Information Technology Integration, Extent of ABC Use, Business Strategy, and Performance

Adam S. Maiga*

Abstract

A review of prior research reveals mixed results with respect to the organizational performance achieved from both Information Technology (IT) integration and Activity-Based Costing (ABC). Drawing from information systems, accounting, marketing, and management literature, this study extends prior studies and uses structural equation modelling (SEM) to assess whether manufacturing plant IT integration impacts its extent of ABC use and whether there is a direct relation between both IT integration and extent of ABC use and plant performance, or whether both IT integration and extent of ABC use impact plant performance through low-cost and product differentiation strategies.

Overall, the results indicate support for the theoretical framework. Plant IT integration significantly affects the extent of its ABC use, and both IT integration and extent of ABC use significantly affect low-cost strategy and product differentiation strategy that, in turn, impact both market performance and profitability. Market performance is also found to significantly impact profitability

Keywords

IT integration
Extent of ABC use
Business strategy
Market performance
Profitability

* Columbus State University, USA

Introduction

Information technology (hereafter IT) can provide a rich source of appropriate information for management accounting systems (Burns and Vaivio, 2001). Thus, it has been widely suggested that there are important links between information technology and management accounting systems (Chapman and Chua, 2000; Ittner and Larcker, 2001; Chenhall, 2003; Moscove et al., 1999). While it is widely acknowledged that IT can play an increasingly important role in the field of accounting, organizations are faced with the challenge of properly integrating information technology into accounting practices (Olsen and Cooney, 2000). Despite suggestions of potentially important synergies between IT and accounting, their relationship has been studied relatively little.

The IT literature reveals mixed results with respect to organizational performance achieved from IT integration (Chapman and Kihn, 2009; Hunton et al., 2003; Poston and Grabski, 2001). Barua and Mukhopadhyay (2000) and Sambamurthy et al. (2003) suggest that many studies have overlooked important intermediate organizational capabilities that mediate the relationship between IT and organizational performance.

Chan et al. (1997) and Henderson and Venkatraman (1999) argue that the inability to realize value from IT investments is, in part, due to the lack of alignment between IT and business strategy. Mahmood and Mann (1993), Kaplan and Norton (1996), Palvia, (1997), Kathuria et al. (1999), and Li and Ye (1999) also argue that the relationship between IT and performance should be studied within a strategic management framework. From this richer vantage point, IT integration serves as an enabler of existing organization-specific management approaches. More specifically, IT with integrated databases enables users to identify, access, and interpret data (Goodhue, 1995). Furthermore, efficiencies in the production of performance measurement information

may be demonstrated through the use of integrated information technology (DeSeve et al., 1997).

Similarly, a review of the literature on the link between activity-based costing (hereafter ABC) and business performance has been inconclusive (Rafiq and Garg, 2002; Bromwich and Bhimani, 1989; Gordon and Silvester, 1999; Innes and Mitchell, 1995; Ittner et al., 2002). However, most of the prior research has typically focused on the direct impact of ABC while ignoring its indirect impact in supporting other organizational capabilities. Chenhall and Langfield-Smith, (1998) suggest the potential for intervening effects of organizational variables and call for further research.

In light of the above discussion, the study argues that a more rigorous approach is needed to assess the relation among IT integration, extent of ABC use, plant strategy (product differentiation strategy and low-cost strategy) and plant performance (market performance and profitability). The research question are (1) whether IT integration has a significant effect on extent of ABC use, and (2) whether plant strategy moderates the impact of both IT integration and extent of ABC use on plant performance (market performance and profitability). No prior study has investigated the simultaneous relationships among the variables used in this study.

Results indicate that (1) the relation between the extent of IT integration and extent of ABC use is significant, (2) the effect of both IT integration and extent of ABC use on plant strategy is significant, (3) plant strategy is significantly related to market performance, (4) and both plant strategy and market performance significantly influence financial performance.

Results also indicate that neither IT integration nor extent of ABC use has a significant direct impact on plant performance measures (market performance and profitability). Instead, the effects of IT integration (extent of ABC use) on market performance (profitability) are mediated through the development of plant strategy (product differentiation and low-cost strategy).

This study contributes to the literature in three ways. First, on an overall level, the paper contributes by taking steps toward filling the gap between the mature literature on business strategy in terms of product differentiation strategy and low-cost strategy and the more recent stream of literature which highlights contemporary developments in information technology and management accounting.

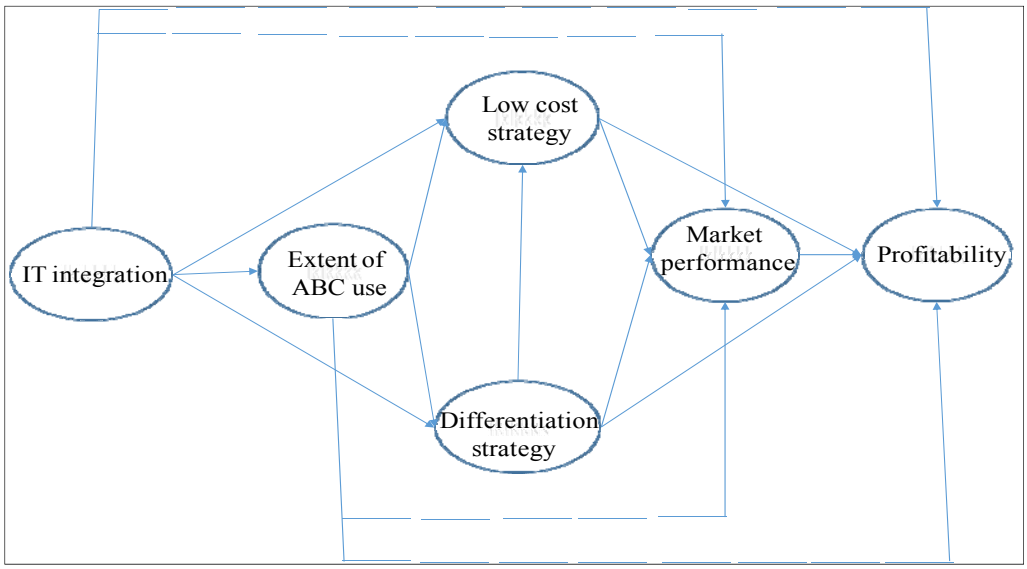
Second, by evaluating the link between IT integration and extent of extent of extent of ABC use and the possible intervening effect of plant strategy on the link between IT integration (extent of ABC use) and plant performance, a framework is provided to indicate that the relationship between IT integration (extent of ABC use) and its impact on plant performance is moderated by plant strategy. Third, the paper contributes to the literature by suggesting that the conceptual lens for studying the IT integration/extent of ABC use–performance linkage needs to incorporate plant strategy as an intervening variable when applied to the sample used in this study.

This study is directed at the plant level, rather than firm level, for two reasons. First, the two strategies, low-cost and product differentiation, are more likely to be associated with the plant level (Brown and Blackmon, 2005). Second, ABC implementations have often occurred within specific business units of a firm, rather than on a firm-wide basis.[1] Hence, hereafter, reference will be made to plants rather than firms.

The study is organized as follows. In the next section, the literature review and hypotheses are developed. This is followed by sections on research methods, discussion of findings, implications, and limitations.

[1]This helps avoid the drawbacks associated with prior studies, which have mostly focused on aggregated, firm-level financial measures (Banker et al., 2008).

Figure 1: A Conceptual Structural Model of Path Coefficients



Literature Review and Hypotheses Development

The purpose of this research is to integrate prior research and to offer new empirical evidence on the intervening effect of plant strategy (product differentiation strategy and low-cost strategy) on the link between the joint use of IT and ABC and plant performance. The conceptual model of this study is depicted in Figure 1.

Extent of IT Integration and Extent of ABC Use

An organization's level of internal cost management is dependent on its level of IT integration to the extent that these systems allow for more accurate tracking of costs and enable the association of specific costs to specific activities (Moscove et al., 1999). Cooper, (1988) suggests that ABC becomes more beneficial as the cost of data collection and processing is reduced; this requires higher levels of information technology that provides detailed historical data that is easily accessible to users and provides much of the driver information needed by ABC (Reeve, 1996). In general, companies with shared databases that track the detailed operational data needed for resource and activity analysis have an easier time implementing and maintaining ABC (Reeve 1995; Anderson, 1995). This suggests that the level of information technology integration in an organization can play an important role in influencing extent of ABC use. Thus,

H_1: IT integration has a significant positive impact on extent of ABC use.

IT Integration and Low-Cost Strategy

Strategy researchers have stressed that information acquisition can result in providing potentially useful ideas related to internal and external opportunities as well as to threats that are relevant to formulating innovative strategy to gain competitive advantage in differentiating products or lowering costs (Dutton and Freedman, 1985; Hambrick, 1982; Jelinek, 1979; Shrivastava, 1983). Anderson and Lanen (2000), for example, find that electronic data interchange with suppliers can mitigate some of the costs of complexity identified in earlier cost driver studies. These electronic data exchanges provide an avenue for plants to lower their costs of material procurement, and reduce their labor and overhead costs (Anderson and Lanen, 2000; Ittner and Larcker, 2001). Therefore, the following hypothesis is tested:

H_2: IT integration has a significant positive impact on low-cost strategy.

IT Integration and Product Differentiation Strategy

IT integration can be instrumental in effectively incorporating customers' views into new product designs. Consequently, the company can develop better products that enhance customer satisfaction (Newing, 1998). For example, IBM uses electronic meeting systems to facilitate strategic listening sessions with customers as input to the design of new computers (Gessner et al., 1994). Lotus extensively used IT to get assistance in designing, customizing, and implementing its products from its 12,000 business partners (Endrijonas and Fulcher, 1996). IT integration can also provide greater visibility into the supply-chain processes of its value chain, including its partners and suppliers, which, in turn, enable the plant to monitor real-time changes in customer requirements and product specifications and transmit these changes electronically to its outsourcing partners. Also, supplier portals enable plants to update information which allows their suppliers to make adjustments and react more efficiently to customer-driven changes (Bardhan et al., 2006). Consequently, the following hypothesis is proposed:

H_3: IT integration has a significant positive impact on product differentiation strategy.

Extent of ABC Use and Low-Cost Strategy

By recognizing the causal relationships among resources, activities, and cost objects such as products or customers, ABC allows the identification of non-value added activities, as well as new opportunities for cost reduction (Cooper and Kaplan, 1991; Carolfi, 1996). This is consistent with prior studies which suggest that the information provided by ABC allows managers to reduce costs by designing products and processes that consume fewer activity resources, increasing the efficiency of existing activities, and eliminating activities that do not add value to customers (Ittner et al., 2002; Gunasekaran and Sarhadi, 1998). In addition, ABC can facilitate evaluating costs and benefits associated with developing close business relationships with suppliers (Shank and Govindarajan, 1992). This may lead to a better understanding of the cost advantages of specific linkages with suppliers (Chenhall and Langfield-Smith, 1998). ABC can thereby enhance the cost effectiveness of companies. Thus:

H_4: Extent of ABC use has a significant impact on low-cost strategy.

Extent of ABC Use and Product Differentiation Strategy

Turney (1996) argues that an ABC system fits well with any quality improvement program. ABC can serve as a useful information system to support effective decision-making processes related to quality initiatives (Gupta and Galloway, 2003). The increased information about activities and cost drivers is also expected to enhance quality improvement initiatives by identifying the activities caused by poor quality and the drivers of these problems (Armitage and Russell, 1993; Carolfi, 1996) by highlighting the quality-related, non-value-added activities, which can therefore facilitate quality improvement (Cooper et al., 1992; Ittner, 1999; Ittner et al., 2002). Jorgenson and Enkerlin (1992) describe how ABC information helped Hewlett-Packard product teams simulate and improve quality early in the product-design phase. Ittner et al. (2002) found that extent of ABC use is positively related to higher quality levels. Therefore,

H_5: Extent of ABC use has a significant positive impact on product differentiation strategy.

Product Differentiation Strategy and Low-Cost Strategy

The level of quality in a product is a strategic decision every manufacturing company must make. The quality of a product often serves as the basis for a differentiation strategy (Weech-

Maldonado et al., 2004) and is an important foundation for firms that desire to be low-cost competitors (Foster and Gallup, 2002; Crosby, 1979). For example, case studies indicate that Japanese car manufacturers, such as Toyota and Honda, prove that quality could be built into the product at a consistently lower cost and on a continuous basis. As quality increases, rework is reduced and the cost of building the product decreases.

Dell, the computer producer, is another example of a company that pursues product quality differentiation and cost leadership simultaneously. Dell has been able to capitalize on the advantages of mass customization while achieving significant economies of scale through its product differentiation strategy. This is also in line with considerable previous research confirming that enhanced cost competitiveness can be achieved by quality improvement programs (Crosby, 1979; Deming, 1982; Garvin, 1987; Skinner, 1986; Jones and Butler 1988; Gupta and Campbell, 1995; Flynn et al., 1994). This directly leads to the following hypothesis:

H_6: Product differentiation strategy has a significant positive impact on low-cost strategy.

Product Differentiation Strategy and Market Performance

An organization that pursues a product differentiation strategy may attempt to create a unique image in the minds of customers that its products are superior to those of its competitors (Miller, 1988). This strategy that allows a business to achieve high quality will lead to the attainment of a higher reputation in the market-place that can translate into higher sales growth and increased market share (Amoako-Gyampah and Acquaah, 2007). Therefore, the following hypothesis is tested:

H_7: Product differentiation strategy has a significant positive impact on market performance.

Low-Cost Strategy and Market Performance

Low-cost strategy is claimed to result in companies gaining higher market share and dominant market position (Coeurderoy and Durand, 2001). From a strategy perspective, a number of researchers, following Porter's arguments (1985), have studied the impact of low-cost strategy on market share (Pelham, 1999; Pelham and Wilson, 2008). The basic idea popularized in most handbooks is that an organization that manages to sustain a competitive advantage in cost structure can offer the lowest prices to customers and thus concentrate on the highest volume of sales. Thus, a low-cost strategy can lead to improvements in efficiencies that an organization can use to achieve an increase in sales growth and market share (Amoako-Gyampah and Acquaah, 2007). Therefore,

H_8: Low-cost strategy has a significant positive impact on market performance.

Product Differentiation Strategy and Profitability

The more successful a company is at differentiating its products from those of others, the less elastic the demand curve for the product (Bichler et al., 2002). If the demand curve is less elastic, then the company may charge a price premium while keeping demand constant. Alternatively, the company could hold price constant and reap the benefits of increased aggregate demand. Both alternative courses of action resulting from positive product differentiation can lead to enhanced profitability (Kotha and Vadlamani, 1995; Porter, 1980).[2] Hence,

H_9: Product differentiation strategy has a significant positive impact on profitability.

[2] Quality improvements could lead to greater demand in the market, which would enhance profitability even if the per-unit prices are held constant (Maiga and Jacobs, 2008).

Low-Cost Strategy and Profitability

A low-cost strategy can provide opportunities for enhanced profitability (Hambrick, 1983; Henderson and Henderson, 1979; Miller and Friesen, 1986; Porter, 1980, 1985). For example, the extent that a firm succeeds in driving down costs per unit of output, thereby increasing gross margins, firm profitability should increase (Miller, 1987; Porter, 1980). Hence, low-cost strategy is expected to transfer businesses' savings directly to the bottom line (Rust et al., 2002). Therefore,

H_{10}: Low-cost strategy has a significant positive impact on profitability.

Market Performance and Profitability

Anderson and Sullivan (1993) and Day and Wensley (1988) pointed out that market performance is a precursor to business profitability. Also, Demsetz (1973) suggests that firms with higher market share gain efficiencies that translate into greater profitability. Moreover, the empirical studies point to market performance as a likely antecedent of business profitability. For example, Rumelt and Wensley (1981) and Prescott et al. (1986) indicated that market performance has significantly positive effects on financial performance. In meta-analysis, Szymanski et al. (1993) found that market share is a significant contributor to profitability. Also, Capon et al. (1990) found that both market share and sales growth are positively tied to financial performance. Therefore,

H_{11}: Market performance has a significant positive impact on profitability.

IT Integration and Plant Performance

Support for the claim that the relationship between extent of IT integration and plant performance is mediated by intervening factors stems directly from the resource-based perspective (Tippins and Sohi, 2003). This is consistent with prior research that suggests that IT by itself does not lead to success; it can help to facilitate successful outcomes only when integrated into organization's strategic planning (Henderson and Venkatraman, 1999; Mahmood and Mann, 1993; Kaplan and Norton, 1996; Palvia, 1997; Kathuria et al., 1999; Li and Ye, 1999; Neo, 1988). This suggests that simple ownership of IT by an organization does not support the thesis that IT will positively impact its market performance and profitability. Therefore, the following hypotheses are tested:

H_{12a}: IT integration has an indirect effect on market performance.

H_{12b}: IT integration has an indirect effect on profitability.

Extent of ABC Use and Plant Performance

Kennedy and Affleck-Graves (2001) suggest that ABC may not, per se, add value but may merely be correlated with other variables that are true value drivers. Therefore, this study argues that a plant's extent of ABC use should not directly influence market performance and profitability, but it should do so indirectly by supporting plant strategy. This argument is consistent with Chenhall and Langfield-Smith (1998), who suggest the potential for intervening effects of organizational variables. Therefore,

H_{13a}: Extent of ABC use has an indirect effect on market performance.

H_{13b}: Extent of ABC use has an indirect effect on profitability.

Research Design and Methods

Construct Measures

Perceptual measures of variables used in this study are based on prior literature.[3] There are 21 items (see Appendix) that emerged from the pilot study:[4] two for IT

[3] Research suggests that self-reported measures correlate well with actual (i.e., objective) measures (Taylor and Todd, 1995).

[4] The questionnaire was evaluated by academics at three universities with expertise

integration, four for extent of ABC use, five for product differentiation strategy, four for low-cost strategy, three for market performance, and three for profitability. All items are based on a seven-point Likert scale.[5] The reliability of each construct was examined via Cronbach's (1951) alpha, all were above .70 and are indicative of internal consistency (Nunnally, 1978). Tentative evidence attesting to the unidimensionality of the constructs was provided through exploratory factor analysis. The next step involved the collection of data through a survey.

To address the hypotheses and the research question, a survey method was used to collect data from a cross section of U.S. manufacturing business units. The initial sample includes a list of 835 manufacturing plants that are ABC adopters from Maiga and Jacobs (2008). The plant managers were used as primary contacts. To each business unit, three copies of the questionnaire were mailed with self-addressed, postage-paid envelopes for returning the completed questionnaire directly to the researchers. Questionnaires were pre-coded to enable non-respondents to be identified for a second mailing.[6] The questionnaires were then to be completed by the plant manager, the information systems manager, and/or the production manager.[7] The use of multiple respondents is expected to add validity to the responses (Philips, 1981). The survey cover letter promised anonymity and described the objectives of the study. To increase the response rate, follow-up letters and another copy of the questionnaire were sent to those who had not responded. Within the first three weeks 286 plants responded. The second mailing resulted in 67 responding plants.[8] Overall, there were 328 usable plant responses (two or three respondents per plant) which represent a 39.28 percent response rate. Table 1 provides a more detailed analysis of sample plants included in the study.

Non-response bias is always a concern in survey research. To investigate the likelihood of non-response bias in the data, a test for statistical differences in the responses between the early and late waves of survey respondents was used, with the last wave of surveys received considered representative of non-respondents (Armstrong and Overton, 1977). T-tests compared the mean scores of the early and late responses and yielded no statistically significant differences among the survey items, providing some that the plants responding to the questionnaire are closely representative of the broader population surveyed (Siegel, 1956).Next, the inter-respondent reliability was assessed using a Spearman-Brown interclass correlation coefficient (Shrout and Fleiss, 1979). These results indicated that inter-respondent reliability was high across all questions in the survey (ranging from .70 to .89). Therefore, the responses for each plant were averaged to arrive at a representation of variable values for each manufacturing plant.

in information systems, accounting, manufacturing management, and marketing.

[5] This study used a seven-point Likert scale to increase the sensitivity of the measurement instrument and because it is believed that this scale is appropriate for the assumptions of factor analysis used in the analysis of research findings. In addition, the use of a seven-point scale is believed to be appropriate because it is the most common scale in U.S. research (Wolak et al., 1998).

[6] The complete questionnaire is available from the first author upon request.

[7] For precautions against retrospective biases and errors multiple informants were used.

[8] Plants with only one respondent and incomplete responses were discarded.

Table 1: Responses Received

First wave	286
Second wave	67
Total respondents	353
Less unusable respondents (plants with only one respondent and incomplete responses)	25
Plants with usable responses	328

Results

In this section, the descriptive statistics are first presented. Next, the research model depicted in Figure 1 is assessed using SEM with a two-stage model-building process (Joreskog and Sorbom, 1993; Hair et al. 2013; Maruyana, 1998).

Descriptive Statistics

Table 2 provides descriptive information about the sample of manufacturing plants and respondents used in this study. Panel A of Table 2 provides the profile of the responding companies, showing that they constitute a broad spectrum of manufacturers as defined by the two-digit SIC code. Additional information on respondents' characteristics is provided in Panel B of Table 2.

Measurement Model

A confirmatory factor analysis, using LISREL 8.30, is conducted to test the measurement model. The fit indices are shown in Tables 3 and 4. The ratio chi-square to degrees of freedom results in a ratio of 1.46. The GFI is 0.97, whereas the NFI is 0.96, CFI is 0.96, and the RMSEA is 0.029. All the model-fit indices exceeded their respective common acceptance levels suggested by previous research, thus demonstrating that the measurement model exhibited a good fit with the data collected. Next, the psychometric properties of the measurement model in terms of reliability, convergent validity and discriminant validity were evaluated.

Reliability and convergent validity of the factors were estimated by composite reliability and average variance extracted (see Table 3). The composite reliabilities can be calculated as follows: (square of the summation of the factor loadings)/ {(square of the summation of the factor loadings) + (summation of error variables)}. The interpretation of the resulting coefficient is similar to that of Cronbach's alpha, except that it also takes into account the actual factor loadings, rather than assuming that each item is equally weighted in the composite load determination. Composite reliability for all the factors in the measurement model is above 0.80. The average extracted variances are all above the recommended 0.50 level (Hair et al, 2013), which means that more than one-half of the variances observed in the items are accounted for by their hypothesized factors.

Convergent validity can also be evaluated by examining the factor loadings and squared multiple correlations from the confirmatory factor analysis (see Table 3). Following the Hair et al. (2013) recommendations, factor loadings greater than 0.50 are considered to be very significant. All of the factor loadings of the items in the research model are greater than 0.50, with most of them being above 0.80. Also, squared multiple correlations between the individual items and their a priori factors are high (above 0.50 in all cases). Thus, all factors in the measurement model had adequate reliability and convergent validity. Next, the discriminant and convergent validity were assessed. The average variance extracted (AVE) determines the average variance shared between constructs and its measures and the variance shared between

the constructs, which are the square correlations between the constructs. To demonstrate the discriminant validity of the constructs, the AVE for each construct should be greater than the square correlations between the constructs and all other constructs (Fornell and Larcker, 1981). Table 4 shows that the AVE (on diagonal) is greater than the square correlation matrix (off diagonal) of the constructs. In summary, the measurement model demonstrated adequate reliability, convergent validity, and discriminant validity. Therefore, it is comforting support for the models to allow proceeding with an evaluation of the structural model and hypotheses testing.

Table 2: Respondents' Characteristics

Panel A: Industry Classification

	Number of Plants in SIC	Sample (n = 328)	% of Sample
Food and kindred products	20	32	9.76%
Textile mill products	22	13	3.96%
Apparel and other textile products	23	24	7.32%
Lumber and wood products	24	5	1.52%
Furniture and fixtures	25	16	4.88%
Paper and allied products	26	37	11.28%
Chemicals and allied products	28	26	7.93%
Petroleum and coal products	29	15	4.57%
Rubber and plastics products	30	14	4.27%
Stone, clay and glass products	32	4	1.22%
Primary metal industries	33	28	8.54%
Fabricated metal products	34	11	3.35%
Industrial machinery and equipment	35	17	5.18%
Electronic, electrical equipment	36	29	8.84%
Transportation equipment	37	13	3.96%
Instruments and related products	38	44	13.41%
Total		328	100.00%

Panel B: Other Characteristics of Respondents

	Mean	Standard deviation	Minimum	Maximum
Length at present position (years)	14.36	3.07	6	16
Length in management (years)	18.43	4.38	12	19
Number of employees	1,938	221	592	1,585
Sales (millions)	13.65	168.23	3.14	257.59

Table 3: Analysis of Measurement Model

	Standardized Loading	T-value
IT integration:		
Information in reports produced by our information systems is entirely based on common sources of data (e.g. a common database)	0.88	26.97
We have a fully-integrated information systems that contain both financial and non-financial information	0.83	--
Extent of ABC use:		
Design engineering	0.91	23.87
Manufacturing engineering	0.72	18.95
Product management	0.81	19.84
Plant-wide.	0.79	--
Product differentiation strategy		
Provide unique products	0.86	24.12
Offer higher quality products than your major competitors	0.77	19.07
Offer innovative products	0.91	25.31
Offer highly differentiated products	0.76	18.99
Offer products with distinctly different features from those of competing products	0.83	--
Low-cost strategy		
Be the lowest cost provider in your industry	0.77	18.28
Provide your customers with the lowest prices among your major competitors	0.83	19.84
Emphasize efficiency	0.87	21.07
Strive for high volume to spread costs	0.78	--
Market performance		
Changes in market share	0.81	17.36
Market share growth relative to our competition	0.89	18.94
Growth in sales of our products	0.72	--
Profitability		
Return on sales (ROS)	0.87	17.92
Turnover on assets (TOA)	0.79	17.38
Return on assets (ROA)	0.84	--

Fit indices: ($\chi 2$/df = 1.46, GFI = 0.97, NFI = 0.96, CFI = 0.96, and RMSEA = 0.029).
* Indicates a parameter is fixed at 1.0 in the original solution.

Table 4: Correlation, Reliability, and Average Variance Extracted

	Mean	SD	1	2	3	4	5	6
(1) IT integration	4.99	0.73	**0.81[a], 0.72[b]**					
(2) Product differentiation strategy	4.91	0.87	0.22[c]**,0.04[d]	**0.92, 0.78**				
(3) Low-cost strategy	4.96	0.63	0.30**, 0.08	0.47**, 0.22	**0.89, 0.78**			
(4) Extent of ABC use	4.89	0.69	0.18*, 0.03	0.28**, 0.07	0.70**, 0.48	**0.92, 0.88**		
(5) Market performance	4.73	0.64	0.26**, 0.06	0.58**, 0.33	0.60**, 0.35	0.37**, 0.12	**0.83, 0.80**	
(6) Profitability	5.12	0.65	0.25**, 0.06	0.49**, 0.24	0.57**, 0.32	0.38**, 0.13	0.57**, 0.32	**0.90, 0.77**

[a] Reliabilities are on the diagonal, and [b]average variance extracted is on the diagonal (in bold prints).
[c] Correlation [**significant at the 0.01 level, *significant at the 0.05 level (2-tailed)]
[d] Square correlation
For discriminant validity, average variance extracted (diagonal elements denoted b) should be larger than the square correlations (off-diagonal elements denoted d) (Fornell and Larcker 1981).

Structural Model

To test the hypotheses, a structural model is evaluated, and if the model fits the data adequately, the t-values of the structural coefficients (i.e., γ and β) can be used to test the research hypotheses. The overall structural model fit appears to be reasonable (e.g., chi-square to degrees of freedom 1.04, GFI = 0.98, NFI = 0.95, CFI = 0.96, and RMSEA = 0.031) (Table 5). Next, the standardized parameter estimates for the model were assessed by using the significance of individual path coefficients to evaluate the hypotheses (Table 5 and Fig. 2). Hypothesis H_1 states that extent of IT integration is associated with extent of ABC use. The results support this hypothesis. Specifically, higher level of IT integration is associated with higher level of ABC use. This suggests that companies can leverage their IT integration to support their ABC use. Similarly, both H_2 and H_3 are supported. That is, extent of IT integration is associated with both low-cost strategy and product differentiation strategy.

Therefore, extent of IT integration is associated with plant strategy. Results also indicate support for H_4 and H_5, in that extent of ABC use is significantly associated with both low-cost strategy and product differentiation strategy. Thus, IT integration and ABC are important resources that enable both low-cost and product differentiation strategies. This has significant implications for companies as investments in IT and ABC should be done with strategic direction, aligning said tools with business strategy, may require a high level of managers' involvement. Hence, the contributions of both IT integration and extent of ABC use in enhancing plant strategy cannot be ignored. Empirical results show support for H_6. That is, product differentiation strategy significantly impacts low-cost strategy. Hypotheses H_7 and H_8 suggest that both product differentiation strategy and low-cost strategy are associated with market performance. The data support these assertions and indicate that higher levels of product differentiation strategy and low-cost strategy significantly impact market performance.

Similarly, results indicate that both product differentiation strategy and low-cost-strategy lead to significant profitability, lending support to both H_9 and H_{10}. Hypothesis H_{11} is also supported, indicating that market performance significantly impacts profitability. This study therefore reinforces the importance and benefits of low-cost and differentiation strategies. IT integration, coupled with ABC use, lead to a significant impact on low-cost and differentiation strategies that, in turn,

contribute to firm market performance and profitability. This study also emphasizes the significance of how firms can thrive by using low-cost and differentiation strategies to elevate their status in the market place and achieve profitability. Hence, managers should take advantage of these competitive strategies and will dos if their incentives align with firm performance. For example, if a firm rewards managers' performance according to market performance and profitability, managers would benefit by implementing both low-cost and differentiation strategies.

H_{12a} and H_{12b} suggest that the impact of IT integration on market performance (profitability) is indirect. Table 5 indicates that the indirect effects of IT integration on market performance and IT integration on profitability are significant. Therefore, both H_{12a} and H_{12b} are supported. In addition, Table 5 and Figure 2 show that the direct effects of IT integration on market performance and of IT integration on profitability are not significant.

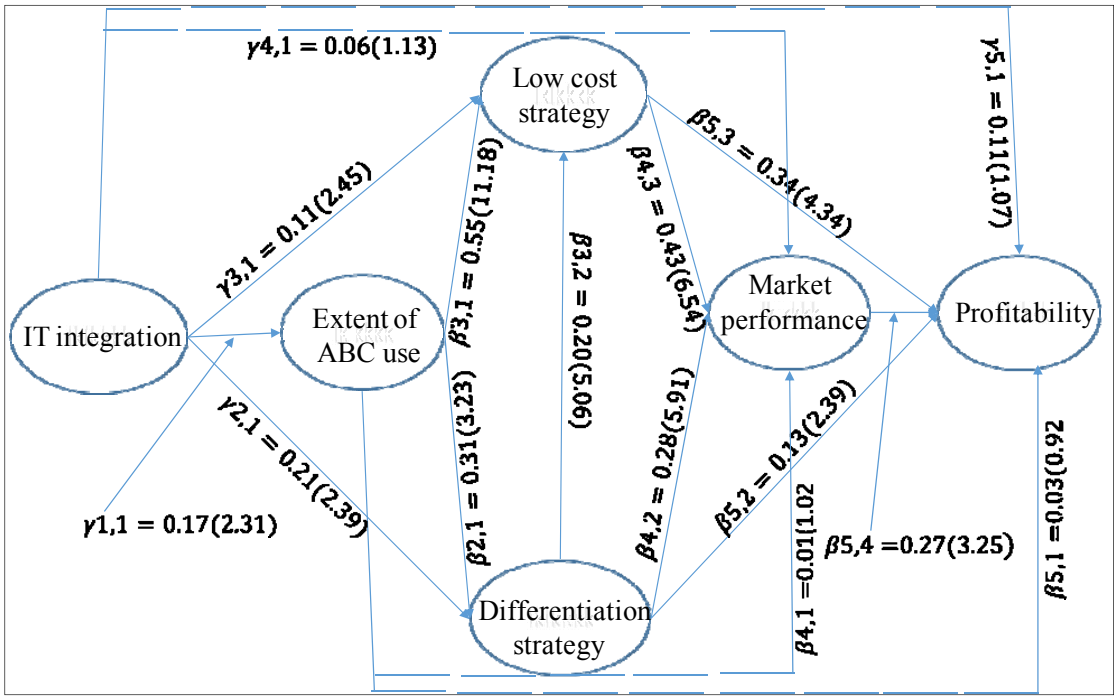
In summary, the results support the contention that intervening variables mediate the relationships between extent of IT integration and market performance (profitability). Similarly, the results support the suggestions that the effect of the extent of ABC on market performance (profitability) is mediated by intervening variables. The results are in line with prior studies that suggest that there is no direct connection between IT integration and performance (e.g., Chapman and Kihn, 2009, Poston and Grabski (2001). The findings are also consistent with prior research which emphasizes the role of intervening variables in explaining the relationship between ABC and business performance (Chenhall and Langfield-Smith, 1998; Kennedy and Affleck-Graves, 2001; Shields et al., 2000).

Table 5: Standardized Path Coefficient Estimates for the Structural Model

Paths	**Standardized Path Coefficients**	
	Direct Effects	***Indirect Effects***
IT integration → Extent of ABC use	0.17**	---
IT integration → Low-cost strategy	0.11**	0.15***
IT integration → Product differentiation strategy	0.21**	0.06*
IT integration → Market performance	0.06	0.18**
IT integration → Profitability	0.11	0.18**
Extent of ABC use → Low-cost strategy	0.55***	0.06*
Extent of ABC use → Product differentiation strategy	0.31**	---
Extent of ABC use → Market performance	0.01	0.35***
Extent of ABC use → Profitability	0.03	0.37***
Product differentiation strategy → Low-cost strategy	0.20***	---
Product differentiation strategy → Market performance	0.28***	0.08**
Product differentiation strategy → Profitability	0.13**	0.17**
Low-cost strategy → Market performance	0.43***	---
Low-cost strategy → Profitability	0.34***	0.12**
Market performance → Profitability	0.27**	---

Fit indices: $\chi 2/df = 1.04$, GFI = 0.98, NFI = 0.95, CFI = 0.96, and RMSEA = .031
*p< 0.05, **p < 0.01, ***p < 0.001

Figure 2: Structural Model Path Coefficients and Significance



Conclusion, Implications, and Limitations

With a sample of 328 manufacturing plants, this study uses SEM to examine the relationships among IT integration, extent of ABC use, product differentiation strategy, low-cost strategy, market performance, and profitability. Results indicate that IT integration is significantly associated with extent of ABC use and that both variables (IT integration and extent of ABC use) significantly affect product differentiation strategy and low-cost strategy. In turn, both strategies impact market performance and profitability. Finally, market performance affects profitability. Further analysis indicates that neither IT integration nor extent of ABC use is directly associated with market performance or profitability, lending support for prior studies that suggest intervening variables for the relation between IT integration, ABC and organizational performance. Hence, this study contributes to the literature by improving our understanding of how IT integration and ABC use impact business performance, and provides strong evidence to suggest that IT integration and ABC efforts by managers generate an increased tendency toward improved performance through business strategy (product differentiation strategy and low-cost strategy).

Managerial Implications

The results of this study have significant implications for corporate practice as investments in IT integration and ABC should be done with strategic direction, aligning said tools with business strategy, which requires a high level of involvement in the part of managers. The profitability of both IT integration and ABC depends on the extent they improve key strategic areas of the business (Ravichandran & Lertwongsatien, 2005). In this sense, it requires proper planning when designing and investing in IT and ABC, in order to ensure their relevance to the development of strategies (Byrd et al., 2006).

Management can learn from this study that in order to achieve greater returns from their investments in IT and ABC, they must also align these resources with business strategy. Therefore, the findings of this study make important contributions to the literature on both IT- and ABC-

performance links and to the debate that organizations must focus on either cost strategy or product differentiation to be successful (Porter, 1980, 1985). Hence, the results of this study should enhance practitioners' confidence in business strategy as a facilitator of the link between IT integration/ABC use and business performance. This study helps to build intuition about the mechanism driving these relationships. The model should help to inform the development of more detailed models and help guide future empirical work with different sampling and industries.

Limitations

As with any study of this type, the results are subject to a number of limitations. First, given the difficulty in collecting "harder numbers," perhaps not based on respondent perceptions, the study relied on a survey to collect a sample size large enough for SEM to test the hypotheses. Further investigation is warranted using field study methods to corroborate the findings (Kerlinger, 1992). Second, this study operationalizes ABC use in terms of the extent to which it is used. Additional dimensions of ABC might be explored. Third, this study relied on cross-sectional data. Collecting longitudinal data can offer richer implications. Fourth, this research focused on manufacturing plants. The nature and strength of the findings can extend some of their implications to the service industry as well. Fifth, with use of the SEM, interpretation of causality between the constructs should be treated with caution. Finally, the challenge for further research is to provide insights that are relevant and useful for practitioners to allow management accounting research to have more of an impact on practice.

Despite these limitations, the results of this study have implications for both theory and practice. From a theoretical or research perspective, we are again reminded by this study that organizations are composed of complex sets of interrelationships, making it challenging to evaluate the impact of any single management innovation and suggesting that the path analytical model is well suited to studies seeking to learn more about the relationships of variables in complex business environments. Thus, the conjecture that IT and ABC may enhance performance only indirectly through its impact on other variables that ultimately add value is supported in this research and implies opportunity for additional research examining more of the rich relationships found in business organizations.

References

Amoako-Gyampah, A. and Acquaah M. (2007), Manufacturing strategy, competitive strategy and firm performance: An empirical study in a developing economy environment, *International journal of production economics,* 111 (2): 575-92.

Anderson, E. W. and Sullivan M. W. (1993), The antecedents and consequences of customer satisfaction, *Marketing Science,* 12 (2): 125-43.

Anderson, S. and Lanen W. 2000), Does information technology mitigate the impact of complexity? A study of within and between firm performance effects of electronic data interchange, Unpublished Working Paper, University of Michigan.

Anderson, S. W. (1995), A framework for assessing cost management system changes: The case of activity based costing implementation at General Motors, 1986–1993, *Journal of Management Accounting Research,* 7 (2): 1–51.

Armitage, H. and Russell G. (1993), Activity-based management information: TQM's missing link, *Cost & Management*, 67 (2): 7–12.

Armstrong, J. S. and Overton T. S. (1977), Estimating nonresponse bias in mail survey, *Journal of Marketing Research*, 14 (3): 396–421.

Atkinson, A. A., Banker, R. D., Kaplan, R. S. and Young S. M. (2001), *Management Accounting*. Prentice Hall International, New Jersey, USA.

Banker, R. D., Bardham, I. R. and Chen T. Y. (2008), The role of manufacturing practices in mediating the impact of activity-based costing on plant performance, *Accounting, Organizations and Society,* 33 (1): 1-19.

Bardhan, I. R., Whitaker, J. and Mithas S. (2006), Information technology, production process outsourcing and manufacturing plant performance, *Journal of Management Information Systems,* 23 (2): 13-40.

Barua, A., and Mukhopadhyay T. (2000), Information technology and business performance: Past, present, and future, in: *Framing the Domains of Information Technology Management: Projecting the Future... through the past,* R. W. Zmud (ed.), Pinnaflex Press, 65-84, , Cincinnati, OH, USA.

Bichler, M., Kalagnanam, J. Katicioglu, K. King, A. J. Lawrence, R. D. Lee, H. S. Lin, G. Y. and Lu, Y. (2002), Applications of flexible pricing in business-to-business electronic commerce, *IBM Systems Journal,* 40 (2): 287-302.

Bromwich, M., and Bhimani, A. (1989), *Management accounting: Evolution, not revolution*, Chartered Institute of Management Accountants, London, UK.

Brown, S., and Blackmon, K. (2005), Aligning manufacturing strategy and business-level competitive strategy in new competitive environments: The case for strategic resonance, *Journal of Management Studies,* 42 (4): 793-815.

Burns J. and Vaivio, J. (2001), Management accounting change, *Management Accounting Research,* 12 (4): 389-402.

Byrd, T., Lewis, B. and Bryan, R. (2006), The leveraging influence of strategic alignment on IT investment: An empirical examination, *Information and Management*, 43(3): 308-321.

Cagwin, D. and Bouwman, M. J. (2002), The association between activity-based costing and improvement in financial performance, *Management Accounting Research,* 13 (1): 1–39.

Capon, N., Parley, J. U. and Hoenig, S. (1990), Determinants of financial performance: A meta-analysis, *Management Science,* 36 (10): 1143-1158.

Carolfi, I. A. (1996), ABM can improve quality and control costs, *Cost and Management,* 70 (1): 12–16.

Chan, Y., Huff, S., Barclay, D. and Copeland, D. (1997), Business strategic orientation: Information systems strategic orientation and strategic alignment, *Information Systems Research,* 8 (2): 125–150.

Chapman, C. and Chua, W. F. (2000), Information technology, organizational form, and accounting, Proceedings of the 2nd Conference on New Directions in Management Accounting: Innovations in Practice and Research, December, 14-16: 193-211, Brussels, Belgium.

Chapman, C. S. and Kihn, L. (2009), Information system integration, enabling control and performance, *Accounting, Organizations and Society,* 34 (2): 151-169.

Chenhall, R. H. (2003), Management control systems design within its organizational context: Findings from contingency-based research and direction for the future, *Accounting, Organizations and Society,* 28 (2): 127-168.

Chenhall, R. H., and Langfield-Smith, K. (1998), The relationship between strategic priorities, management techniques and management accounting: An empirical investigation using a system approach, *Accounting, Organizations and Society,* 23 (3): 234–264.

Coeurderoy, R. and Durand, R. (2001), Age, order of entry, strategic orientation, and organizational performance, *Journal of Business Venturing,* 16(5): 471-494.

Cooper, R. (1988), The rise of activity-based costing – Part I: What is an activity-based cost system?, *Journal of Cost Management,* 2 (2): 45.

Cooper, R., and Kaplan, R. S. (1991), Profit priorities from activity-based costing, *Harvard Business Review*, 69 (3): 130–135.

Cooper, R., Kaplan, R. S., Maisel, L., Morrissey, L. and Oehm, R. (1992), *Implementing activity-based cost management,* Institute of Management Accountants, Montvale, NJ, USA.

Cronbach, L. J. (1951), Coefficient alpha and the internal consistency of tests, *Psychometrika,* 16 (3): 297–334.

Crosby, P.B. (1979), *Quality is Free: The Art of Making Quality Certain,* McGraw-Hill, New York, USA.

Day, G. S., and Wensley, R. (1988), Assessing advantage: A framework for diagnosing competitive superiority, *Journal of Marketing,* 52 (1): 1-20.

Deming, W. E. (1982), Quality, productivity, and competitive position, *M.LI* Center for *Advanced Engineering Study,* MA, USA.

Demsetz, H. (1973. Industry structure, market rivalry, and public policy, *Journal of Law and Economics,* 16 (3): 1–9.

DeSeve, E., Pesachowitz, A. and Johnson, L. (1997), *Best IT practices in the federal government*, chief information officers; industry advisory council; Washington, DC, available on line at http://www.cio.gov/docs/iac.htm

Dutton, J. M. and Freedman, R. D. (1985), External environment and internal strategies: Calculating, experimenting and imitating in organizations. In R. Lamb and P. Shrivastava (eds.), *Advances in Strategic Management*, 3 (5): 39-67. Greenwich, CT: JAI Press.

Endrijonas, J.and Fulcher, J. (1996), Share the wealth, *Manufacturing Systems,* 14(3): 42–46.

Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994), A framework for quality management research and an associated measurement instrument, *Journal of Operations Management*, 11(4): 339-366.

Fornell C., and Larcker, D. F. (1981), Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research,* 18 (2): 39-50.

Foster, S. T. and Gallup, L. (2002), On functional differences and quality understanding, *Benchmarking: An International Journal,* 9(1): 86-102.

Gessner, S., McNeilly, M. and Leskee, B. (1994), Using electronic meeting systems for collaborative work, *Planning Review,* 22 (1): 34–39.

Goodhue, D. (1995), Understanding user evaluations of information systems, *Management Science,* 4 (12): 1827-1841.

Gordon, L. A. and Silvester, K. J. (1999), Stock market reactions to activity-based costing adoption, *Journal of Accounting and Public Policy,* 18 (3): 229–235.

Gunasekaran, A. and Sarhadi, M. (1998), Implementation of activity-based costing in manufacturing, *International Journal of Production Economics,* 56 (57): 231–242.

Gupta, M. and Campbell, V. S. (1995). The cost of quality, *Production and Inventory Management Journal*, 36(3): 43-49.

Gupta, M. and K. Galloway. (2003), Activity-based costing/management and its implications for operations management, *Technovation,* 23 (2): 131–138.

Hair, J. F., Hult, G. T. M, Ringle, C. and Sarstedt, M. (2013), *A primer on partial least squares structural equation modeling*

(PLS-SEM), SAGE Publications, Thousand Oaks, USA.

Hambrick, D. C. (1983), High profit strategies in mature capital goods industries: A contingency approach, *Academy of Management Journal,* 26 (4): 687-707.

Hambrick, D. C. (1982), Environmental scanning and organizational strategy, *Strategic Management Journal,* 3 (2): 159–174.

Henderson, B, and Henderson, D. (1979), *Corporate strategy*. ABT Books, Cambridge, MA, USA.

Henderson, J. and Venkatraman, N. (1999), Strategic alignment: Leveraging technology for transforming organizations, *IBM Systems Journal*, 38 (2): 472–484.

Hunton, J., Lippincott, B. and Reck, J. (2003), Enterprise resource planning systems: Comparing performance of adopters and non-adopters, *International Journal of Accounting Information Systems,* 4 (3): 165–184.

Innes, J. and Mitchell, F. (1995), A survey of activity based costing in the UK's largest companies, *Management Accounting Research*, 6 (2):137–153.

Ittner, C. D. (1999), Activity-based costing concepts for quality improvement, *European Management Journal*, 17 (5): 492–500.

Ittner, C. D., Lanen, W. N. and. Larcker, D. F. (2002), The association between activity-based costing and manufacturing performance, *Journal of Accounting Research,* 40 (3): 711-726.

Ittner, C. and Larcker, D. (2001), Assessing empirical research in managerial accounting: A value-based management perspective, *Journal of Accounting and Economics,* 32 (1): 349–410.

Jelinek, M. (1979), *Institutionalizing innovation: A study of organizational learning systems*, Praeger Publishers, New York, USA.

Jones, G. R. and Butler, J. E. (1988), Costs, revenues, and business-level strategy, *Academy of Management Review,* 14 (2): 202–213.

Joreskog, K. G., and Sorbom, D. (1993), *LISREL 8: User's reference guide,* Scientific Software, Chicago, IL., USA.
Jorgenson, D. M. and Enkerlin, M. E. (1992), Managing quality costs with the help of activity-based costing, *Journal of Electronics Manufacturing,* 2 (4): 153.

Kaplan, R. S. and Norton, D. P. (1996), *The Balanced Scorecard: Translating Strategy into Action*, Harvard Business School Press, Boston, MA, USA.

Kathuria, R., Anandarajan, M. and Igbaria, M. (1999), Linking IT applications with manufacturing strategy, *Decision Sciences,* 30 (4): 959–991.

Kennedy, T. and Affleck-Graves, J. (2001), The impact of activity-based costing techniques on firm performance, *Journal of Management Accounting Research,* 13 (1): 19–45.

Kerlinger, F. N. (1992), *Foundations of behavioral research*, Harcourt Brace, New York, NY, USA.

Kinney, M. R. and Wempe, W. F. (2002), Further evidence on the extent and origins of JIT's profitability effects, *The Accounting Review,* 77(1): 203-225.

Kotha, S. and Vadlamani, B. L. (1995), Assessing generic strategies: An empirical investigation of two competing typologies in discrete manufacturing industries, *Strategic Management Journal,* 16 (1): 75–83.

Li, M. and Ye, R. (1999), Information technology and firm performance: Linking with environmental, strategic and managerial contexts, *Information & Management,* 35 (1): 43–51.

Mahmood, M. A, and Mann, G. J. (1993), Measuring the organizational impact of information technology investment: An exploratory study, *Journal of Management Information System,* 10 (1): 97–122.

Maiga, A. S. and Jacobs, F. A. (2008), Extent of ABC use and its consequences, *Contemporary Accounting Research,* 25 (2): 533-566.

Maruyana, G. M. (1998), *Basics of structural equation modelling*, Sage Publications, London, UK.

Miller, D. (1987), The structural and environmental correlates of business strategy, *Strategic Management Journal,* 8 (1): 55–76.

Miller, D. (1988), Relating Porter's business strategies to environment and structure: Analysis and performance implications, *Academy of Management Journal,* 31 (2): 280–308.

Moscove, S. A., Simkin, M. G. and Bagranoff, N. A. (1999), *Core Concepts of Accounting Information Systems*, Sixth Edition, John Wiley and Sons, New York, USA.

Neo, B. S. (1988), Factors facilitating the use of information technology for competitive advantage: An exploratory study, *Information and Management,* 15 (4): 191-201.

Newing, R. (1998), BP introduces its $250m digital nervous system, *Financial Times (IT Supplement),* 10: 11.

Nunnally, J.C. (1978), *Psychometric theory*. McGraw-Hill, New York, USA.

Olsen, D. H. and Cooney, V. (2000), The strategic benefits of data warehousing: An accounting perspective, *Information Strategy: Executive's Journal, 16* (2): 35–40.

Palvia, P. C. (1997), Developing a model of the global and strategic impact of information technology, *Information and Management,* 32 (3): 229-244.

Pelham, A. M. (1999), Influence of environment, strategy, and market orientation on performance in small manufacturing firms, *Journal of Business Research,* 45 (1): 33-46.

Pleham, A. M. and Wilson, D. T. (2008), A longitudinal study of the impact of market structure, firm structure, strategy, and market orientation culture on dimensions of small-firm performance, *Journal of the Academy of Marketing Science,* 24 (1): 27-43.

Philips, L. W. (1981), Assessing measurement error in key informant reports: A methodological note on organizational analysis in marketing, *Journal of Marketing Research,* 18 (3): 395-415.

Porter, M. E. (1980), *Competitive strategy: Techniques for analyzing industries and Competitors*, The Free Press, New York, USA.

Porter, M. E. (1985), *Competitive advantage: Creating and sustaining superior performance,* Free Press, New York. USA.

Poston, R. and Grabski, S. (2001), Financial impacts of enterprise resource planning implementations, *International Journal of Accounting Information Systems,* 2 (4): 271–294.

Prescott, J.E., Kohli, A. K. and Venkatraman, N. (1986), The market share–profitability relationship: An empirical assessment of major assertions and contradictions, *Strategic Management Journal,* 7 (4): 377–394

Rafiq, A., and Garg, A. (2002), Activity-based costing and financial institutions: Old vine in new bottles or corporate panacea? *The Journal of Bank Cost & Management Accounting,* 15 (2): 12-29.

Ravichandran, T. and Lertwongsatien, C., (2005), Effect of information systems resources and capabilities on firm performance: A resource-based

perspective, *Journal of Management Information Systems,* 21 (4): 237-276.

Reeve, J. M. (1995), *Cost management in continuous process environments*, In Handbook of Cost Management, edited by Barry J. Brinker. Warren, Gorham and Lamont, Boston, MA, USA.

Reeve, J. M. (1996), Projects, models and systems: Where is ABM headed? *Journal of Cost Management,* 10 (2): 5–16.

Rumelt, R. P. and Wensley, R. C. (1981), In search of the market share effect, *Academy of Management Proceedings*: 1-6, Boston, MA, USA.

Rust, R. T., Moorman, C. and Dickson, P. R. (2002), Getting return on quality: Revenue expansion, cost reduction, or both?', *Journal of Marketing,* 66 (4): 7–24.

Sambamurthy, V., Bharadwaj, A. S. and Grover, V. (2003), Shaping agility through digital options: Reconceptualizing the role of IT in contemporary firms, *MIS Quarterly,* 27 (2): 237-263.

Shank, J. K. and Govindarajan, V. (1992), Strategic cost management: The value chain perspective, *Journal of Management Accounting Research,* 4 (1): 179-197.

Shields, M. D., Deng, F. J. and Kato, Y. (2000), The design and effects of control systems: Tests of direct and indirect effect models, *Accounting, Organizations and Society,* 25 (2): 185–202.

Shrivastava, P. (1983), A typology of organizational learning systems, *Journal of Management Studies* 20 (1): 7-28.

Shrout, P. E. and Fleiss, J. L. (1979), Intraclass correlations: Uses in assessing rater reliability, *Psychology Bulletin,* 86 (2): 420-428.

Siegel, S. (1956), *Nonparametric statistics for the behavioral sciences*, McGraw-Hill Book Company, New York, USA.

Skinner, W. (1969), Manufacturing: Missing link in corporate strategy, *Harvard Business Review*, 47 (1): 136–145.

Swenson, D. (1995), The benefits of activity-based cost management to the manufacturing industry, *Journal of Management Accounting Research*, 7 (1):167–180.

Szymanski, D. M., Bharadwaj, S. G. and Varadarajan, R. P. (1993), Standardization versus adaptation of international marketing strategy, *Journal of Marketing,* 57 (1): 17–33.

Taylor, S. and Todd, P. A. (1995), Understanding information technology usage: A test of competing models, *Information Systems Research,* 6 (2): 144-176.

Tippins, M. J. and Sohi, R. S. (2003), IT competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal,* 24 (8): 745-761.

Turney, B. B. P. (1996), *Activity Based Costing: The Performance Breakthrough*, CLA, London, UK.

Vorhies, D. W., and Harker, M. (2000), The capabilities and performance advantages of market-driven firms: An empirical investigation, *Australian Journal of Management,* 25(2): 145-171.

Weech-Maldonado, R., Meret-Hanke, L., Neff, M.C.and Mor, V. (2004), Nurse staffing patterns and quality of care in nursing homes, *Health Care Management Review* 29 (2), 107–116.

Wolak R, Kalafatis, S. and Harris, P. (1998), An investigation into four characteristics of services, *Journal of Empirical Generalizations in Marketing Science,* 3 (2): 22-41.

APPENDIX

IT integration (Chapman and Kihn, 2009)

Please indicate the extent to which you agree (disagree) with the following:

	Strongly agree						Strongly disagree
1. Information in reports produced by our information systems is entirely based on common sources of data (e.g., a common database)	1	2	3	4	5	6	7
2. We have a fully-integrated information systems that contain both financial and non-financial information	1	2	3	4	5	6	7

Extent of ABC Use (Swenson, 1995; Cagwin and Bouwman, 2002; Maiga and Jacobs, 2008):

Please indicate the extent to which the following functions routinely use the ABC information for decision making:

	Extremely low use						Extremely high use
1. Design engineering	1	2	3	4	5	6	7
2. Manufacturing engineering	1	2	3	4	5	6	7
3. Product management	1	2	3	4	5	6	7
4. Plant-wide	1	2	3	4	5	6	7

Product Differentiation Strategy (Vorhies and Harker, 2000).

To what extent is the strategy of your business to:

	Not at all						To a great extent
1. Provide unique products?	1	2	3	4	5	6	7
2. Offer higher quality products than your major competitors?	1	2	3	4	5	6	7
3. Offer innovative products?	1	2	3	4	5	6	7
4. Offer highly differentiated products?	1	2	3	4	5	6	7
5. Offer products with distinctly different features from those of competing products?	1	2	3	4	5	6	7

Low-Cost Strategy (Vorhies and Harker, 2000).

To what extent is the strategy of your business to:

	Not at all						To a great extent
1. Be the lowest cost provider in your industry?	1	2	3	4	5	6	7
2. Provide your customers with the lowest prices among your major competitors?	1	2	3	4	5	6	7
3. Emphasize efficiency?	1	2	3	4	5	6	7
4. Strive for high volume to spread costs?	1	2	3	4	5	6	7

Market Performance **(**Vorhies and Harker, 2000)
Please indicate your market performance over the last three years relative to that of major competitors.

	Much worse than our major competitors						Much better than our major competitors
1. Changes in market share	1	2	3	4	5	6	7
2. Market share growth relative to our competition	1	2	3	4	5	6	7
3. Growth in sales of our products	1	2	3	4	5	6	7

Profitability (Kinney and Wempe, 2002; Atkinson et al., 2001; Maiga and Jacobs, 2008)

Please indicate the extent to which your plant has experienced improvement in profitability over the last three years compared to your major competit

	much worse than our major competitors						much better than our major competitors
1. Return on sales (net income before corporate expenses divided by sales)	1	2	3	4	5	6	7
2. Turnover on assets (sales divided by total assets)	1	2	3	4	5	6	7
3. Return on assets (net income before corporate taxes divided by total assets)	1	2	3	4	5	6	7

Please answer the following:

1. Number of years at this position? _____
2. Number of years in management? _____
3. Number of employees?_____
4. Average sales over the past three years?_____