IT investments [9, 13]. One suggested assessment cycle [19] is shown in Figure 1.

Within the general framework of IT project development the concept of different system types was then considered using McFarlan's [14] strategic matrix grid shown in Figure 2.

The rationale for using the concept of McFarlan's grid is that it is possible to clearly identify systems which are critical or vital to an organisation, whilst others are strategic or potentially strategic. Critical or vital systems essentially automate back office tasks, which have traditionally been regarded as a cost to the organisation. They were seldom, if ever, revenue-producing. Thus the IT benefits from invest-

ment in this area will be largely related to cutting costs. To look for a productivity payoff from such systems is therefore highly misleading. However, the strategic systems, those which were designed to provide the organisation with competitive advantage, might have the potential to be evaluated in terms of productivity since they may be expected to assist the organisation in a revenue generating capacity. If managers are aware of this dichotomy when they measure the benefits of their organisation's investment in IT their ability to have realistic expectations will be enhanced.

In order to explore these concepts the following set of empirical generalisations [20] was developed:

- That the evaluation technique will be selected independently of the type of system being assessed.
- The majority of the benefit evaluation effort will be expended during the feasibility stage, the majority of respondents will not complete post-implementation audits of the benefits which accrue.
- Intangible benefits are not regarded as sufficient to cost justify IT investments
- Different evaluation techniques are applied by SBEs and CIOs

The interview was structured to identify respondents' usage of different evaluation methods for different system types, and when during the project life cycle most of the evaluation effort occurs. The interview schedule was validated by two pilot interviews which found the following questions to be relevant and sufficiently broad to permit meaningful results to be obtained:

1. Do you attempt to measure the benefits of IT?
2. When during the project life cycle do you do that?
3. What effort do you put into the measurement of costs and benefits at each stage? (Figure 1 was shown)
4. Do you classify your systems into different types? (Figure 2 was shown)
5. Do you use different benefit measurement approaches for the different types of systems?

Degree to which IT developments will create competitive advantage	High	Strategic	Turnaround
	Low	Factory	Support
		High	Low
		Degree to which the firm is functionally dependent upon IT today	

Figure 2. McFarlan's strategic matrix

3 The Research Sample

The firms which took part in this study all have total operating costs of less than R28 million per annum. Effectively, this excludes the large financial institutions such as banks, building societies and insurance companies. The decision to research smaller IT investors was based on the expectation that they had not previously been researched on the issue of IT benefit measurement, and that they might be in the process of developing such investment appraisal procedures.

Chief information officer respondents

The sample was selected by using the 'snowball' approach which is widely accepted in business research. A pilot interview was held with the IS Director of the University Computer Centre who suggested eight potential respondents who were all IS directors in diverse industries. Of those eight CIOs six were available for interviews and five of them were able to suggest CIOs in other firms. Thus a total of thirteen CIOs were interviewed.

Senior business executive respondents

At the end of each interview the IS directors were asked to recommend a senior executive from the business side of the organisation in order to compare their responses. Where this was not possible business managers who had some control over the deployment of IT within their organisations were located, they all came from industry sectors which had been represented by the group of IS directors. Thus senior business executives formed the basis for the responses for non-technical evaluation of IT benefits.

The total number of respondents were twenty four, the sample being made up of thirteen CIOs and eleven SBEs.

4 Content Analysis of the Evidence

The twenty four interviews were conducted within a total of fourteen firms. The tape recorded interviews were transcribed and through content analysis the researcher was able to identify a total of fourteen concepts. Every concept was raised by the eleven SBEs, thirteen of the concepts

were raised by the CIOs. The omission of one concept was caused by no CIOs mentioning that their ISD was more interested in the technology than the business. The result of the content analysis is a frequency table which shows the number of occasions on which discussion regarding the main concepts occurred.

Since the empirical generalisation posited that CIOs and SBEs would evaluate the benefits of IT investments differently, the concepts raised by these two groups have been analysed separately. In the analysis of the findings presented below reference is made to the percentage of respondents from a group. This figure is derived by noting how many respondents in a given group, either CIO or SBE, mentioned the concept. It does not relate to the frequency with which that concept was raised by given individuals. The frequency of the concept is shown in the content analysis table. This means that whilst, for example, a higher percentage of CIOs referred to the users being in control of the IT investment as being relevant to their evaluation of the benefits, the SBEs who did regard user control as important mentioned that more frequently. Thus the percentage analysis takes cognisance of two factors, the number of respondents within a given group who mentioned the concept and the intensity with which they felt that concept to be relevant to their evaluation of IT benefit measurement.

5 Results of the Content Analysis for the CIOs

Table 1 provides a list of the thirteen concepts raised by the CIOs with the frequencies of their responses shown in the total column.

The results of the content analysis are analysed below in descending order of frequency for the thirteen CIO respondents.

Users control the IT expenditure

Of the CIOs 92% regarded the concept of users controlling the IT expenditure as being highly relevant to their evaluation of IT benefits. These CIOs saw their role in benefit evaluation as relatively technical, in that the users conducted the business and operational feasibility study

Table 1. The CIO content analysis concepts in descending order of frequency

	Codes	Concepts	Total
1	UCS	Users motivate for IT expenditure, users justify that spend and take responsibility for the investment	37
2	PBT	The system must payback within a predetermined time frame	31
3	SCB	The same cost/benefit measurement techniques are used whether the system is critical, vital (TPS), potentially strategic or strategic (MIS, DSS, EIS)	27
4	CRP	IT provides control which permits cost reduction programs to proceed	26
5	PST	Pilot sites are used to test the viability of IT investments	26
6	ARB	If the business can reduce its assets via an IS that is a major benefit	22
7	FSO	The cost/benefit measurement is only done at feasibility stage with no post-implementation audit to check that the benefits actually materialized	22
8	RBR	IT must reduce business risk	20
9	NIM	There is no infrastructure in place which accurately monitors and controls intangible benefits	13
10	NMB	ISD do not market the benefits of IT	7
11	DCB	Different cost/benefit measurement techniques are used whether the system is critical, vital (TPS), potentially strategic or strategic (MIS, DSS, EIS)	5
12	CMI	Intangible benefits are measured by customer/client satisfaction	3
13	PIA	Post-implementation audits are used to measure the actual costs of systems	2

whilst the IT staff were more concerned with technical feasibility. As one CIO explained, with the proliferation of PC systems he was often unaware of IT investments made at departmental level unless advice was requested to size a new software product. Strassman's comment [23] that IT is migrating to areas where it is not easily counted was clearly corroborated by the CIOs in this study.

Payback method of IT appraisal

The importance of payback as a means of evaluating the proposed IT investment was mentioned by every CIO in this sample. They suggested that, although the payback approach to investment appraisal does not offer a full description of the benefits which may accrue from a given system, it does provide a time frame within which they were able to plan the system development. Clearly if the system development and/or implementation time was underestimated then the payback time would be regarded as important and it would then become a cause for concern. One CIO listed the system development time frame as a clearly defined element of the payback period, this allowed him to monitor project development. If a project was running on time or up to two weeks late then he expected monthly progress reports. If the project development was two to four weeks over the scheduled time then he expected weekly project reports, and projects which were more than four weeks late were regarded as critical as both the payback time and the project cost would be affected if the project went in late. This CIO accepted that by taking the estimates as actual deadlines he was increasing pressure on his development staff, but had found that by providing bonus incentives in fact few projects ever overran. In this environment the payback was being used more as a project management tool than a formal performance measure.

The time frame which the payback approach provides was regarded by many of the CIOs as a critical point for negotiation at board level. If they were able to provide a financial argument which provided a payback period of less than one year, their chances of having the investment approved were greatly enhanced. A payback period of one to two years presented a more complex situation at board level. One CIO explained that for investments with that extended payback period he would have to put the proposal to the vote at board level an average of nine times. As a result many CIOs explained that they modularised their IT investment plans, ensuring that each project had a payback period of less than one year if at all possible. To put through one project as three small projects was more likely to gain approval.

The same cost benefit techniques regardless of the system type

Of the CIO informants 85% said that they used the same cost benefit measurement techniques regardless of the system type. Some of the respondents were unaware of the terms used by McFarlan but they were able to identify systems in the four quadrants using different terminology. Both critical and vital systems were often referred to as transaction processing systems (TPS), also called must-do

or bread and butter systems, terms which clearly define the system as providing support to the organisation.

Systems which were designed to enhance the managerial decision-making process were referred to as management information systems (MIS) and decision support systems (DSS). These systems were regarded by these respondents as partially strategic in that, given better decision-making tools the management and therefore the performance of the organisation would benefit. Industry-specific systems which enhanced customer relationships were commonly referred to as strategic. These varied according to the industry. Some regarded a sales tracking system as strategic, whilst others claimed that they gained strategic advantage by summarising TPS data from various sources in order to build an executive information system (EIS). Many CIOs had some experience of appraising IT investments which were potentially strategic. As shown above, they commonly used the payback approach for evaluating such investments.

In the main it appears that the CIOs conduct technical feasibility studies only after the user has made some business commitment to the system. This could obviously lead to situations where proposed systems appear to be financially sound but cannot be implemented. Effectively, this means that to the ISD staff, systems are frequently regarded as must do, since their role in the evaluation process is limited to identifying hardware and software which meets the user's requirements within a given budget. ISD staff are simply told what must be done.

IT assists in controlling cost reduction programmes

Of the CIOs in this sample, 77% believed that if IT enabled the organisation to provide control and feedback on cost reduction programmes within the business, that was a large benefit. Cost reduction programmes included a wide range of applications. One CIO had completed a feasibility study on decentralising the entire IS function as part of a corporate strategy to use regional offices as the data processing sites whilst creating a head office which was primarily an information centre. The firm had adopted this strategy in order to minimise the financial vulnerability of each regional office, since many of their regional operations had been closed down when they became financially non-viable. The remaining regions then had to carry a larger share of the IT costs, which increased their business risk. That was clearly a strategic system in that it enabled the firm to compete more effectively.

A cost reduction programme which related to the factory quadrant of McFarlan's matrix was the firm which invested in a sales tracking system in order to monitor sales activity in each region. The system also monitored the number of calls made by sales representatives in relation to the number of sales which were successfully concluded. The CIO was delighted to find a hidden benefit when the managing director realised that not only was there a direct correlation between the number of calls and successful sales, there were in fact more sales representatives employed by the firm than were necessary. This led to a change in the commission structure which the firm offered

to their sales staff.

Use of pilot sites to test the viability of an IT investment
Of the CIOs in this sample, 62% used pilot site testing in order to evaluate the benefits of an IT investment. When the proposed system was for a support function the CIO can usually rely on past figures to calculate the time taken for the cost of the system to break even with the benefits. However if the IT investment is strategic, or addressing a new business need which falls outside the mandatory system type, then the figures presented after the feasibility stage must reflect that the system will payback within a predetermined time frame. A pilot site was often used by CIOs in this sample to assist them in assessing a realistic payback period.

For many CIOs this approach to evaluating the benefits of the IT relied on minimal capital expenditure, which avoided the necessity of a decision at the board level. The CIOs often regarded such expenses as part of the feasibility study and spoke of using amounts of less than R20 000 to implement a pilot system. Such funds were frequently available to the CIO without approval from the board. If the pilot study was found to be cost effective or was otherwise deemed a success, only then would the board become involved in assessing the full potential benefit of implementing the system on a larger scale. Only one CIO had used the pilot approach at the suggestion of the board.

Asset reduction

The value of IT to reduce business assets was mentioned as a major benefit by 69% of the CIOs. As with the concept of cost reduction programmes discussed above, systems which have the potential to reduce business assets may be support, strategic or potentially strategic. One firm in the service sector attributed much of their success to their use of IT to schedule customer access to their service. Through the use of IT they had reduced their capital investment in their service commodity by 40%, which led directly to their ability to reduce the cost of that service to the customer. Thus what was initially a factory system developed sufficient benefit to the firm to create an opportunity for a strategic information system. Very similar situations were mentioned by other CIOs. Asset reduction provided the initial motivation to invest in IT, but the system then created opportunities to gain competitive advantages and reduce capital expenditure on other business functions.

Feasibility study benefit measurement

The major effort in evaluation of IT benefits was spent on the feasibility stage according to 85% of the CIOs in this sample. This effectively means that IT benefit evaluation is primarily ex-ante, with very little post-implementation auditing to assess the validity of the potential benefits which were identified at the first stage of the systems development life cycle. This finding confirms the research reported by Hochstrasser and Griffiths [11] and others.

Once the project was approved the CIOs were too busy allocating resources to that project, completing within deadlines and ensuring that implementation and handover

went smoothly, to take time to audit the project again. This was regarded as a problem and the CIOs were unanimous on the reason for not conducting post-implementation audits. CIOs lack the time to look back and evaluate past performance. CIOs are too busy dealing with the application backlog. This belief was corroborated by Craul [3], who has found that

"The ISD cannot wait to see a return on the investment, they are under constant pressure to get onto the next project."

IT to reduce business risk

The use of IT to reduce business risk was raised by 77% of the CIOs. This goal assisted the CIO in assessing the feasibility of such systems in that there was often a clearly identifiable figure which could be attributed to the IT investment and thus the quantitative approach to benefit measurement was enhanced.

The term business risk is clearly very broad and requires further definition. From the CIO respondents in this study it appeared that there were potentially two quite different benefits to the organisation when IT was appraised in terms of reducing business risk. One approach was to view the IT investment in terms of how it would enhance efficiency in the operations of the organisation. These systems typically related to improving the operations of those value activities which formed the business functions of the organisation. For example a system which monitored chemical usage did more than allow a cost reduction programme to proceed. It allowed the firm to control the process which used the chemicals so that they were able to improve customer service. Thus not only did the inbound logistics activity become financially controllable, but the firm's image to the customer was enhanced with the increased ability to answer ad hoc queries. The CIO felt that this provided the firm with a strategic advantage and reduced the risk of competitors taking away some of their business.

The second approach was to view the IT investment in terms of how it would enhance effectiveness of the organisation. These systems typically related to improving the interfaces between the value activities of the organisation. For example EDI was regarded as a system which was primarily installed to reduce the cost of providing customers with a better service. The role of the sales staff was dramatically affected when customers were provided with on-line access to the product database and the ability to place orders with full knowledge of the suppliers' stock-on-hand. The reduction in business risk was achieved both through improved customer service, and through automating the stock ordering process.

Thus the concept of reducing business risk may incorporate asset reduction and cost control programmes but it is broader and usually linked to a strategic advantage which the firm plans to gain.

No formal measurement for intangible IT benefits

Of the CIOs 62% felt that there were no practical evaluation techniques available which would allow them to take intangible benefits into account when they were evaluat-

ing an IT investment. They regarded this as a problem but were unanimous in their agreement that to propose a system which was exclusively, or even largely, based on intangible benefits would damage their credibility with the business managers. CIOs would mention intangible benefits in their feasibility studies, but as a very minor point at the end of the report, after the financial justification had been presented.

ISD do not market the benefits of IT

The concept of the ISD not marketing the benefits of IT was related to a sense of the image of the ISD within certain organisations. Only 31% of the CIOs mentioned this issue and it was always raised after the CIO had explained why they did not conduct post-implementation audits. These CIOs felt that post-implementation auditing would enable them to quantify the actual benefits of IT to the organisation. If such figures were available that in turn would enable the IT function to be taken more seriously within the firm.

Different cost benefit methods for different system types

One CIO used different cost benefit approaches according to the type of system proposed. He works in a large organisation where responsibility for the IT function has been handed over to user committees. This CIO regards his function within the organisation as being one of advisor and in-house consultant to the users. Whilst his ISD does have a large support staff, the motivation for the IT investment always comes from the business users. Thus he is very aware of the system types being proposed.

Intangible benefits measured by customer response

Only one CIO raised this issue. He was one of the four CIO respondents who has a seat on the board of directors and he is very aware of the client base which his organisation seeks to address.

Post-implementation auditing

Again, only one CIO was aware of post-implementation auditing. He stated bluntly that his firm is run by the accountants. In that organisation the feasibility study was largely financial, using a predefined spreadsheet which ran to ten pages. Any investment over R20 000 had fixed costing procedures which must be followed if the proposal was to be considered at board level. If the investment was between R20 000 and R30 000 he would try to modularise the project and handle the investment within the ISD funding rules. Where proposals for IT investments exceeded that amount he had fixed cost ceilings which affected his decision on whether or not to apply for funding. If the capital investment was between R30 000 and R50 000 he knew that he would have to present the proposal at board level at least twice before it gained approval, if the investment amount was between R50 000 and R100 000 it would take him on average ten presentations, which he called 'putting it to the vote', and for investments of over R100 000 the proposal would be put to the vote at least twelve times. Each time the proposal was presented to the board the assumptions, and therefore the figures, were questioned and

he would have to undertake further research and adjust the spreadsheets accordingly. Clearly this represented a huge investment of his time, so he vetted projects carefully before even attempting to gain the board's approval.

6 Results of the Content Analysis for the SBEs

Table 2 provides a list of the fourteen concepts raised by the SBEs, with the frequencies of their evidence shown in the total column. As above, the concepts column provides a one sentence explanation of the concept.

The results of the content analysis have been analysed in descending order of frequency for the eleven SBE respondents.

Payback method of IT appraisal

The payback approach to IT benefit measurement was used by 90% of the SBEs. They believed that this approach, whilst having certain drawbacks, at least allowed them to evaluate the investment within a fixed time frame. The financial extent of the investment would be re-evaluated if the payback period was found to be insufficient. By closely linking the IT investment to a time period within which benefits could be expected to accrue, the SBEs felt that they would be alerted to a problem either with the estimates which had been presented at the feasibility stage, or with the viability of the investment itself.

The SBEs were very unwilling to approve IT projects which had a large capital investment coupled with a payback period of over two years simply because that represented a commitment which would be hard to break. If the project costs escalated they would either have to continue along an increasingly unknown investment path, possibly losing more money than the benefits could reasonably be expected to balance; or they would lose valuable time in attempting to correct an unworkable solution to the business need. The payback method may have problems in managerial accounting terms, but the timed element is very popular as a means of controlling the investment.

Users control the IT expenditure

Of the SBEs, 91% worked in organisations where the users controlled the IT investment. This included not only the initial motivation for the investment in IT but also the selection of viable solutions, vendor support contracts, training and maintenance. The users were expected to fully detail all these aspects of their proposed investment in order for it to gain approval at board level. It is important to bear in mind that 85% of the SBE respondents were Financial Directors of their firms so they were discussing the concepts of IT benefit evaluation in the context of their experience of board level debates. The remaining 15% of SBEs were just below board level and were more aware of IT investment decisions which could be taken, and which were being taken, with no requirement for board level approval. Thus financially smaller, departmental investments are made without the rigorous appraisal techniques mentioned by 85% of the SBEs.

Table 2. The SBE content analysis concepts in descending order of frequency

	Codes	Concepts	Total
1	PBT	The system must payback within a predetermined time frame	42
2	UCS	Users motivate for IT expenditure, users justify that spend and take responsibility for the investment	41
3	ARB	If the business can reduce its assets via an IS that is a major benefit	41
4	DCB	Different cost/benefit measurement techniques are used whether the system is critical, vital (TPS), potentially strategic or strategic (MIS, DSS, EIS)	39
5	PIA	Post-implementation audits are used to measure the actual costs of systems	38
6	CRP	IT provides control which permits cost reduction programs to proceed	37
7	RBR	IT must reduce business risk	37
8	CMI	Intangible benefits are measured by customer/client satisfaction	36
9	NIM	There is no infrastructure in place which accurately monitors and controls intangible benefits	20
10	PST	Pilot sites are used to test the viability of IT investments	15
11	ITT	ISD are more interested in the technology than in identifying the business benefits of IT	11
12	SCB	The same cost/benefit measurement techniques are used whether the system is critical, vital (TPS), potentially strategic or strategic (MIS, DSS, EIS)	8
13	FSO	The cost/benefit measurement is only done at feasibility stage with no post-implementation audit to check that the benefits actually materialized	2
14	NMB	ISD do not market the benefits of IT	2

Asset reduction

The value of IT to reduce assets was raised by 82% of the SBEs. As discussed above the system type may be support, strategic or potentially strategic. By counting financial savings in assets the SBEs felt comfortable that IT had a measurable benefit within the firm.

Different cost benefit methods for different system types

Different cost benefit evaluation techniques for different system types were used by 82% of the SBEs, who generally placed a very high value on the business need for which the IT investment was being considered. The business need may be measured in terms of external pressures, such as competitors utilising IT in a competitive manner, or customer requirements which demand a faster document turnaround time. The financial justification becomes little more than a costing exercise to ensure that the required funds are available. This finding is quite remarkable in that it suggests very different perspectives used within single organisations to evaluate the same investment.

Post-implementation auditing

The difference between the single CIO response and the SBE response of 91% is again most interesting. The SBEs were very aware of having no formal post-implementation auditing procedures available within the firm, but as one respondent stated

"The benefits are well-known to us, they are fundamental to the way in which we do business."

If the IT investment was inappropriate then the business suffered losses in revenue or in the opportunity to generate such revenue. Post-implementation auditing, although not formally performed, was actually inherent in the way the SBEs use the systems. This is analogous to saying that by driving a car one can determine how well the engine is running. There is no need for a chemical analysis of the exhaust to see the percentage of waste products if the car is performing well.

IT assists in controlling cost reduction programmes

The 82% of SBEs who raised this issue is so close to the CIO response that the same interpretation which was given above must apply. By directly reducing costs the benefits are quantifiable and easy to define.

IT to reduce business risk

The value of IT in reducing business risk was mentioned by 91% of the SBEs. Clearly this is a fundamental measure of the benefit of IT and, as discussed reduced business risk extends beyond cost reduction or asset reduction programmes and is usually linked to a strategic advantage which the firm plans to gain. The points raised above in the discussion of CIO responses regarding business risks as either efficiency directed or effectiveness focused also pertain to the SBE respondents' viewpoints.

Apart from strategic IT investments, such as the sales tracking systems and customer pre-booking systems detailed above, the SBEs in this study also mentioned the

benefit of systems which enhanced management reporting facilities. The management reporting facilities frequently extracted data from a range of databases, both internal and external to the organisation. Management reporting also made use of historical data in order to assist managers in predicting future trends. Whilst such information was treated with an appropriate level of caution since the future is by no means bound to repeat the past, the SBEs clearly felt that their capacity to make informed decisions was enhanced by the use of such technology, and that by having access to such information the firms was less vulnerable to the taking of uninformed risks.

Intangible benefits measured by customer response

All the SBEs used customer response as a means by which intangible benefits were evaluated. They measured such response by monitoring the number of transactions processed, by comparing historical data with current figures and by other highly quantitative means. Customer response was generally regarded by the CIOs as being intangible, possibly because they rarely work with the live data.

No formal measurement for intangible IT benefits

The fact that 64% of the SBEs had no formal procedures for measuring intangible benefits reveals their awareness of the difficulty of quantifying these benefits in simple terms. The business impact of IT often affects the customer in relatively small ways, to for example the effect on customers who are able to book a service at a cheaper rate one month earlier than was previously possible is too small a unit of measurement. The measurement of such idiosyncratic benefits cannot be generalised into a set of generic procedures. Thus whilst customer response is used to measure intangible benefits by the whole SBE group, that measurement cannot be standardised.

Use of pilot sites to test the viability of an IT investment

The importance of using pilot sites to evaluate the potential benefits of an IT investment was mentioned by 64% of the SBEs. For many managers in this sample the systems which they believed to be business critical were not comprehensively evaluated for benefits, since the managers concerned felt that the benefits would be obvious.

Strategic systems were generally evaluated as a business risk, and where possible, pilot testing was used to minimise that risk. The possibility of losing the investment and gaining no benefits was taken into account, and in several cases if no benefits did emerge that was written off as experience or responsible risk-taking. Pilot testing allowed SBEs to explore new IT investments whilst keeping the project small enough to retain control of the costs.

ISD motivated more by the technology than the business

The suggestion that their ISD was more interested in the technological benefits that IT could offer than in the business benefits was made by 45% of the SBEs. This revealed a conflict which was generally related to recommendations from the CIO to change some fundamental element of the firms' IT infrastructure, such as downsizing to mid-range

Table 3. Summary of the findings in descending overall frequency order.

Codes	CIO	Total	SBE	Total	All	Total
UCS	92%	37	91%	41	92%	78
PBT	100%	31	90%	42	95%	73
CRP	77%	26	82%	37	79%	63
ARB	69%	22	82%	41	76%	63
RBR	77%	20	91%	37	84%	57
DCB	8%	5	82%	39	45%	44
PST	62%	26	64%	15	63%	41
PIA	8%	2	91%	38	49%	40
CMI	8%	3	100%	36	54%	39
SCB	85%	27	18%	8	51%	35
NIM	62%	13	64%	20	63%	33
FSO	85%	22	9%	2	47%	24
ITT	0%	0	45%	11	23%	11
NMB	31%	7	18%	2	24%	9

computers, changing to a relational database and so on.

The same cost benefit techniques regardless of the system type

Two of the SBEs used the same cost benefit approach regardless of the IT investment type. Both came from firms which had an annual operating budget of less than R5 million per annum and the business need for IT was at the support level. No strategic systems were either implemented or planned.

Feasibility study benefit measurement

One of the SBEs only evaluated the benefit of IT at the feasibility stage. As this was always a support system he felt that if the investment was not achieving the expected benefits it would be obvious, since the business support function would be inadequate.

ISD do not market the benefits of IT

Two SBEs mentioned that their ISD did not market the benefits of IT effectively. These SBEs were again in firms with small operating budgets, and the potential for outsourcing the IT function was under discussion at the time of the interview for this research.

7 Summary of the Content Analysis Findings

From the above discussion it is clear that certain concepts are regarded as being more important to CIOs whilst other concepts are more highly valued by the SBEs.

Summary of the findings

By considering each empirical generalisation in the light of the findings it is possible to ascertain the extent to which they were either supported or rejected by the evidence. Table 3 provides a summary of the findings which have been sorted into descending order of the total number of times each concept was mentioned by all the respondents.

The evaluation technique will be selected independently of the type of system being assessed

The evidence to support this was not strong since there is considerable disparity between the two respondent groups. This empirical generalisation is valid for the CIOs in this sample and invalid according to the SBE respondents. For the CIOs it appears that the system type is not generally relevant to the appraisal process. CIOs use a standard payback which is the most popular technique to evaluate the benefits of IT. This disparity between the two groups of respondents is shown by the varying percentages for SCB and DCB in Table 3.

The finding that the payback period is regarded as being very important to CIOs in this study corroborates some of the findings in Edmonds' study [8] of investment evaluation techniques used by CIOs from financial organisations in South Africa. Edmonds found that the payback period was used by 25% of his sample, and the only higher response was from the CIOs who used no economic evaluation whatsoever. He also found that when the IT investment was of a strategic nature then no economic justification was considered to be relevant. Pike [17] suggests that the payback method is appropriate in times of high levels of uncertainty and when inflation is a risk, because when projects are time related the longer the investment period the greater the risk of failure. This view that the forecasting of cash flows becomes highly speculative under such conditions, is supported by Wilkes [24]. Despite these reservations concerning the payback technique the evidence supplied by the informants for this research shows that it is still a very popular approach to IT investment evaluation.

The majority of the benefit evaluation effort will be expended during the feasibility stage, the majority of respondents will not complete post-implementation audits of the benefits which accrue.

The evidence to support this was strong from the CIO respondents whilst the SBE respondents did not support this empirical generalisation. The disparity between these two groups suggests that the CIOs and the SBEs view IT benefits from radically different viewpoints and that the IS staff forecast benefits ex-ante whilst the business people

look for ex-post evidence of benefits.

Intangible benefits are not regarded as sufficient to cost justify IT investments

There was strong support for this and there was consensus of opinion between the CIOs and the SBEs regarding the problem of there being no formal procedures or appropriate methods for measuring intangible benefits. The SBEs were prepared to evaluate intangible benefits by regarding positive response from customers as evidence of achievement. The CIOs explained that they would only present quantifiable figures when proposing investment in IT. Intangible benefits were almost denied any value whatsoever.

Different evaluation techniques are applied by SBEs and CIOs

The fourth empirical generalisation suggesting that different evaluation techniques would be applied by SBEs and CIOs has clearly been supported by the above evidence in that some of the above findings reveal a considerable degree of disparity between the two groups.

Unexpected findings

Three concepts do not fit easily into the set of empirical generalisations which formed the basis of this study. Two of these, the concept of the ISD staff being more interested in the technology than the business and the idea that the ISD do not market the benefits of IT to the organisation, can be regarded as having minor relevance to this study since less than 50% of either respondent group supported the concepts.

However one concept emerged which had the support of 92% of the CIOs and 91% of the SBEs, this was the importance of the users being in control of the IT investment. The importance of the users being in control of the IT investment has far-reaching implications. It has been suggested by Prosser [18] that:

“Evaluation of the effectiveness of IT is going to become far more important over the next few years, and we have to find ways of measuring the intangible benefits such as customer service and corporate image if the value of technology is to be realised by the business community.”

This view is also held by Strassman [23] who contends that IT has a value which does not easily relate to financial calculations since ‘Information technology costs are migrating to where they are not easily counted’. Research into exactly what the users control, and how they exercise that control would clearly be valuable to our understanding of IT benefit evaluation.

8 Conclusions

The collected evidence suggests that the CIOs support the expectations that evaluation techniques are selected independently of the system type and that evaluation efforts are concentrated on the feasibility stage of the IT investment. However, the SBEs rejected both of these expectations.

These findings are significant in that they indicate that fundamentally different perspectives are used in the evaluation of IT benefits. Since both CIOs and senior business executives are internal stakeholders the disparity between their approaches evaluating IT must have an impact on which projects are accepted by their organisations. If a CIO’s knowledge of technological advances is not utilised, then the organisation may fail to take advantage of the most appropriate technology. Similarly, if an SBE proposes an IT investment which is strategically sound in business terms, the CIO may be unaware of the full business implications of the project. This could lead to IT investments which are not in the long-term interests of the firm. Both groups in this sample showed evidence of having hidden agendas which were not revealed to managerial staff within their own organisations. This suggests that management could benefit from becoming more effective in communicating their IT and business needs.

The evidence that both groups of respondents believed that intangible benefits are insufficient to cost justify IT investments is most interesting. During the early development of IT investment in businesses, automation was the common aim of many firms. This phase provides relatively tangible benefits since, for example, clerical output can be measured quantitatively. However many firms are now investing in systems which provide qualitative benefits, such as ease of well-informed decision-making which an effective Executive Information System can provide. The benefits of these more sophisticated IT investments are often intangible. It appears that the managers in this sample are deeply confused as to how to measure such qualitative benefits. They avoid the issue by using figures to convince the board as to the wisdom of the investment. This traditional financial approach to IT benefit evaluation may be simply postponing the day when intangible benefits require clear identification in order for the right IT investments to be made for the right reasons. Until there is some formalisation of the measurement of intangible benefits CIOs in this sample discount the importance of intangible benefits in their IT investment proposals, whilst SBEs rely on customer response to justify their decisions after the investment has been made.

Finally, the importance of user’s being in control of the IT investment has far reaching implications for both practitioners who have responsibility for investment appraisal, and for researchers in this field. For practitioners this finding suggests that business executives require continuous exposure to leading-edge technologies if they are to make the most advantageous IT investments for their organisations. Conversely, it suggests that the CIOs placed in an invidious position when suggesting technological advances which have not been identified as pertinent to the organisations’ business objectives. For researchers, Hirschheim and Smithson’s suggestion quoted in the introduction to this paper cannot be overlooked. When the IT investment is high in financial terms, decisions surrounding that expenditure may become politicised within the organisation. By acknowledging when this very subjective evaluation approach is being applied the researcher may be better able

to identify the complex issues which surround IT benefit evaluation.

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