

Association for Information Systems AIS Electronic Library (AISeL)

ECIS 2007 Proceedings

European Conference on Information Systems
(ECIS)

2007

Identifying Success Factors for Information Technology Investments: Contribution of Activity Based Costing

Narczyz Roztocki

State University of New York at New Paltz, roztockn@newpaltz.edu

H. Roland Weistroffer

Virginia Commonwealth University, hrweistr@vcu.edu

Follow this and additional works at: <http://aisel.aisnet.org/ecis2007>

Recommended Citation

Roztock, Narczyz and Weistroffer, H. Roland, "Identifying Success Factors for Information Technology Investments: Contribution of Activity Based Costing" (2007). *ECIS 2007 Proceedings*. 115.

<http://aisel.aisnet.org/ecis2007/115>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2007 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

IDENTIFYING SUCCESS FACTORS FOR INFORMATION TECHNOLOGY INVESTMENTS: CONTRIBUTION OF ACTIVITY BASED COSTING

Narczyz Roztocki, School of Business, State University of New York at New Paltz, USA,
roztockn@newpaltz.edu

Heinz Roland Weistroffer, School of Business, Virginia Commonwealth University, USA,
hrweistr@vcu.edu

Abstract

Conditions and factors that affect the success or failure of investments in information technology (IT) are not well understood. In this paper we explore possible factors that impact the success of IT investments. We use event study methodology to determine successful investments. Among the factors we investigate are those that relate to the operation of the investing firm, such as the use of modern cost management systems. We report on preliminary results of our investigation, and propose several avenues for further research.

Keywords: Information Technology Investments, Event Study, Activity-Based Costing, Enterprise Application Integration, Data Mining.

1 INTRODUCTION

A few years ago, Carr created a great deal of attention with his provocative paper “IT doesn’t matter” (Carr, 2003). The lively discussion that followed in both the business and the academic communities raised awareness to the fact that investments in information technology (IT) do not always result in competitive advantages for businesses. Fundamental questions about the contributions of IT to business performance still persist today. In spite of decades of research, the factors which determine the success of investments in IT are still not well understood.

Moreover, key insights gained from reviewing numerous productivity studies affirm the complexity of the topic (Oz, 2005). The published research shows that many diverse factors, such as system characteristics, organizational fit, management style and organizational size, play important roles.

The primary objective of our study is to extend the existing body of knowledge by exploring additional factors that may lead to successful IT investments. In this, we use an event study approach to assess the success of IT investments. Furthermore, we propose to use data mining as an auxiliary tool for discovering corroborating factors.

The results of a recent study (Roztock & Weistroffer, 2007) suggest that market conditions may play a more important role than has commonly been recognized. More specifically, there seems to be some evidence that in bear markets, stock prices react less favorably to some types of IT investments than under bull market conditions. Previously, the possible effects of market conditions appear to have been underestimated in IT research. If stock market conditions prove important, much of the earlier research may need to be re-evaluated.

In addition to stock market conditions, one of our premises is that companies that are on the cutting edge in their business practices are perceived to be more prudent and thus successful in their IT investments, which will show as abnormal positive stock market reactions in IT investment

announcements. For this we look at announcements of IT investments by companies employing modern cost management systems, such as *activity based costing* (ABC), to examine if such investments by these companies are viewed favorably by investors. We also look at whether investments in certain types of IT trigger a more positive reaction in the market. Our reasoning here is that some technologies may be seen as bringing about better and more effective business practices. To test this we examine announcements of investments specifically in *enterprise application integration* (EAI) technology. We focus our investigation on investments in EAI technology as this technology allows the integration of different computer systems, thus providing for more efficient communication and exchange of data among organizational units. Consequently, implementation of EAI technology is widely considered to be crucial to the firm's performance.

It is also quite feasible that the factors that bring about IT success are more complex. Using a modern cost management system by itself may not be sufficient to induce positive reactions by investors. Nor may investments in cutting edge technology always be perceived favorably. It is possible that a more complex combination of factors is required to make IT investments successful. Therefore we specifically try to identify such supporting features using data mining tools.

The remainder of our paper is structured as follows: First we discuss ABC, EAI, and event study methodology, and we review some prior event studies in the field of IT. We also briefly discuss how data mining may be used to identify corroborating factors for successful IT investments. Next, we derive several research hypotheses. Following description of our data collection and analysis methodology, we present some preliminary results. We conclude with a discussion of the results and the consequent directions for future research. This paper presents research still in process, and we anticipate to have updated results when we present this paper at the conference.

2 THEORETICAL BACKGROUND

2.1 Activity Based Costing

A proper estimation of costs needed for cost benefit analysis represents a major challenge, as in many organizations, traditional accounting methods are still widely used (Ness & Cucuzza, 1995; Kaplan & Anderson, 2004). Miscalculations in cost estimates in turn often negatively affect operational and strategic decision making (Johnson, 1987). In contrast to the traditional methods, the cost estimates generated by ABC are more reliable, because this more modern, elaborate method looks at activities and multiple cost drivers when tracing overhead (Cooper, 1988; Cooper, 1989). In the past, organizations using ABC were able to dramatically improve in their cost structures and achieve higher profits (Cooper & Kaplan, 1991). In addition, reliable cost estimations provided by the ABC system often lead to better managerial decision-making (Cooper & Kaplan, 1988).

For all these reasons, it may be assumed that companies extensively using ABC will make different investment decisions than those relying on traditional accounting methods. In others words, firms using ABC are likely to follow different strategies, when investing in IT, from those not using ABC. Firms using ABC may be expected to focus on greatest weaknesses and best opportunities and prefer IT investments which better support their cost reduction effort and therefore produce more tangible benefits.

2.2 Enterprise Application Integration Technology

For many organizations, integration of the various corporate information systems (IS) is a challenging issue. As companies continue to implement different systems that are not easy to integrate with their existing structures, their overall business efficiency may decline. This decrease in overall efficiency resulting from such integration problems could possibly be a partial explanation of the so-called "productivity paradox" of information technology (Brynjolfsson, 1993).

One common means to address this integration issue is EAI software (Johannesson & Perjons, 2001; Themistocleous et al., 2004). This sophisticated technology is believed to increase flexibility and prolong the lifecycle of many corporate applications (Irani et al., 2003). It is therefore very reasonable to expect that EAI implementation should have a positive effect on business performance.

Although EAI technology has been implemented and is used by a large number of companies, aside from a few isolated case studies (Puschmann & Alt, 2004), there is little published, empirical evidence of the tangible benefits of such investments.

2.3 Event Study

Event studies draw on the movements in stock prices to assess the relevance and implications of different happenings (McWilliams & Siegel, 1997). Possible events or subjects of investigation include changes in corporate focus (Markides, 1992), changes in leadership (Lubatkin et al., 1989), new engagements in joint ventures (Koh & Venkatraman, 1991), and layoffs (Worrell et al., 1991). According to the efficient market theory stock prices fully reflect all available information at a given time (Fama, 1970; Fama, 1991). Thus, when an unexpected, but relevant announcement reaches the financial markets, the price of a stock adjusts in reaction to the released information. If the news is broadly perceived as positive for the future financial position of a company, the stock price increases, and if the news is perceived as having negative implication, the stock price decreases (Fama et al., 1969). In essence, event studies use the unexpected changes in stock prices to realize and appraise complex corporate dealings from an investor's perspective.

Since its first prominent use in 1969 (Binder, 1998; Fama et al., 1969), the methodology has been successfully applied in accounting, finance and strategic management. More recently, event studies have increasingly been employed in the field of IT.

2.4 Previous Event Studies in IT

Event studies are a relatively new addition to the repository of research tools in the field of IT. Until the 1990s, event studies in IT research were extremely scarce, though they were already extensively used in other fields, such as accounting, finance and strategic management. The pioneering of this research method to the field of IT research is often attributed to a study which investigated possible differences in innovative and non-innovative investments (Dos Santos et al., 1993). That study provided empirical evidence that implementing a new and innovative technology is perceived by investors to lead the company to the edge of competitive advantage. In contrast, non-innovative IT investments appear to not have any significant impact on stock prices. Furthermore, regarding industry type, stocks of manufacturing and financial companies seem to respond comparatively to investments in IT.

In the early 2000s, event study methodology started to be embraced by more researchers in the field of IT. One study (Im et al., 2001) expanded the scope of investigation by looking at additional factors such as firm size and timing of the announcement. The results of that study indicate that IT investments seem to have a large effect on smaller firms, and a positive stock price reaction can be expected for more recent announcements. Other studies focused on assessing stock price reaction to e-commerce initiatives (Subramani & Walden, 2001). Accordingly, investors seem to associate e-commerce initiatives with additional benefits for the company, both for business-to-business (B2B) as well as business-to-consumer (B2C). One investigation looked at possible effects of creating a position of chief information officer (CIO) (Chatterjee et al., 2001). The key finding of that research was that financial markets respond positively to newly created CIO positions.

A subsequent study investigated possible differences between IT investments which target infrastructure and those which focus on application (Chatterjee et al., 2002). This study concluded that investments in infrastructure are more favorably received. Using the aggregated data from three previous event studies, another investigation (Dehning et al., 2003) found a significant positive stock

price reaction to transformative IT investments. A more recent event study investigated the market reaction to announcements on investments in enterprise resource planning (ERP) systems (Ranganathan & Brown, 2006). The announcements about investments in ERP seem to be rewarded by the investors and result in increased valuation of the firm.

In summary, event study methodology has gained acceptance in the field of IT research, and many of the results have also been confirmed through other research methods.

2.5 Data Mining

Knowledge discovery is the non trivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data; and data mining is the application of specific algorithms for the extraction of such patterns or models (Han & Kamber, 2001). Looking at announcements of IT investments, data mining may be applied to identify patterns in these announcements that correlate with notably positive or negative abnormal stock price reactions. To do this, we first need to create a data repository with relevant data pertaining to these announcements, particularly data that correspond to possible factors that impact IT investment success. Such factors may relate to properties of the investing company, such as the use of ABC; they may relate to the particular technology in which the investment is made, such as investing in EAI technology; or they may relate to external circumstances, such as current market conditions. Data mining is a technique we intend to use in our ongoing studies; we have no results as yet to report in this paper.

3 RESEARCH HYPOTHESES

As discussed in the theoretical background section, the results of earlier event studies suggest that abnormal positive or negative reactions of stock prices are likely to occur only when specific factors or conditions apply. In contrast, for a sufficiently large random sample of IT investment announcements no significant abnormal reaction in stock prices is to be expected. Thus we postulate:

H1: Announcements of investments in IT in general do not lead to abnormal returns.

Previous published research has identified a number of specific factors that may effect the stock price reaction to announcements of investments in IT. For example, one previous event study (Roztocki & Weistroffer, 2006) has looked at the type of cost management systems used by firms as a factor affecting stock price reaction to IT investment announcements. Whereas traditional cost accounting systems lump all indirect expenses into a few overhead pools or categories, with ABC major business activities are identified and costs are systematically assigned to these activities. While this approach requires more effort on data collection, it also results in more reliable and accurate cost estimation. The type of cost management system used in a company is an example of a factor that can be controlled by management.

Though Roztocki & Weistroffer (2006) did not find evidence of positive abnormal stock price reaction to IT investments by companies using ABC, our argument is that organizations possessing reliable cost management systems, in comparison to their competitors, are less likely to make expensive mistakes when investing in IT, and that this is recognized by the market. Thus, though the market reaction may not be positive in absolute terms, we expect that the market will respond more favorable to announcements of IT investments by companies using ABC than by companies not using ABC:

H2: Stocks will respond more positively to announcements of investments in IT in companies using ABC than in companies not using ABC.

According to the *attention-based* view of the firm (Ocasio, 1997), most investors follow a strategy of avoiding poor investments while searching for good opportunities (Gulati & Higgins, 2003). More specifically, this means that investors try to avoid being overly engaged in stocks of companies that are viewed as highly risky.

One proxy for measuring investment risk is the security's *beta* (Fuller & Wong, 1988) from the Capital Asset Pricing Model (CAPM) (Lintner, 1965; Sharpe, 1964). In essence, beta is the ratio of the covariance of the stock's returns and the market's index returns, with the variance of the market's returns. Frequently, a higher beta suggests low financial performance. The beta of a company is an example of a factor that is only partially or indirectly controlled by management. Thus management may try to influence the company's beta via restrictive financial policies.

Sometimes company executives see new technologies as opportunities to compensate for serious managerial problems. Often these investments are conducted because of pressure from external forces, such as concerned shareholders demanding quick results. Investments in IT, however, are no panacea for managerial problems. Rather, investments in IT may actually exacerbate managerial troubles, while also adding extra costs to an already distressed budget. Therefore, it may be reasonable to anticipate that after an announcement of an investment in IT by a company perceived as risky to start with, some investors will decide to sell their stocks in this company and pursue more promising prospects.

In contrast, executives in companies using ABC may have higher credibility regarding their decision-making, and thus investors will be less likely to sell their stock in those companies. Following this argument, we hypothesize:

H3: Stocks of firms with high beta and not using ABC will respond less favorably to announcements of investments in IT than stocks of companies with comparable beta but using ABC.

A recent event study (Oh et al., 2006), which focused on IT outsourcing, introduced a control variable for market conditions, differentiating between generally favorable (bull market) and unfavorable markets (bear market). The market condition is an example of a factor that is beyond management's control.

We postulate that conditions of financial markets are an important aspect for investment decisions as a bull market encourages investments, whereas a bear market discourages investments. Moreover, in a bear market, investors tend to be more risk averse and less willing to retain stocks of risky companies. Therefore we hypothesize:

H4. During unfavorable market conditions, stocks will respond more positively to announcements of investments in IT in companies using ABC than stocks of companies not using ABC.

The current study reports on research in progress, and additional hypotheses may be investigated by the time of the conference.

4 METHODOLOGY

4.1 Sample

The announcements were obtained from several different sources. Some of the announcements were obtained from earlier research studies and some were collected from the Lexis-Nexis database. More specifically, our set of announcements includes 81 announcements used in a study investigating stock price reaction in three companies using ABC cost management systems (Roztocki & Weistroffer, 2006) The three companies using ABC were Honeywell, Parker Hannifin, and United Technologies. Our set also includes 81 announcements that were used in an event study investigating investments in EAI technology (Roztocki & Weistroffer, 2007). In addition, we collected announcements on IT investments by companies which could be assumed not using ABC. In a prior study, a number of companies were used as the control group to companies using ABC (Gordon & Silvester, 1999). To search for appropriate announcements of IT investments conducted by these firms, queries including company name and combinations of words related to IT, such as computer system and investment, were used. In total, we were able to identify 17 additional IT investments announcements. The final

sample used in our study consisted of 179 announcements. The time period was from 1989 to 2005, however, the majority of the investments were conducted in the late 1990s and 2000s. Thus, in comparison to other event studies in the field of IT, we were able to accumulate a fairly large and more current sample of announcements which increases the statistical power of the analysis and the validity of the results.

4.2 Analysis

4.2.1 Assessing the stock price reaction

For purpose of comparison with prior published research, we used a similar methodology applied in earlier event studies to assess the stock price reaction to IT announcements (Dos Santos et al., 1993; Im et al., 2001). Consequently, stock price reaction to announcements was assessed in terms of unexpected, or abnormal returns (AR), and calculated based on the widely used market model (Brown & Warner, 1985). Basically, AR, possibly as consequence of IT investment announcements, are the differences between the actual returns and the expected, projected returns.

A 200-day estimation period, starting 201 days and ending 2 days before the announcement, was used to determine the alpha and beta parameters required for the AR calculation. The SP 500 market index served as proxy for stock market returns. To measure the stock price reaction to the IT investments, two different event windows were used, both starting one day before the announcement (day -1), but the one ending on the day of the announcement (day 0), and the other ending one day after the announcement (day 1). Thus, the first event window is denoted as (-1,0) and the second as (-1,1).

For each of the event windows, cumulative abnormal returns (CAR) were calculated by summing the AR for the days of the event window. The stock price reaction was further tested for significance using cumulative standardized abnormal returns (CSAR).

4.2.2 Partitioning the sample

The full sample was used to test our first hypothesis, while several sub-samples were used to test the subsequent three hypotheses.

Consequently, to test the second hypothesis, our sample of announcements was divided into two sub-samples: one for the experimental group and one for the control group. Announcements about IT investments in companies using ABC made up the experimental group, and the control group consisted of announcements for companies not using ABC.

To test the third hypothesis, the announcements were further divided into “low risk” and “high risk” sub-samples. Companies with beta below 1.2 were designated as “low risk” while companies with beta of 1.2 and higher were classified as “high risk.”

To test the fourth hypothesis, the sample was divided into four sub-samples based on both, ABC usage as well as market conditions, at the time before the announcements. When during the 200 day estimation period, the total market returns of the SP 500 index were positive, the specific announcement was placed into the “bull market” sub-sample. In contrast, all announcements with negative stock market returns during the estimation period were part of the “bear market” sub-sample.

5 RESULTS

Preliminary results are shown in Table 1 and summarized in Table 2. As shown in Table 1, the CSAR values for the full sample of 179, though slightly negative, are not significantly different from zero, supporting Hypothesis 1 that, on average, the announcements about investments in IT do not lead to significant abnormal returns.

With respect to Hypothesis 2, the CSAR values are insignificantly negative for companies using ABC. The CSAR are also insignificantly negative for the control group. Based on this, there seems to be no substantial differences in the response of stock prices to IT investments by companies using ABC and those not using ABC. In summary, Hypothesis 2 seems to be not supported.

The CSAR values for “low risk” announcements (beta below 1.2) are insignificantly different from zero. Furthermore, the CSAR values for “high risk” announcements (beta 1.2 or more) for companies using ABC are more negative but still insignificantly different from zero. However, the significantly negative CSAR values for the “high risk” announcements for the control group provide support for Hypothesis 3.

Regarding Hypothesis 4 and as indicated by the CSAR values, in a bull market, investors’ reaction to investments in IT seem to be favorable, though our results are statistically insignificant. In a bear market, investors’ overall reaction to investment announcements appears to be negative. For companies using ABC, the abnormal returns are negative, though not significantly different from zero. In striking contrast, for companies not using ABC, investors’ reaction to investment announcements appears to be statistically significantly negative. Thus hypothesis 4 seems to be supported.

In summary, our results suggest that not all announcements of investments in IT automatically move stocks up. Moreover, the results seem to confirm our earlier observation that reactions of stock prices are likely to occur only when specific factors or conditions apply. For example, stock market conditions are an important factor. While under favorable market conditions the abnormal returns tend to be positive (however statistically insignificantly), they tend to be significantly negative in a bear market.

Sample	Number of Announcements	CSAR [-1,0]	Z-Value	CSAR [-1,0]	Z-Value
Full sample	179	-0.096	-1.28	-0.090	-1.20
Breakdown by announcements					
Experimental group (ABC)	83	-0.086	-0.78	-0.111	-1.01
Control group (no ABC)	96	-0.105	-1.02	-0.072	-0.70
Breakdown by beta factor					
Below 1.2					
Experimental group (ABC)	53	-0.002	-0.01	-0.057	-0.42
Control group (no ABC)	79	-0.019	-0.17	0.012	0.11
1.2 or higher					
Experimental group (ABC)	30	-0.234	-1.28	-0.204	-1.12
Control group (no ABC)	17	-0.501	-2.07**	-0.464	-1.91*
Breakdown by market condition					
Bull market					
Experimental group (ABC)	44	0.049	0.33	-0.032	-0.21
Control group (no ABC)	55	0.187	1.38	0.126	0.93
Bear market					
Experimental group (ABC)	39	-0.238	-1.49	-0.200	-1.25
Control group (no ABC)	41	-0.495	-3.17***	-0.337	-2.16**

*Significant at $\alpha=0.1$ **Significant at $\alpha=0.05$ ***Significant at $\alpha=0.01$

Table 1. Cumulative standardized abnormal returns (CSAR)

Hypothesis	Results	Comments
1	Supported	Overall, investments in IT do not result in abnormal returns
2	Not supported	Investments in IT by companies using ABC do not result in abnormal returns. The stock price reaction is comparable to investments in IT by other companies.
3	Supported	For companies with high beta but using ABC, investments in IT result in less negative stock price reaction than for comparable companies not using ABC.
4	Supported	During unfavorable market conditions, investments in IT by companies using ABC in general seem to be received less negatively than investments in IT by companies not using ABC.

Table 2. Summary of results

6 DISCUSSION AND CONTRIBUTION

Our results so far mostly confirm some results from previous event studies while presenting new findings and pointing out several promising research avenues. For example, the results confirm that IT investments in general do not result in abnormal positive stock market returns. Likewise, the use of ABC by itself also does not always make IT investments be received favorably by the market. Our results show that IT investments by companies that have a high beta value, i.e. are considered risky in general, are received negatively by the market. Furthermore, IT investments are less favorably received in bear markets than in bull markets. When investing in IT, companies using ABC appear to have more credibility to the investors in bear markets. In addition, when a company is perceived as a high investment risk (high beta) but is using ABC, the investors perceive the company more favorably, than a company not using ABC.

We believe that our research described in this paper makes a valuable contribution to the field. For example, our preliminary results provide empirical evidence that the financial market may reward sound accounting practices, and cost management systems are considered by investors to be important during adverse market conditions and other difficult business environments.

As we pointed out, this paper reports on exploratory research in progress, and we are still looking at other hypotheses. Specifically, we are looking at combinations of factors possibly affecting stock market returns, using data mining techniques to possibly identify these factors and partition our sample. Rather than a single factor causing abnormal stock market returns, it appears that a combination of factors is required for IT investments to be successful. The contribution of our study is in helping identify these factors or combination of factors.

7 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Similar to other event studies, one limitation of our research is the challenge in accounting for possible confounding events, which may result in stock movements not related to the investments in IT. Though we examined our sample for confounding events and excluded questionable announcements from the final sample, the possibility of contamination of data always exists. For example, changes in laws and regulations may substantially affect a particular group of companies, but are hardly traceable to a specific firm. A further limitation is related to our data collection. It is quite possible that other researchers using different queries and search methods may identify a different sample of announcements.

Although the extensive research efforts in the field of IT productivity have shed some light on this topic, the factors that determine the success of IT investments are still not very well understood. The issues involved are too complex to be adequately handled by only a small number of research

approaches. Thus event studies, taking the investors' perspective, clearly deserve academic attention, as additional findings yielded by this method may enrich the existing body of knowledge.

Again, this paper reports on research in progress. As the next step, we plan to use data mining to identify patterns in the IT investments announcements that correlate with notably positive or negative abnormal stock price reactions.

Another promising research avenue may be to examine the performance of announcing companies after some time delay. Such a study could verify if the announced investments in IT indeed materialized, generating tangible benefits, and if the stock market anticipation was correct.

To conclude, we believe that our research described in this paper makes a valuable contribution to the field and hope that our study will inspire other scholars to validate our findings through further event studies and other methods.

References

- Binder, J. J. (1998) The Event Study Methodology Since 1969. *Review of Quantitative Finance and Accounting* 11 (2), 111-137.
- Brown, S. J. and Warner, J. B. (1985) Using Daily Stock Returns: The Case of Event Studies. *Journal of Financial Economics* 14 (1), 3-31.
- Brynjolfsson, E. (1993) The Productivity Paradox of Information Technology. *Communications of the ACM* 36 (12), 67-77.
- Carr, N. G. (2003) IT Doesn't Matter. *Harvard Business Review* 81 (5), 41-49.
- Chatterjee, D., Pacini, C. and Sambamurthy, V. (2002) The Shareholder-Wealth and Trading-Volume Effects of Information-Technology Infrastructure Investments. *Journal of Management Information Systems* 19 (2), 7-42.
- Chatterjee, D., Richardson, V. J. and Zmud, R. W. (2001) Examining the Shareholder Wealth Effects of Announcements of Newly Created CIO Position. *MIS Quarterly* 25 (1), 43-70.
- Cooper, R. (1988) The Rise of Activity-Based Costing - Part One: What is an Activity-Based Cost System? *Journal of Cost Management* 2 (Summer), 45-54.
- Cooper, R. (1989) The Rise of Activity-Based Costing - Part Three: How Many Cost Drivers Do You Need, and How Do You Select Them? *Journal of Cost Management* 2 (Winter), 34-46.
- Cooper, R. and Kaplan, R. S. (1988) Measure Cost Right: Make the Right Decisions. *Harvard Business Review* 66 (5), 96-103.
- Cooper, R. and Kaplan, R. S. (1991) Profit Priorities from Activity-Based Costing. *Harvard Business Review* 69 (3), 130-135.
- Dehning, B., Richardson, V. J. and Zmud, R. W. (2003) The Value Relevance of Announcements of Transformational Information Technology Investments. *MIS Quarterly* 27 (4), 637-656.
- Dos Santos, B. L., Peffer, K. and Mauer, D. (1993) The Impact of Information Technology Investment Announcements on the Market Value of the Firm. *Information Systems Research* 4 (1), 1-23.
- Fama, E. F. (1970) Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance* 25 (2), 383-417.
- Fama, E. F. (1991) Efficient Capital Markets: II. *The Journal of Finance* 46 (5), 1575-1617.
- Fama, E. F., Fisher, L., Jensen, M. C. and Roll, R. (1969) The Adjustments of Stock Prices to New Information. *International Economic Review* 10 (1), 1-21.
- Fuller, R. J. and Wong, G. W. (1988) Traditional versus Theoretical Risk Measures. *Financial Analysts Journal* 44 (2), 52-57.
- Gordon, L. A. and Silvester, K. J. (1999) Stock market reaction to activity-based costing adoption. *Journal of Accounting and Public Policy* 18 (3), 229-251.
- Gulati, R. and Higgins, M. C. (2003) Which ties matter when? The contingent effects of interorganizational partnerships on IPO success. *Strategic Management Journal* 24 (2), 127-144.

- Han, J. and Kamber, M. (2001) *Data Mining: Concepts and Techniques*. Morgan Kaufmann.
- Im, K. S., Dow, K. E. and Grover, V. (2001) Research Report: A Reexamination of IT Investment and the Market Value of the Firm - An Event Study Methodology. *Information Systems Research* 12 (1), 103-117.
- Irani, Z., Themistocleous, M. and Love, P. E. D. (2003) The impact of enterprise application integration on information system lifecycles. *Information & Management* 41 (2), 177-187.
- Johannesson, P. and Perjons, E. (2001) Design principles for process modelling in enterprise application integration. *Information Systems* 26 (3), 165-184.
- Johnson, H. T. (1987) The Decline of Cost Management: A Reinterpretation of 20th-Century Cost Accounting History. *Journal of Cost Management* 1 (Spring), 5-12.
- Kaplan, R. S. and Anderson, S. R. (2004) Time-Driven Activity-Based Costing. *Harvard Business Review* 82 (11), 131-138.
- Koh, J. and Venkatraman, N. (1991) Joint Venture Formation and Stock Market Reaction: An Assessment in the Information Technology Sector. *Academy of Management Journal* 34 (4), 869-892.
- Lintner, J. (1965) The Evaluation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics* 47 (1), 13-37.
- Lubatkin, M. H., Chung, K. H., Rogers, R. C. and Owens, J. E. (1989) Stockholder Reaction to CEO Changes in Large Corporations. *Academy of Management Journal* 32 (1), 47-68.
- Markides, C. C. (1992) Consequences of Corporate Refocusing: Ex Ante Evidence. *Academy of Management Journal* 35 (2), 398-412.
- McWilliams, A. and Siegel, D. (1997) Event Studies in Management Research: Theoretical and Empirical Issues. *Academy of Management Journal* 40 (3), 626-657.
- Ness, J. A. and Cucuzza, T. G. (1995) Tapping the Full Potential of ABC. *Harvard Business Review* 73 (4), 130-138.
- Ocasio, W. (1997) Towards an attention-based view of the firm. *Strategic Management Journal* 18 (Summer Special Issue), 187-206.
- Oh, W., Gallivan, M. J. and Kim, J. W. (2006) The Market's Perception on the Transactional Risks of Information Technology Outsourcing Announcements. *Journal of Management Information Systems* 22 (4), 271-303.
- Oz, E. (2005) Information technology productivity: in search of a definite observation. *Information & Management* 42 (6), 789-798.
- Puschmann, T. and Alt, R. (2004) Enterprise application integration systems and architecture - the case of the Robert Bosch Group. *Journal of Enterprise Information Management* 17 (2), 105-116.
- Ranganathan, C. and Brown, C. V. (2006) ERP Investments and the Market Value of Firms: Toward an Understanding of Influential ERP Project Variables. *Information Systems Research* 17 (2), 145-161.
- Roztock, N. and Weistroffer, H. R. (2006) Stock Price Reaction to the Investments in IT: Relevance of Cost Management Systems. *Electronic Journal of Information Systems Evaluation* 9 (1), 27-30.
- Roztock, N. and Weistroffer, H. R. (2007) How Do Investments in Enterprise Application Integration Drive Prices? In *Proceedings of the 40th Hawaii International Conference on System Sciences (HICSS)*.
- Sharpe, W. F. (1964) Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance* 19 (3), 425-442.
- Subramani, M. and Walden, E. (2001) The Impact of E-Commerce Announcements on the Market Value of Firms. *Information Systems Research* 12 (2), 135-154.
- Themistocleous, M., Irani, Z. and Love, P. E. D. (2004) Evaluating the integration of supply chain information systems: A case study. *European Journal of Operational Research* 159 (2), 393-405.
- Worrell, D. L., Davidson III, W. N. and Sharma, V. M. (1991) Layoff Announcements and Stockholder Wealth. *Academy of Management Journal* 34 (3), 662-678.