



Effects of information technology failures on the market value of firms

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ABSTRACT

IT failures abound but little is known about the financial impact that these failures have on a firm's market value. Using the resource-based view of the firm and event study methodology, this study analyzes how firms are penalized by the market when they experience unforeseen operating or implementation-related IT failures. Our sample consists of 213 newspaper reports of IT failures by publicly traded firms, which occurred during a 10-year period. The findings show that IT failures result in a 2% average cumulative abnormal drop in stock prices over a 2-day event window. The results also reveal that the market responds more negatively to implementation failures affecting new systems than to operating failures involving current systems. Further, the study demonstrates that more severe IT failures result in a greater decline in firm value and that firms with a history of IT failures suffer a greater negative impact. The implications of these findings for research and practice are discussed.

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1. Introduction

In the summer of 1993, Greyhound Lines rolled out a new reservation system, Trips. The system turned out to be slow and crash-prone, impeding service quality and leading to a 12% drop in ridership. As this development was reported to the market, Greyhound's stock tumbled nearly 25%. Over the course of a few months, as problems with Trips continued to surface, the stock price dropped another 60 percent (Tomsho, 1994).

In 1999, a software glitch brought online auction pioneer eBay's network to its knees for three days in a row, costing the company an estimated \$2 million a day (Li, 1999). Frustrated customers flooded Internet bulletin boards with threats to leave the service. Investors sent eBay stock tumbling almost 10% with more than twice the normal trading volume in the third day of outages.

In February 2001, sports apparel giant Nike informed stock analysts that due to problems in the implementation of a new supply-chain system, the company was unable to meet their third-quarter earnings estimate. The next day, Nike stock lost 20 percent of its value (CNET News, 2001; Worthen, 2002).

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Research on runaway projects and information technology (IT) failure has often been motivated by the financial costs of failure and the loss in effectiveness and competitiveness resulting from failures (Keil, 1995; Lee and Myers, 2004; Lyytinen and Hirschheim, 1987). Research studies and industry reports have repeatedly pointed to the high frequency of IT failures as well as the financial burden they constitute (Goldfinch, 2007; Johnson, 1995; Standish Group, 2004). Failure rates are often estimated at 30% and the frequency of troubled projects at 46–53% (Goldfinch, 2007; Johnson, 1995; Standish Group, 2001).

One type of financial consequence that has not been considered in IT failure research is the potential loss in firm value that might result from IT failures as they become known to investors. Investors, as owners, are atop the corporate governance structure and their reaction to IT failures is not only a measure of the value loss from IT failure but also a measure of the importance assigned to IT failures by a key stakeholder group. Therefore, investor reactions to IT failures can also be seen as an indication of whether owners are likely to exercise influence over corporate boards and top executives with regard to IT governance. Should the market be tolerant to IT failures, this could suggest a lack of pressure from owners to bring down the frequency and severity of IT failures. On the other hand, should the market indeed care, it would suggest an additional motivation for executives and IT professionals alike to improve corporate capabilities in deploying and operating IT.

While the literature on IT failure has devoted much attention to the roles of various stakeholders (Larsen and Myers, 1999; Mitev, 2000; Sauer, 1993; Wilson and Howcroft, 2005), the role of investors has received scant attention. Coverage of market value loss from IT failures in the practitioner press (Koch, 2004; Wailgum, 2008) and anecdotal evidence (such as the Greyhound, eBay and Nike examples above) provide further impetus for this study.

Using event study methodology, we provide in this paper the first systematic, empirical evidence of the impact that IT failures can have on the market value of a firm. In so doing, we contribute to the literature on IT failure as well as to the body of literature on strategic management and the impact of IT.

Event studies examining stock market reactions to announcements involving strategic technology decisions have reported positive value relevance of announcements such as decisions to make investments in IT resources (Dos Santos et al., 1993), creation of new Chief Information Officer positions (Chatterjee et al., 2001), and acquisitions of Internet firms (Uhlenbruck et al., 2006). However, we found no event study dealing with the value impacts on the level of specific information systems, whether systems in operation or systems being implemented. Furthermore, prior IT-related event studies all concern announcements about decisions or actions that *may* come to have business impacts at some later point in time (Dos Santos et al., 1993; Hunter et al., 2003; Koh and Venkatraman, 1991). Announcements of positive initiatives require of the market to assess the expected value of benefits resulting from the initiative as well as the probability that these positive results will actually materialize. Perhaps because of this, some prior studies have shown mixed results, for example identifying significant market valuation effects only for subsets of the sample (Dos Santos et al., 1993; Hunter et al., 2003). In contrast, IT failures are events that *have materialized* and the challenge for the market is to assess the expected loss in value from the failure. Thus, in contrast to previous IT event studies, this research examines the value impact of events that relate directly to actual shortcomings in the firm's IT capabilities and have direct consequences for business performance.

Previous studies use the resource-based view (RBV) (Barney, 1991; Teece et al., 1997) to demonstrate the market value impact of IT-related announcements by associating IT capabilities and firm value. Following this lead, we are able both to add to existing knowledge about IT failures and how they are assessed and to link IT failure studies to RBV-based studies of the business value of IT (Barua and Mukhopadhyay, 2000; Sambamurthy et al., 2003; Wade and Hulland, 2004).

The underlying questions driving this study are: (1) How much do investors care about IT failures? and (2) Do circumstances under which failures occur impact the market's assessment? In other words, when corporate resources and capabilities fail unexpectedly, how does this impact firm value and does the extent of value loss vary under different conditions? Our study helps provide answers to these questions.

2. Background and Hypotheses

A variety of aspects of IT failure have been covered in the literature. Typologies of failure have been developed, particularly for systems that fail during development (Bussen and Myers, 1997; Lucas, 1975; Lyytinen and Hirschheim, 1987). Factors that promote failure have been identified (Beynon-Davies, 1995; Bussen and Myers, 1997; Fitzgerald and Russo, 2005; Irani et al., 2001) and processes and mechanisms that contribute to failure have been described (Myers, 1994; Sauer, 1993).

An underlying view of much of the IT failure literature is that failure is caused by shortcomings in knowledge, competencies and abilities concerning processes of IT governance, IS development, change management, IS implementation, IS operation and IS use (Fitzgerald and Russo, 2005; Irani et al., 2001; Keil, 1995; Markus and Keil, 1994; Sauer, 1993). IT failures have also been characterized as organizational failures (Goulielmos, 2003, 2005) and have been seen as having long-term consequences for organizational learning abilities (Lyytinen and Robey, 1999).³ While the consequences of IT failures are often characterized as highly negative, few if any attempts have been made to quantify the consequences of failure for firms or their shareholders.

The view of IT failures as being caused by a deficit in organizational capabilities can be directly linked to the resource-based view of the firm. For example, studies within IS that employ RBV commonly include the following IS/IT capabilities related to avoidance of IT failures: capability to manage IT-related change, practices and capabilities for information process-

³ It can also be noted that the study, concepts and phenomena of IS success (DeLone and McLean, 1992, 2003) and IS failure are not directly comparable opposites. For a short discussion on similarities and differences between IS success and IS failure, please see Appendix A.

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