Chapter V

A Socio-Technical Heuristic for Analysis of IT Investments:
Results from Two Case Studies

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ABSTRACT

A majority of CEOs have experienced failed information technology (IT) investments. While such investments have the potential for providing competitive advantage, actual returns have varied widely. Numerous methods exist for investment evaluation, but traditional methods do not adequately account for the intangible benefits that characterize strategic investments and lack other features of portfolio selection. This chapter presents a framework based upon the analytic hierarchy process, combined with integer programming, to overcome the deficiencies associated with traditional approaches to economic evaluation of IT investments. Based on socio-technical theory and observations from two case studies in which the framework was applied successfully, a heuristic is developed for the investment process. Findings and implications are discussed.

INTRODUCTION

American Airlines' apocryphal success with the Sabre System heralded the potential of IT as a source of strategic benefits (Hammer, 1991). While the competitive advantages from superior IT investments are widely recognized, actual returns received on IT investments vary widely, and the IT productivity paradox has international recognition (Brynjolfsson & Hitt, 1998; Dewan & Kraemer, 1998; Santos & Sussman, 2000). A majority of CEOs admit to past failed IT investments but express confidence in the ability of IT to provide strategic advantages in the future (COMPASS, 1999). While most companies submit IT-based applications to some form of economic analysis, the numerous objective measures used in practice provide little relationship to the strategic direction of the firm (Liberatore, Monahan, & Stout, 1992). Moreover, despite recognition of the importance of qualitative benefits, economic analysis of IT returns relies primarily on quantitative measures. At least one author concludes that the productivity paradox may result from a bias toward quantitative measures in MIS research (Chan, 2000).

Traditional approaches to capital budgeting have not proven useful in the economic evaluation of IT-based investments. Single criteria techniques, such as discounted cash flow (DCF) and cost/benefit analysis, are biased toward the tangible benefits that can be more easily identified and quantified. Calculations of IRR or net present value may ignore the "soft," qualitative benefits of IT applications or build them into the model so creatively as to devalue the results. Traditional approaches can penalize investments with valuable soft benefits so often present in strategic applications. Hence, proper evaluation of IT-based investments requires a framework that reliably measures all benefits in a consistent manner that is understood and supported by management. Maximizing returns from IT investments also requires a total portfolio planning approach which cannot be accomplished by valuing each investment individually. In reality, some investments are mutually exclusive, other investments have mutual dependencies, and some investments should not be combined due to the total risk.

Combined with integer programming, the Analytic Hierarchy Process (AHP) supports a multi-objective, multi-criteria (MOMC) approach that addresses several issues hindering the success of IT investments. An MOMC approach, for example, can improve the alignment of the information systems plan with organizational goals. AHP has a wide variety of applications in industry and government (Vargas, 1990; Zahedi, 1986). Its use combined with integer programming for ranking IT investments has not been tested in practice.

The purpose of this chapter is to demonstrate the MOMC approach to IT investment analysis using a framework which, heretofore, has not been demonstrated in practice. This chapter first addresses the socio-technical aspects of IT investment evaluation. Next, the applicability of the proposed framework is

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