



Information technology investments and nonfinancial measures: A research framework

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ABSTRACT

Despite the substantial growth of IT investments, evidence on their impact on firm performance remains inconclusive. An important management question is whether anticipated economic benefits of IT investments are being realized. The intangible benefits obtained from IT are not captured by accrual-based accounting measures alone, and, therefore, call for a comprehensive measure that focuses on segments of performance influenced by IT investments. This study proposes a framework that utilizes nonfinancial measures to link IT investments to their intangible benefits and applies the agency theory to examine the contribution of IT investments by tying managerial compensation to firm value.

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1. Introduction

To improve their performance, organizations are investing an ever-increasing amount of money in information technology (IT). Over the last three decades, firms increased investments devoted to IT from almost 5% of nonresidential fixed investment in 1977 to approximately 21% in 2007 (Bureau of Economic Analysis, 2008). Despite the rapid growth of IT investments, evidence that links IT investments to firm performance remains inconclusive. The substantial amounts invested in IT combined with the lack of evidence on their impact on firm performance put pressure on managers, researchers, and policy makers alike to explain how IT investments may contribute to firm performance. A number of studies have attempted to measure the financial impact of integrating IT into business organizations (e.g., Aral, Brynjolfsson, & Alstynne, 2008; Bharadwaj, 2000; Dehning & Stratopoulos, 2002; Hitt & Brynjolfsson, 1996; Kim, Xiang, & Lee, 2009; Kudyba & Diwan, 2002; Oh, Kim, & Richardson, 2006; Santhanam & Hartono, 2003). The extant literature provides confounding evidence of the relationship between IT investments and firm economic performance, based primarily on financial measures of performance.

IT investments are made based on the assumption that they have the potential to improve both the efficiency of business process and the competitive advantage of the firm. These investments can be internally or externally focused. *Internally focused* IT investments aim to lower the costs of doing business, improve the quality and speed of operations, eliminate repetitive business processes, and increase business flexibility. *Externally focused* IT investments are planned to assist the firm to gain a sustainable competitive advantage and improve its market position, particularly through the improvement of customer satisfaction (Chatterjee, Vernon, & Robert, 2001; Dos Santos, Peffers, & Mauer, 1993). In a competitive market, firms are forced to provide these intangible benefits as the “cost of staying in the game” (Brynjolfsson, 1996, p. 282), and perceive IT investments as a strategic necessity (Clemons, 1991).

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Dehning, Richardson, and Zmud (2003) argue that as IT intensity increases, the benefits of IT go from clearly tangible benefits that are easily measurable (such as cost reduction) to soft or intangible benefits that are more difficult to evaluate (such as better decisions, shared understanding, greater understanding of the operating environment). Financial measures of performance are not designed to capture the expected intangible benefits that can be produced through IT investments (Gunasekaran, Nagi, & McGaughey, 2006; Kaplan & Norton, 1996; Wallman, 1996). In this respect, Hitt and Brynjolfsson (1996) find that the benefits of IT investments create consumer surplus instead of firm profits. The strategic and intangible nature of benefits obtained from IT investments thus call for a different approach that utilizes nonfinancial performance measures at different levels of operation to evaluate the impact of IT investments on firm performance.

Another potential explanation for the lack of consistent results in prior research is related to the possibility for increased agency costs that occur when managers over- or underinvest in IT. Based on agency theory tenets, self-serving managers may pursue corporate strategies (such as IT investments) that enhance their own utility at the expense of that of shareholders (Jensen & Meckling, 1976). When managers derive private benefits from being in charge of large firms, they are more likely to overinvest in certain IT projects that require human capital (Agarwal & Samwick, 2006). Being in charge of a large number of employees will strengthen managers' opportunities to maintain their jobs (Shleifer & Vishny, 1989). If managers have incentives to increase certain IT expenditures at the expense of stockholders, firm performance will be negatively affected.

Alternatively, the economic value of IT investments aligned with its risk profile that results from the uncertain benefits of IT creates another dilemma between chief executives and the Board of Directors. Although both parties recognize the importance of IT investments, they are aware of the immediate negative effect of these investments on the current net income and the uncertainty of their future benefits (Masli, Richardson, Sanchez, & Smith, 2008).¹ Risk-averse Chief Executive Officers (CEOs) may choose to underinvest in IT when their short-term compensation is tied to the current accounting performance (Murphy, 1999). Consequently, risk-neutral stockholders may lose potential long-term returns from IT investments when the CEO emphasizes short-term profits over the long-term value of IT investments. In this sense, financial performance measurements appear to be imperfect tools when evaluating managers' efforts (Davila & Venkatachalam, 2004), especially given recent evidence of managerial earnings manipulation of accounting-based measures of performance (e.g., Desai, Krishnamurthy, & Venkataraman, 2006; Duh, Lee, & Lin, 2009; Erickson, Hanlon, & Maydew, 2006). Banker et al. (2000) provides empirical evidence that following the implementation of an incentive plan that incorporates nonfinancial measures, both nonfinancial and financial performance improve. In a similar vein, Campbell (2007) finds that managers' promotion and demotion decisions are sensitive to nonfinancial measures of service quality.

IT investments are not generally correlated with financial performance measures and, thus, exclusive reliance on financial measures to evaluate IT value could be insufficient and misleading. Accounting measures are lag indicators that report the outcome of past actions and are not forward-looking (Kaplan & Norton, 2001). Using accounting measures can be problematic in evaluating the return on capital investment, such as IT, that may take several years to affect a firm's bottom line due to the substantial learning curve associated with incorporating IT in business activities (Bharadwaj, Bharadwaj, & Konsynski, 1999). Exclusive reliance on financial indicators could, therefore, promote behavior that sacrifices long-term value creation for short-term benefits. Martinsons, Davison, and Dennis (1999) argue that evaluation methods that rely solely on financial measures are not well suited for the new generations of IT applications.

The challenge in tracing IT investments to financial performance measures calls for a new scheme of research that measures the intangible benefits of IT investments. Consequently, the objectives of this study are (1) to develop a framework that accounts for a wider scope of IT benefits and shows the link between IT investments and agency theory, process level-based measures, and firm value, and (2) to guide future research by developing propositions and putting forward a research agenda. The proposed framework builds on the premise that an equity-based compensation plan that aligns the interests of executives with those of shareholders will provide the former with incentives to make long-term strategic IT investments. Since the impact of IT investments on firm performance hinges on the net effect of different combinations of IT investments, aggregating IT investments in one single measure is likely to lead to the misvaluation of their performance. Accordingly, our framework differentiates between the two components of IT investments (internally and externally focused) when evaluating the return on such investments using nonfinancial measures. We argue that the disclosure of these nonfinancial measures is likely to decrease information asymmetry and enhance firm value.

This study contributes to the literature on management accounting and accounting information systems that has called for a refined framework to measure IT investments' payoff (Carmeli & Tishler, 2004; Martinsons et al., 1999; Oh et al., 2006). It contributes to management accounting literature by developing a framework based on nonfinancial measures that capture the impact of IT investments on firm performance. Kaplan and Norton (1996) emphasize the importance of measuring the benefits generated from firm investment and argue that "if you can't measure it, you can't manage it" (p. 24). In addition, the current study introduces agency theory to the line of research that examines the economic value of IT investments. The study further adds to the accounting information systems literature by shedding light on the role of nonfinancial measures in capturing the effects of IT investments on firm performance. Gunasekaran et al. (2006) argue that intangible benefits of IT are often neglected in the process of evaluating IT investments' payoff. Focusing on financial measures alone, to evaluate the payoff of IT investments, led Carr (2003) to conclude that firms cannot gain competitive advantage from their investments

¹ The negative effect of IT investments in current accounting performance measures is due to the fact that the majority of IT investments are immediately expensed under U.S. GAAP.

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