



The use of the balanced scorecard for the evaluation of Information and Communication Technology projects

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Abstract

There is a large consensus among academics and practitioners that ICT investments should be carefully justified, measured and controlled. In practice, the traditional capital investment appraisal techniques (CIAT's) such as payback period or net present value are by far the most used techniques. Nevertheless, serious doubts about the fitness of these techniques in an ICT environment arise. ICT investments have special characteristics (high risks, LT-return, large proportion of intangible/hidden costs and benefits...) which makes the use of these techniques very difficult and the reliability of the outcome most uncertain. Efforts are made to find more appropriate techniques. CIAT's are adjusted so that these techniques become more reliable in an ICT environment. New justification methods/techniques are developed. However neither these adjusted techniques nor the new techniques are frequently used. This might be explained by the fact that the outcome of these techniques is difficult to interpret and to use and the fact that some significant problems (like the estimation of hidden costs) remain unsolved. Moreover, most of the new techniques are still in the conceptual phase. Despite the existence of a wealth of literature, the IS community appears to be no nearer to a solution to many problems associated with ICT appraisal. Since all techniques presented in the article have their drawbacks, it is safe to say that reliance on a sole technique may lead to sub-optimalisation or even failure. Therefore it makes sense to use a mixture of techniques, eliminating or diminishing the weaknesses of each of the techniques used. We strongly recommend a multi-layer evaluation process, or an evaluation process derived from the balanced scorecard, for the appraisal of major ICT investment projects.

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1. Introduction

In today's increasingly competitive business climate, there is a growing requirement for stronger cost control and a demand for higher returns while minimizing risk in investments. Recognition of the potential impact of Information and Communication Technology (ICT) on the strategic power of companies and increasing levels of ICT-expenditure have made the evaluation, justification and control of ICT investments a critically important issue [1–3].

However, the record on measuring and controlling ICT investments has not been impressive. Hochstrasser and Griffiths [1] found that only 18% of the organizations in their sample rely on rigorous meth-

ods to calculate the benefits of investment in IT. Costs are significantly underestimated [4]. At least 22% of expenditure on IT is wasted and between 34 and 40% of IT projects realize no net benefits, however measured [5].

The reason for these failures can be complex: technical, human resource, environmental, organizational and management issues interrelate where explanations are sought. Major barriers, identified by a range of studies, occur in how the ICT investment is evaluated and controlled [1–7].

This paper studies the part of the evaluation and justification process that senior managers consider as being the most important: the feasibility evaluation [3]. More specifically, ex ante evaluation techniques used to justify capital investments in ICT are examined, classified and discussed. These techniques will be referred to as CIAT's (Capital investment appraisal techniques).

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Nomenclature

PP	Payback period
ROI	Return on investment
IRR	Internal rate of return
NPV	Net present value
CIAT	Capital investment-appraisal techniques

2. Traditional evaluation methods

2.1. Introduction

Research strongly indicates that the feasibility study of capital investments in today's companies and organizations is mainly based on financial cost–benefit analysis, conducted using traditional capital investment-appraisal techniques (CIAT) [3,8,9]. Most commonly used for ICT appraisals are payback period (PP) and Accounting Rate of Return/Return On Investment (ARR/ROI). Techniques as Internal Rate of Return (IRR) and Net Present Value (NPV)—which are perceived as being more difficult—are used to a lesser extent [2,9,10] (see Table 1).

2.2. Comparing traditional CIATs in an ICT context

The Payback Period technique (PP) should be considered as the least suitable CIAT for the appraisal of ICT projects. Due to the fact that projects are judged on the period needed to compensate the initial investment, projects with fast payback are favored. As a result, companies using the PP technique will tend to accept too many short-lived projects and reject too many long-lived ones [11]. This is especially harmful for ICT investments, because the returns from ICT investments tend to be long term (see *infra*).

Furthermore, the inability to incorporate risk into the appraisal and the ignorance of the time value of money make this technique inapt for the evaluation of ICT projects [10,11]. PP may be an adequate rule of thumb, but considering the shortcomings, major investment decisions should not be based solely on the results of PP calculations.

Return On Investment (ROI) is more adequate than PP because the total lifecycle of the investment is taken into account. Nevertheless, as with PP, the time value of money is not taken into consideration. Risk can be entered into the appraisal to a certain extent by adjusting the hurdle by which the projects are judged, but this is not useful when dealing with mutually exclusive projects (selecting between two CRM systems for example).

Unlike the previous mentioned techniques, Internal Rate of Return (IRR) takes the time value of money into consideration by introducing a discount factor. This is a major improvement and makes this technique more useful.

Still, there are some disadvantages:

- The result of IRR is a percentage. This makes it difficult to compare projects that differ substantially in size and outcome, since no absolute figures are given.
- If the IRR differs substantially from the cost of capital, it will become difficult to compare projects with a different time pattern.
- There may exist more than one IRR for an investment.
- When this technique is used as a selection tool for mutual exclusive investment projects, risks are not accounted for. It lacks the possibility of entering risk-levels into the selection. This is a major disadvantage, especially when used in an ICT environment (see *infra*) (based on [10,11,12]).

The Net Present Value (NPV) technique calculates the present value of the investment's money flows, using a discount rate [10]. In opposite to IRR, different rates can be used to reflect the risk-levels of mutual exclusive investment.

The NPV technique is considered as being theoretically superior to the IRR technique [11] (Table 2).

2.3. Reasons for using CIAT techniques to evaluate ICT investments

There is an extensive accounting and finance literature that argues that CIATs are appropriate techniques for

Table 1
The use of CIAT techniques to justify capital investments

Technique	All capital investments (including ICT)		ICT investments	
	Sangster 1989, UK (%)	Kim/Farragher 1979, USA (%)	Bacon 1990, UK, USA, Australia, New Zealand (%)	Ballantine/Stray 1998, UK (%)
Payback	78	17	61	60
ARR/ROI	31	11	18	43
IRR	58	37	54	28
NPV	48	29	49	27

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