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# THE RELATIONSHIP OF STRATEGY, FIT, AND BUSINESS PERFORMANCE IN AN E-COMMERCE SETTING: AN EMPIRICAL STUDY

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## Abstract

*Most e-commerce research is based on some expert opinions, but very little empirical or field study research (Ngai and Wat, 2002). While such expertise was very necessary in the earlier years of the exploding e-commerce revolution, today the e-commerce companies need to take greater care in developing business strategies and managing their operations. This is particularly true in that the downturn of e-businesses has been credited to bad business plans that do not include careful e-commerce strategic considerations. This study not only provides a conceptual model based on both information systems and operations strategy literature to uncover a systematic e-commerce strategic framework, but also provides empirical evidence on the link between the business environment, operations strategy, information systems strategic orientation, and business performance. More specifically, this research examines the fit between business environment and operations strategy, the fit between information systems strategic orientation and operations strategy, and the impact of both on business performance.*

**Keywords:** E-commerce, strategic fit, operations strategy, information systems strategy, business performance

## Introduction

Electronic commerce is emerging as one of the driving forces in today's economy. According to Forrester Research Institute (2000), business-to-business electronic commerce will hit \$2.7 trillion in 2004. While Internet trade between individual partners will continue to flourish, the electronic marketplace will fuel most of the growth – reaching 53% of all online business trade in five years. Business activities for information gathering, shopping, trading, brokerage, banking, accounting, auditing, financing, negotiating, collaborating, marketing, supplying, partnering, training, meeting, scheduling, manufacturing, distributing, servicing, and retailing will be changed thanks to the capabilities of the new information technology (Shaw *et al.*, 1997).

Most corporate executives are by now convinced that the scale and pervasiveness of information-driven technological change requires a fundamental review of business strategy (Feeny, 2001). Web-based technology is creating opportunities to rethink business models, processes and relationships along the entire length of the supply chain in the electronic commerce era. Successful electronic commerce strategies translate established strategic concepts into contexts in which they previously were not economically viable. Although most managers are cognizant of impending changes, the business landscape is fuzzy and fast-changing. There is no definitive understanding of electronic commerce strategy among managers. Some trumpet how they use the Internet to enhance customer service, whereas others point to their success in integrating the physical and digital infrastructures to provide seamless service. Some mention the functionality of the Internet, while others highlight their choice of IT platform (Venkatraman, 2000). As such, a systematic approach to electronic commerce strategy would greatly benefit those in this situation (Riggins and Rhee, 1998). Feeny (2001) suggests a comprehensive map of electronic commerce that incorporates its three domains (operations, marketing, and customer services), and argues that the comprehensive map of electronic commerce can become a platform for exploring the new strategic landscape. Operations management literature also suggests that there is a need

to investigate the important role operations management (OM) plays in electronic commerce (Geoffrion and Krishnan, 2001; De Figueiredo, 2000; Keeney, 1999; Shaw et al., 1997). To date there exist few conceptual studies addressing electronic commerce strategy from the OM perspective (Han and Noh, 2000; Min and Galle, 1999; Strader and Shaw, 1997). Shaw et al. (1997) state that electronic commerce research is multidisciplinary in nature and calls for the integration of operation management and management information system research.

Alignment between business environment, operations strategy, and information strategic orientation is a cornerstone of the success of an e-commerce company (Venkatraman, 2000). This encompassing study explores e-commerce research model by focusing on compatibility issues of operations strategies used in the electronic commerce environment, thus linking management information system research with operations management research.

## **Literature Review**

There are many studies on the content of operation strategies (Badri *et al.*, 2000; Ward and Duray, 2000; Kathuria, 2000; Smith and Reece, 1999; Tracey et al., 1999; Youndt et al., 1996; Ward et al., 1995; Anderson *et al.*, 1989). Youndt et al. (1996) examined the moderating effect of different operation strategies on the human resource systems-performance relationship by cluster-analyzing 97 manufacturing companies across four operation strategies orientations (quality, delivery flexibility, scope flexibility, and cost). Their analysis yielded five groups of manufacturers, which they labeled by the emphasis on corresponding operation strategies. However, they did not find these strategy clusters to have any direct impact on operation performance as captured by self-reported measures of product quality, employee productivity, on-time delivery, and equipment utilization.

More recently, to avoid the limitations of previous operations strategy research that focused on specific relationships among a few constructs, Kathuria (2000) developed a taxonomy based on the content of operations strategy (i.e., competitive priorities). Findings of his study suggested that different groups of manufacturers emphasized different sets of competitive priorities, and that different groups of manufacturers appeared to perform better on certain performance measures that were consistent with their focus. However, Kathuria (2000) ignored environmental factors in his research.

In their review of the operations strategy literature, Anderson et al. (1989) proposed the hypothesis that a company would perform better if it linked its operations strategy to its business strategy. Tracey *et al.* (1999) examined the effect of the fit between advanced manufacturing technology and operations strategy on performance. The results indicated that firms with a high level of manufacturing technology, and a high level of manufacturing manager's participation in strategy formulation, had high levels of competitive capabilities and improved performance. Smith and Reece (1999) defined and measured the concept of fit as it applied to operations strategy. They further investigated the interrelationships between business strategy, operations strategy, productivity, and performance. The findings of their study suggested that the fit between operations strategy and business strategy was of greater importance than the particular choice of strategy, and that the fit had a significant positive and direct effect on business performance

Ward and Duray (2000) examined the relationship between environment, competitive strategy, manufacturing strategy, and business performance. Their study demonstrated that the strategic linkages in manufacturing businesses were clearer among good performers than poor performers. The findings of their study also suggested that competitive strategy acted as a mediator between an organization's environment and its manufacturing strategy, and that the relationship between competitive strategy and performance is mediated by manufacturing strategy.

Ward et al. (1995) investigated the relationship between environmental factors, operations strategy, and business performance by surveying 1000 firms in Singapore. Their research suggested that environmental concerns appeared to have a substantial impact on operations strategy, and that good performers adopted different operations strategies in response to environmental stimuli than did poor performers. Badri et al. (2000) extended the study of Ward et al. (1995) to a different environment, the United Arab Emirates, and expanded the environment dimension to include other variables, such as government regulations and political effects. Their study concurred with the findings of Ward et al. (1995), and suggested that proper environmental considerations should be a part of any operations strategy framework.

One of the caveats of operations strategy research lies in neglecting the impact of information system strategy in the conceptual framework. Moreover, it appears that there has been no empirical research to date that applies operations strategy to the context of electronic commerce.

Information systems strategy is integral to business strategy, and the focus of information systems strategy is on alignment with business strategy (Levy and Powell, 2000). Bili and Raymond (1993) showed that information systems strategy in companies became more critical as technology became more central to companies' products and processes, and that the information systems strategy needed to be integrated with the business strategy. Without an alignment between information systems strategy and business strategy, it is likely that information systems will be developed in a piecemeal manner, neither contributing to strategic vision nor enhancing organizational flexibility to respond to market changes (Avison et al., 1998). Earl (1996) also argued that information systems strategy needed to change in response to the business environment. According to Levy et al. (1998), firms adopting information systems without considering business strategy are unlikely to gain business benefits. King and Teo (1997) attempted to establish and test relevant benchmark variables that could assist in identifying and predicting the stage of business strategy and information systems strategy integration. The results of their study supported the stages of growth model of business strategy. Information systems strategy integration and benchmark variables were found to be successful in predicting the stage of integration.

A string of information systems strategy research also addressed the fit between operations strategy and information systems strategic orientation, and the impact of that fit on business performance (King, 1987; Reich and Benbasat, 1996; Chan et al., 1997; Chan et al., 1998; Reich and Benbasat, 2000; Sabherwal and Chan, 2001).

Chan et al. (1997) proposed a conceptual model that illustrated links between operations strategy, information systems strategic orientation, and business performance. Their study presented survey instruments developed to operationalize these constructs, and described the results of empirical tests of the measurement and structural models. Findings of their research suggested that companies with high IS strategic alignment were better performing companies. Although the findings implied that there were "several ways to win," alignment between operations strategy and information systems strategic orientations was linked to business performance.

Chan et al. (1998) examined the realized information systems strategy (the existing uses of information technology in organizations), operations strategy, and performance. The objective of their study was to develop valid and reliable means of quantifying how information technology was actually used by organizations to provide support for business operations. Their research suggested that the fit between realized information systems and operations strategy had a positive impact on business performance. However, the information systems research in this area did not include environmental factors.

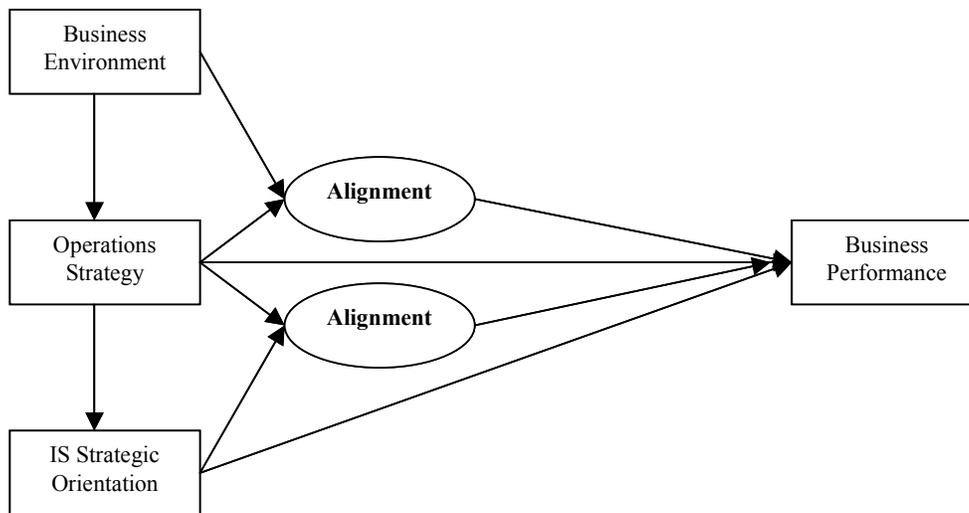
Reich and Benbasat (2000) investigated factors that influenced the social dimension of alignment (the social dimension of alignment refers to the state in which business and IT executives understand and are committed to the business and IT mission, objectives, and plans) between business and information technology objectives. They argued that the establishment of strong alignment between information technology (IT) and organizational objectives was one of the key concerns of information systems managers. This paper presented findings from a study which investigated the influence of several factors on the social dimension of alignment within 70 business units in the Canadian life insurance industry.

Sabherwal and Chan (2001) studied the alignment between business strategy and information systems strategy, which was widely believed to improve business performance. They examined the impact of alignment on perceived business performance using Miles and Snow's popular classifications of the Defender, Analyzer, and Prospector business strategies. A priori theoretical profiles for these business strategies were developed using Venkatraman's (1989) measure of business strategy. Theoretical profiles for IS strategies were developed in terms of four types of systems – operational support systems, market information systems, strategic decision support systems, and inter-organizational systems. Empirical data from two multi-respondent surveys of 164 and 62 companies were analyzed. Results indicated that alignment affected perceived business performance, but only in some organizations. Alignment appeared to influence overall business success in Prospectors and Analyzers but not in Defenders. In this study, a comprehensive conceptual framework is proposed based on both information systems research and operations strategy research. The framework explores the relationship between environmental factors, information strategic orientation, operations strategy, and business performance in an electronic commerce setting.

## **Research Model**

This study extends the de facto operations strategy model (Badri et al., 2000; Ward et al., 1995; Skinner, 1969) by incorporating an information systems strategic orientation (Chan et al., 1997; Chan et al., 1998; Reich and Benbasat, 2000; Sabherwal and Chan, 2001). Moreover, this study applies the proposed conceptual framework in an electronic commerce setting. Figure 1 shows the holistic (systems) electronic commerce manufacturing strategy model.

Figure 1 indicates that the business environment directly influences operations strategy, that the alignment between business environment and operations strategy influences business performance, that operations strategy has a direct impact on information systems strategic orientation, that the fit between information systems strategic orientation and operations strategy influences business performance, and that information systems strategic orientation directly influences business performance. The conceptual model can also be tested to verify the structural contingency theory.



**Figure 1. Electronic Commerce Operations Strategy Model – A Holistic Model**

While Figure 1 presents a holistic (systems) view of the relationships among the constructs, Figure 2 presents a dimension-specific (bivariate) view (Drazin and Van de Ven, 1985). The holistic view suggests that relationships between constructs are meaningful, whereas the dimension-specific view suggests that the dimensions of these constructs can be disaggregated and that relationships among these dimensions can be meaningfully tested (Chan et al., 1997). In this study, both models will be tested.

Dimensions of business environment are adapted from Ward et al. (1995), and one additional dimension – government regulations, is added because government regulations have great influence on electronic commerce (i.e., taxation, freedom of speech, etc.). Four of the most commonly stated operations strategy dimensions are included (Stonebraker and Leong, 1994; Ward et al., 1995; Kathuria, 2000). The dimensions of information systems strategy is a revised version of Chan et al.’s STROEPIS instrument (Chan et al., 1997), based on the notion that information systems strategy complements operations strategy.

The business performance instrument is adapted from Chan et al. (1997), and includes market growth, profitability, product/service innovation, and company reputation. The classification of “high performer” and “low performer” is based on the performance measures developed by Hambrick (1984). Subjective performance measures are used in this study due to difficulty in obtaining accurate performance data and controlling for industry variations. The subjective nature of the data gathered is a limitation of the current research, although subjective data have frequently been used in this type of research and considered acceptable (Chan et al., 1997; Venkatraman and Ramanujam, 1987).

The relationships between individual dimensions of different constructs are examined and tested to provide more managerial insights.

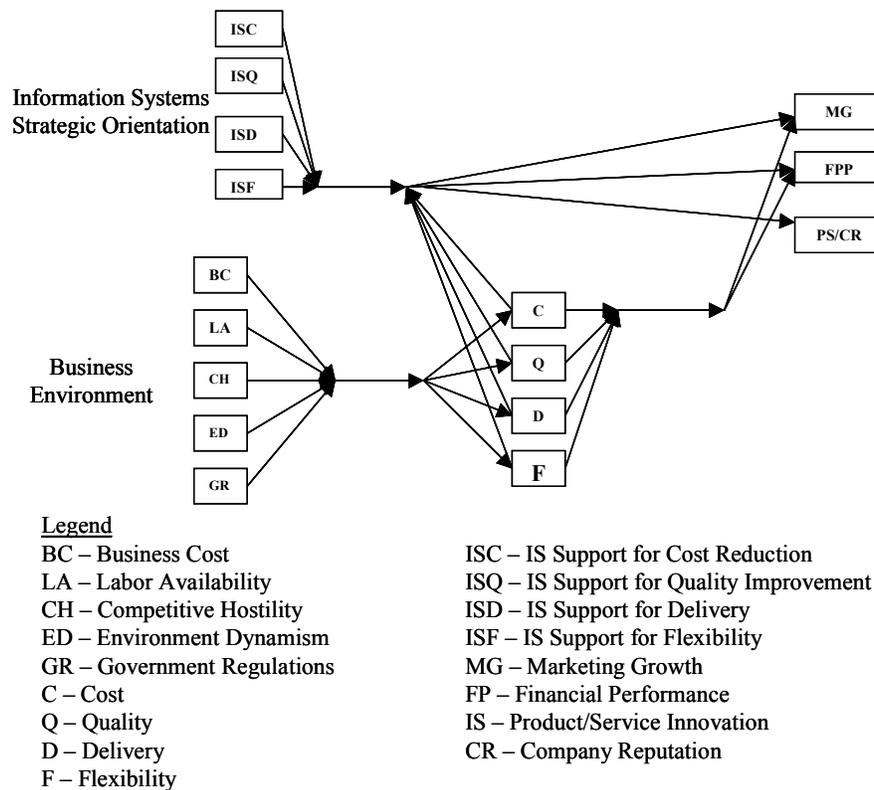
## Research Hypotheses

Based on the framework presented in Figure 1 and Figure 2, several hypotheses are developed and stated as follows:

### **H1: Business environment positively influences operations strategy choice.**

Hypothesis 1 tests whether there is a direct relationship between business environment and operations strategy. The literature provides some empirical evidence on a positive relationship between these two constructs. It is noted that several such studies

(Ward and Duray, 2000; Badri et al., 2000; Youndt et al., 1996; Miller and Roth, 1994; Adam and Swamidass, 1989; Skinner, 1969) reported that business environment influenced managers' selection of operations strategy. Similar findings are expected in this study. The evidence of the support of this hypothesis is assessed by using the entire sample (166 subjects). If there is more than one significant path between a business environment dimension and an operations strategy dimension, hypothesis 1 will be supported.



**Figure 2. Electronic Commerce Operations Strategy Model – A Bi-variate View**

Operations strategy literature also suggests, that from a bi-variate model standpoint, there are significant differences between paths for high and low performing electronic commerce organizations. Hypothesis 1a describes such relationship between high and low performing electronic commerce companies.

**H1<sub>a</sub>: High performing electronic commerce organizations utilize different operations strategy to deal with business environment from those used by low performing organizations.**

The empirical support of this hypothesis is assessed by comparing the path analyses of operations strategy and business environment for both high and low performing groups.

**H2: The fit between business environment and operations strategy positively influences business performance.**

This hypothesis is tested to identify a positive relationship between the alignment of business environment, operations strategy, and business performance in an electronic commerce setting. Previous studies provide empirical evidence on the predicted direct link between the fit between environment factors and operations strategy and business performance. According to Badri et al. (2000) and Ward et al. (1995), high performers responded more to environmental stimuli by adopting different operation strategies than did low performers. The empirical support of this hypothesis is assessed by comparing the fit indices of both high and low performing groups.

**H3: Operations strategy positively influences information systems strategic orientation.**

This hypothesis tests the impact of operations strategy on information systems strategy. Literature provides some empirical evidence on this relationship. Sabherwal and Chan (2001), Reich and Benbasat (2000), Segars and Grover (1998), Das et al. (1993), and Henderson and Venkatraman (1992) all suggested that operations strategy influenced information systems strategic orientation. This relationship was also supported by other previous studies (Turban et al., 2000; Shaw et al., 1997). As a result, it is expected that operations strategy will positively influence information systems strategic orientation. The evidence of the support of this hypothesis is assessed by using the whole sample (166 subjects). If there is more than one significant path between an operations strategy dimension and a dimension of information systems strategic orientation, hypothesis 3 will be supported.

Information strategic orientation literature also suggests, that from a bi-variate model standpoint, there are significant differences between paths for high and low performing electronic commerce organizations. Hypothesis 3a describes such relationship between high and low performing electronic commerce companies.

**H3<sub>a</sub>: High performing electronic commerce organizations implement different information strategic orientation to support operations strategy from those implemented by low performing organizations.**

The empirical support of hypothesis 3a is assessed by comparing the path analyses of the relationship between operations strategy and information systems strategic orientation from both high and low performing groups.

**H4: The fit between information systems strategic orientation and operations strategy positively influences business performance.**

Hypothesis 4 tests whether the alignment between information systems strategic orientation and operation strategy has a positive influence on the business performance. The literature contains evidence of a positive impact of the fit between information systems strategic orientation and operations strategy on business performance (Chan et al., 1997; Chan et al., 1998). Hence, it is expected that the fit between information systems strategic orientation and operations strategy will have a positive impact on the performance. The empirical support of this hypothesis is assessed by comparing the fit indices of the relationship between information systems strategic orientation and operations strategy from both high and low performing groups.

**H5: Information systems strategic orientation positively influences business performance.**

This hypothesis tests the direct impact of between information systems strategic orientation on business performance. Earl (1996) provided empirical evidence that information system strategy was directly linked with business performance. The findings of Chan et al. (1997) and Chan et al. (1998) rendered similar results. It is expected that between information systems strategic orientation directly influences business performance. The evidence of the support of this hypothesis is assessed by using the whole sample (166 subjects). If there is more than one significant path between a dimension of information systems strategic orientation and one of the three dimensions of business performance, hypothesis 5 will be supported.

Strategy literature suggests, that from a bi-variate model standpoint, information systems strategic orientation of high performing electronic commerce firms has different impact on the business performance as compared with low performing electronic commerce firms.

Hypothesis 5a describes such relationship between high and low performing electronic commerce companies.

**H5<sub>a</sub>: Information systems strategic orientation implemented by high performing electronic commerce organizations has significant impact on the business performance than by the low performing electronic commerce companies.**

The empirical support of hypothesis 5a is assessed by comparing the path analyses of the relationship between information systems strategic orientation and business performance from both high and low performing groups.

**H6: High performing organizations conform to the conceptual model to a greater extent than low performing organizations.**

Because of broad support in the literature, it is expected that the model will fit companies that exhibit relatively high business performance. Relatively high and low performers are distinguished in this study because the literature suggests that low performers are less likely to adhere to the model (Badri et al., 2000; Chan et al., 1998; Chan et al., 1997; Ward et al., 1995). It

is expected to find statistical support that high performers have a good fit for a path model directly linking environment factors, operations strategy, electronic business, and business performance. However, the absence of significant linkages or good model fit for high performers would indicate that the data do not support this conceptual model. The empirical support of hypothesis 6 is assessed by comparing the fit indices of the overall conceptual model from both high and low performing groups.

To assess H1a, H2, H3a, H4, H5a, and H6, the database of this research was also partitioned into high and low performers with respect to combined scores of three dimensions of the business performance construct. Hambrick (1984) suggested dividing the sample into separate high and low performance sub-samples in this manner as a practical analytical technique for strategy research. This practical analytical technique has been widely employed in operations strategy research (Badri et al., 2000; Ward et al., 2000; Berry et al., 1999; Ward et al., 1995; Ward et al., 1994). Performance measures are all perceptual scale items in this study. The questions that measure these scale items used a Likert scale ranging from 1 to 5. First, scale items measuring the three dimensions of business performance were averaged to ensure scale consistency among the three dimensions. Then the average scores for the business performance measures of market growth, financial performance, and innovation/reputation were combined and used to identify 84 high performers and 82 low performers. The averaged scores for the business performance measures of market growth, financial performance, and innovation/reputation were added to create a scale that ranges from a low of 3 to a high of 15. Based on this composite score, companies were separated into two groups: low performers having performance values of nine or less and high performers having performance values of 10 or more. Ward et al. (2000) used a similar approach to calculate the composite scores of business performance.

## Research Methodology

The preliminary questionnaire was developed through literature review and interviews with managers of several electronic commerce companies. A set of questionnaire items was developed to corresponding constructs of the business environment, operations strategy, information systems strategic orientation, and business performance. Each set is designed to measure the specific content of each of the corresponding items. Responses are measured on a five-point Likert Scale. The questions used in the development of the instrument were adapted from several previous studies with modifications to fit the electronic commerce setting.

A total of 800 questionnaires were distributed. Out of 202 responses received in a single mailing, 166 were usable resulting in a response rate of 21%. Among the 36 unusable responses, 10 of them do not meet the electronic commerce criteria and the other 26 do not contain sufficient data for further analyzing. Such a response rate is not unusual when the unit of analysis is the firm and involves an extensive organizational level survey (Griffin, 1997).

The data analysis of this research includes: (1) data preparation to conduct a normality test, and (2) instrument validation (reliability and validity) to test the research framework. Several tests were conducted during the instrument validation, including descriptive statistics analysis, tests of scale reliability, criterion-related (horizontal) validity, unidimensionality, construct validity, and tests of convergence and discriminant in measurements and constructs. Generally speaking, these tests and analyses have been widely used in instrument developments in operations management research (Flynn et al., 1990; Gupta and Somers, 1992; Ward et al., 1995; Pagell and Krause, 1999; Badri, et al., 2000; Shin et al., 2000; Koufteros et al., 2001).

## Results

All six proposed hypotheses in the research were empirically supported. Due to limited paper length, only hypothesis 6 is reported in detail for this submission.

### **H6: High performing organizations conform to the conceptual model to a greater extent than low performing organizations.**

Table 1 shows fit indices of the three-construct model of both low and high performers (Kline, 1998). The high performer's model showed an SRMR index of 0.018, a CFI value of 0.94, an RMSE index of 0.057, a  $\chi^2/df$  value of 3.08, and a Critical N of 71.23. All fit indices indicated a good fit of the model for high performers. This indication of a good fit substantiated the overall model of the relationship of business environment, the information systems strategic orientation, and operations strategy for high performing companies. The high performer's model also suggested high statistical power.

**Table 1. Fit Indices – Relationship Among Business Environment, Information Systems Strategic Orientation, and Operations Strategy (Both High and Low Performers)**

	BE, ISO, & OM	
	High Performer	Low Performer
SRMR	0.025	0.142
CFI	0.97	0.55
RMSE	0.047	0.310
$\chi^2$	15.71 (6)	69.73 (6)
$\chi^2/df$	2.618	11.622
Critical N	73.51	120.53
Power	0.992	0.368

<sup>a</sup> Significant path at 0.05 level

The same four-construct model was specified for low performers with dramatically different results. The fit indices did not suggest a good fit of the model when data from low performers were used. The low performer’s model showed an SRMR index of 0.142, a CFI value of 0.55, an RMSE index of 0.310, a  $\chi^2/df$  value of 11.622, and a Critical N of 120.53. All the fit indices indicate a poor fit of the overall model for low performers. The indication of a good fit for high performer’s model and poor fit for the low performer’s model supported hypothesis 6, that high performers conform to the conceptual model to a greater extent than low performers.

## Discussions

Due to the page limitation, only the implication of strategic alignments on business performance is discussed in this section.

As mentioned in hypotheses 2, 4, 5, and 6, the findings of this research indicate that electronic commerce companies with good strategic alignments (fits) perform better than companies with poor strategic alignments. More specifically, the hypotheses test results indicate the following: (1) the fit between the business environment and operations strategy influences business performance (H2); (2) the fit between the information systems strategic orientation and operations strategy influences business performance (H4); and (3) high performers conform to the conceptual model to a greater extent than low performers (H6).

The findings also suggest that systems models of alignment provide more information than do bivariate models (Chan et al., 1997). The bivariate research model (Figure 2) involved the examination of numerous “fine-grained” relationships. The bivariate findings could be somewhat unstable as suggested by (Venkatraman, 1989). This lends support to the view that examining isolated components of strategy and performance could be misleading (Chan et al., 1998). As a result, alignment can be a better predictor of perceived performance.

## Conclusions

This research has built on the work of others, most notably Sabherwal and Chan (2001), Ward and Duray (2000), Badri et al. (2000), Chan et al. (1998), Chan et al. (1997), Ward et al. (1995), and Swamidass and Newell (1987), in expanding the operations strategy theory by adding the information systems strategic orientation construct to the operations strategy model to be examined in an electronic commerce setting.

This research established the existence of important links between operations strategy and a number of business environment dimensions in an electronic commerce setting. In other words, the business environment appeared to have substantial impact on operations strategy, and successful firms (high performers) adopted different operations strategies in response to environment stimuli than did poor performers. This research also confirmed the notion that the fit between the environment and operations strategy was seen as a central tenet of each of the major strategic management streams (Ward et al., 1995).

The existence of important links between operations strategy and a number of information systems strategic orientation dimensions was also established. That is, operations strategy appeared to have significant impact on information systems strategic orientation, and high performing companies utilized different information systems strategies to support their operations strategy than did low performing companies in an electronic commerce setting. This was in line with the assertion that companies that appeared to perform better were companies in which there was better alignment between operations strategy and the information systems strategic orientation (Chan et al., 1997).

This research also established the existence of important links among the business environment, the information systems strategic orientation, and operations strategy. The findings suggested that high performers conformed to the overall conceptual model to a greater extent than low performers. Similar results were also found in a previous operations strategy study (Ward and Duray, 2000).

There were several major findings in this research. The first major finding was that operations strategy researchers should build into virtually all research design explicit considerations regarding environment factors. The business environment appeared to have a tangible impact on strategic choices in operations. It also appeared that a link between the business environment and operations strategy helped determine business performance. The second major finding of this research was that the information systems strategic orientation should be considered in conducting operations strategy research in an electronic commerce environment. An information systems strategic orientation appeared to have a direct support in implementing various operations strategy dimensions. It also appeared that an alignment between the information systems strategic orientation and operations strategy influenced business performance. The third major finding suggested that both the business environment and information systems strategic orientation appeared to have direct impact on operations strategy simultaneously. It also appeared that an alignment among the business environment, the information systems strategic orientation, and operations strategy helped determine business performance.

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