

## Association for Information Systems AIS Electronic Library (AISeL)

---

ICIS 2004 Proceedings

International Conference on Information Systems  
(ICIS)

---

December 2004

# Strategic Fit of Supply Chain Management Information Systems: A Measurement Model

Tim McLaren  
*Ryerson University*

Milena Head  
*McMaster University*

Yufei Yuan  
*McMaster University*

Follow this and additional works at: <http://aisel.aisnet.org/icis2004>

---

### Recommended Citation

McLaren, Tim; Head, Milena; and Yuan, Yufei, "Strategic Fit of Supply Chain Management Information Systems: A Measurement Model" (2004). *ICIS 2004 Proceedings*. 47.  
<http://aisel.aisnet.org/icis2004/47>

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2004 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# STRATEGIC FIT OF SUPPLY CHAIN MANAGEMENT INFORMATION SYSTEMS: A MEASUREMENT MODEL

**Tim McLaren**  
Ryerson University  
Toronto, Ontario, Canada  
[tmclaren@ryerson.ca](mailto:tmclaren@ryerson.ca)

**Milena M. Head**  
McMaster University  
Hamilton, Ontario, Canada  
[headm@mcmaster.ca](mailto:headm@mcmaster.ca)

**Yufei Yuan**  
McMaster University  
Hamilton, Ontario, Canada  
[yuanuf@mcmaster.ca](mailto:yuanuf@mcmaster.ca)

## Abstract

*This study expands upon current conceptualizations of fit between a firm's competitive strategies and information systems capabilities. Limitations of existing theories have hindered the development of operationalized models for measuring the strategic fit of a firm's information system. Using configurational theory and the concept of emergent strategies and capabilities, this paper develops a model for measuring the strategic fit of a specific type of information system: supply chain management information systems (SCM IS). Findings from a multiple-case study of five manufacturers indicate the developed model can give an accurate, reliable, and useful analysis of the strategic fit of a firm's SCM IS. The operationalized model is sufficiently grounded theoretically and empirically to enable further study of the strategic fit of IS and its relationship with firm performance.*

**Keywords:** Strategic fit, measurement model, information systems capabilities, supply chain management

## Introduction

For over 20 years, researchers have proposed, refined, and debated models for studying the fit<sup>1</sup> of competitive strategies with various high-level information systems concepts (e.g., Henderson and Venkatraman 1992; Luftman 2001; Papp 2001; Peppard and Breu 2003). However, the development of detailed operationalized models for measuring the strategic fit of the capabilities enabled by a firm's IS has been hindered by limitations of the theories employed (Ciborra 2000).

This study addresses this gap by developing a theoretically and empirically grounded model for measuring the strategic fit of a specific type of information system: supply chain management information systems (SCM IS). The term supply chain management (SCM) is often used as a synonym for logistics, purchasing, planning, or some combination of these functions. This paper adopts a more integrated definition of supply chain management as planning and coordinating the materials flow from source to user as an integrated system rather than as a series of independent activities (Christopher 1998). SCM IS are interorganizational information systems that use information and communication technology (ICT) to coordinate information within and between the participants of a supply chain (i.e., the customers, retailers, suppliers, and distributors involved in the consumption and provision of a particular product or service). Firms often employ a portfolio of SCM IS, which typically include

---

<sup>1</sup>The terms *fit* and *alignment* are used inconsistently in various studies. This paper uses fit to refer to the state or outcome of alignment, and alignment to refer to the process of alignment.

legacy systems connected by electronic data interchange (EDI), packaged applications using Web-based communications, or some other combination of ICT.

SCM IS are increasingly critical to the success of many firms (Chopra and Meindl 2001; Kumar 2001), but have received insufficient attention in empirical IS research (Subramani 2004). Individual studies have explored the benefits and capabilities of different types of SCM IS such as EDI (Lee et al. 1999; Mukhopadhyay et al. 1995), electronic marketplace (Dagenais and Gautschi 2002; Kaplan and Sawhney 2000), or extended enterprise resource planning (Green 2001) systems. However, there are few empirically derived models suitable for analyzing the range of SCM IS alternatives. As a result, firms face complex and risky decisions analyzing and selecting an appropriate SCM IS solution or ensuring that their implemented systems are aligned with their competitive strategies (Reddy and Reddy 2001). Although the developed strategic fit model is operationalized specifically for SCM IS, the underlying theories and methodology could be adopted in future studies for analyzing other types of information systems.

The following section examines the theoretical foundations of the developed measurement model of the strategic fit of SCM IS. The third section describes a positivist multiple-case study investigation used to explore, refine, and validate the model using a mix of qualitative and quantitative methods. The findings from the case studies are then examined. The final section discusses the implications of the measurement model for research and practice.

## Theoretical Foundations of the Measurement Model

In IS literature, the dominant model of strategic alignment or fit, proposed and refined by several researchers (e.g., Henderson and Venkatraman 1992; Henderson et al. 1996; Luftman 2001; Papp 2001), suggests that for information systems, strategic alignment involves achieving fit between competitive strategies, IS strategies, organizational infrastructure and processes, and IS infrastructure and processes. These models conceptualize strategy using the rational “strategy as design” perspective (e.g., Ansoff 1965; Porter 1985) as opposed to the “strategy as emergent patterns of activities” perspective (e.g., Mintzberg 1978).

Difficulties arise in operationalizing the rational models as they fail to distinguish between *intended* strategies and capabilities and *realized* or *emergent* patterns of activity. To overcome these measurement issues, this study conceptualizes competitive strategies and IS capabilities as patterns of activities that emerge from the dynamic interplay between intended and realized designs (Markus and Robey 1998; Mintzberg 1978; Truex et al. 1999). Thus, measures are used to examine emergent patterns of activity, rather than stated intent.

Configurational theory is used in this study to manage the complexity of analyzing multiple multidimensional constructs such as competitive strategy and IS capabilities (Doty et al. 1993). Miles and Snow (1978) studied emergent competitive strategy patterns in numerous firms and identified four stable and recurring configurations of competitive strategy patterns. Their typology was selected for this study for conceptualizing emergent competitive strategies as it has strong empirical support and predictive utility established from numerous studies in competitive strategy and information systems (Croteau and Bergeron 2001; Doty et al. 1993; Hambrick 1983; Sabherwal and Chan 2001; Zahra and Pierce 1990).

Miles and Snow identified three archetypical configurations known as defenders, prospectors, and analyzers.<sup>2</sup> Each archetype displays unique patterns of responses to 11 dimensions of competitive strategy: product-market breadth, market leadership, market surveillance, growth, process goals, competency breadth, adaptability, administrative focus, planning, organizational structure, and control. Although the descriptions of the archetypes are multifaceted, at a high level, the archetypes exhibit competitive strategy patterns focusing on operational efficiency, innovation, and risk minimization, respectively.

A shortcoming of Miles and Snow’s typology is that the original paragraph-type measure of competitive strategy archetype fails to fully operationalize all 11 dimensions of the typology (Conant et al. 1990). Thus, in this study, questionnaire measures adapted from Conant *et al.* (1990) are used to measure all 11 dimensions of a firm’s competitive strategies and determine the competitive strategy archetype to which the firm most closely corresponds.

---

<sup>2</sup>Miles and Snow identified an additional strategic type called reactors, but since these firms do not appear to have a consistent strategy, the reactor archetype is omitted from most studies (Doty et al. 1993).

The organizational capabilities enabled by a firm’s SCM IS can be modeled using constructs identified in a prior field study (McLaren et al. 2004a): operational efficiency, operational flexibility, planning, internal analysis, and external analysis. Operational efficiency capabilities focus on controlling product and transaction costs (Simons 1987). Operational flexibility capabilities focus on rapid detection of and response to market opportunities (Sambamurthy et al. 2003). Planning capabilities involve determining what quantity of products should be available in which locations at future points in time. Internal analysis capabilities provide support for decision making regarding a firm’s internal operations. External analysis capabilities focus on market scanning and competitive intelligence activities (Segev 1989) in addition to support for monitoring and coordinating the activities of a firm’s supply chain partners (McLaren et al. 2004a).

A related study (McLaren et al. 2004b) analyzed previous empirical studies to determine the theoretically ideal level of support SCM IS should provide for each capability according to Miles and Snow’s competitive strategy archetype of the firm (see Appendix A). This enables questionnaire measures to be used to assess the level of support a firm’s SCM IS are perceived to provide for each capability. Comparing the lack of deviation between the ideal and perceived capabilities profiles gives a measure of the strategic fit of a firm’s SCM IS (Figure 1).

Several researchers recommend operationalizing organizational fit as the Euclidean distance between the ideal and reported values (Van de Ven and Drazin 1985; Venkatraman 1989). Pilot study results from this investigation suggested strategic fit should be determined by the amount the perceived level is *below* ideal, i.e., by subtracting the perceived level of support for each IS capability from the theoretically ideal level, replacing it with zero if negative, and calculating the square root of the sum of the squared differences. A lower distance implies a higher degree of fit.

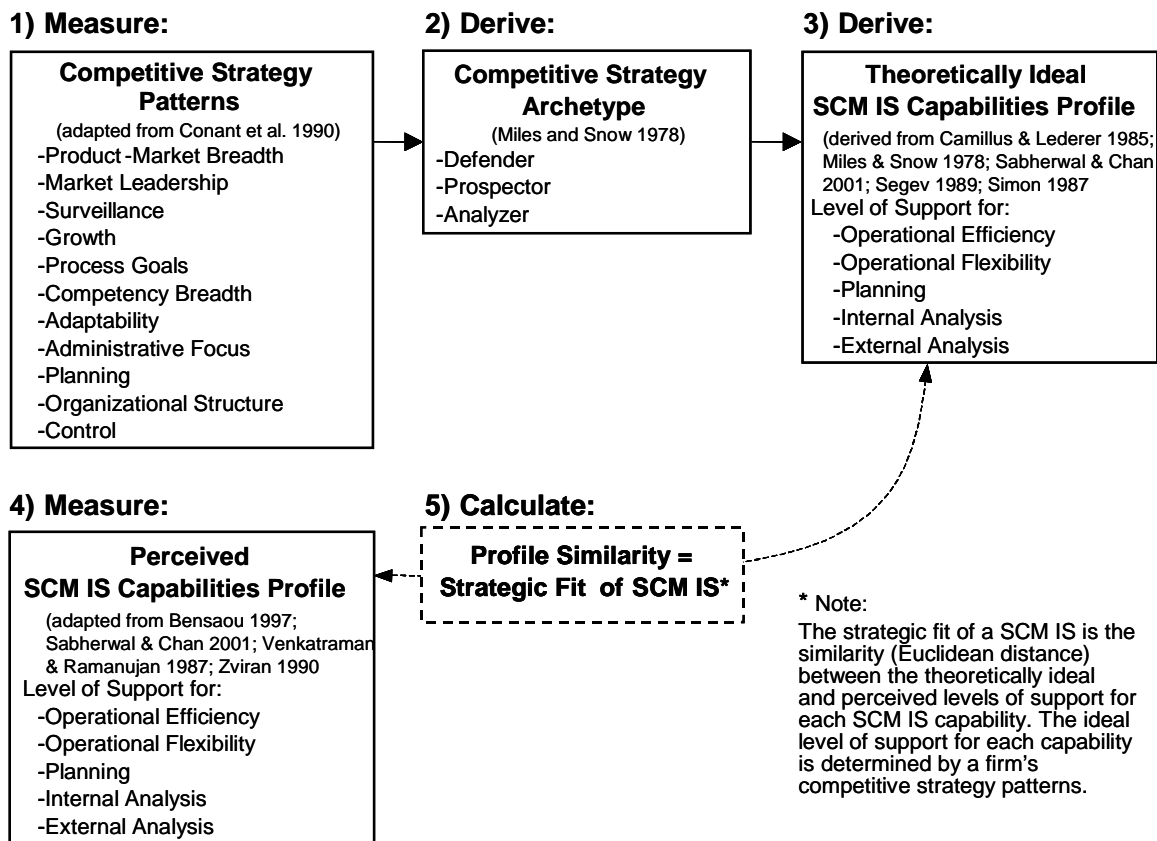


Figure 1. Operationalized Model of Strategic Fit of SCM IS

## Research Design

The objective of this research was to develop and operationalize an empirically supported model for measuring the strategic fit of a firm's SCM IS. A positivist multiple-case study design was used to explore and refine the developed model and evaluate potential operationalizations using case study evidence. A purposive theory-driven sampling strategy was used to ensure all aspects of the proposed theoretical measurement model were included in evidence gathered from the informants (Eisenhardt 1989) and to facilitate comparisons and theoretical and literal replication (Yin 2003). The selection criteria required cases to be established manufacturers with revenues over US\$100 million who had used SCM IS for over 5 years and who were representative of the range of competitive strategies and SCM IS capabilities employed in the model. Descriptions of the cases are summarized in Appendices B and C.

Likert-type questionnaire items adapted from previously validated studies were completed by senior managers from each case to assess the case's competitive strategy archetype and the perceived level of support the case's SCM IS provide for operational efficiency, operational flexibility, planning, internal analysis, and external analysis (see the previous section). Interviews and questionnaires were completed by multiple informants from five firms to ensure the data covered a range of competitive strategy types, SCM IS, and participant experiences. A total of seven senior managers, two senior consultants, and three expert researchers were interviewed as some had knowledge of multiple cases. Senior managers were responsible for SCM IS at the case; consultants had SCM IS consulting experience at the case; expert researchers had knowledge of the case through publicly available documents. Data gathered from the external participants were used only to corroborate evidence and provide feedback on the analyses and findings. All participants had a minimum 5 years of experience in the industry in order to be able to compare the case with its competitors.

Results from questionnaires were compared with results of a pattern-matching analysis of interviews and archival documents, which were gathered from the cases over a 20-month period and coded and analyzed using QSR's NVivo software. The analyses were compared between cases, respondents, and methods to further refine the theoretical measurement model (Eisenhardt 1989), check for corroboration of measures and respondents (Sawyer 2001), and assess the objectivity, content validity, and internal consistency reliability of the measures and resulting analyses of the strategic fit of a firm's SCM IS (Straub et al. 2004).

Objectivity was ensured through "member checking"—having the informants review the case analyses and highlight any inaccuracies to ensure the findings followed from the evidence. Objectivity was also enhanced through constant comparisons and pattern matching between the theories and data. Content validity was established through use of previously validated measures, triangulation of multiple data sources, theoretical sensitivity of the researchers to the cases, and extensive pilot-testing of alternative measures using case respondents and a panel of three expert practitioners. Reliability was strengthened by using a formal case study protocol, maintaining a database of evidence and findings, and comparing results from multiple respondents (Eisenhardt 1989; Strauss and Corbin 1998; Yin 2003).

## Findings

The measurement model outlined in Figure 1 was used to assess the competitive strategy archetype of each case, derive the theoretically ideal level of support the case's SCM IS should provide for each capability, measure the perceived level of support the case's SCM IS did provide for each capability, and determine the gaps between the ideal and perceived levels.

For steps 1 and 2 of the model, Table 1 summarizes the competitive strategy archetype each case most closely resembled. The first column gives the archetype derived from the questionnaire measures adapted from Conant et al.'s (1990) 11-dimension measure and the Miles and Snow (1978) paragraph-type measure, respectively. The second column shows the archetype derived from the qualitative analysis of interview transcripts and archival documents. Except for one response to the paragraph-type measure, there was agreement in each case's competitive strategy archetype between each respondent for a case and between each of the three measures. This indicates the measures have good content validity and internal consistency reliability. This also suggests the more parsimonious yet controversial paragraph-type measure provides an accurate assessment of Miles and Snow's competitive strategy archetype in many, but not all, cases. Regardless, the Conant et al. 11-dimension measure gave a more detailed, informative, and theoretically sound assessment of Miles and Snow's multidimensional competitive strategy construct than the original paragraph-type measure.

**Table 1. Competitive Strategy Archetype Inferred from Questionnaires and Interviews**

Case	Archetype from Questionnaires	Archetype from Qualitative Analysis	Example Evidence from Qualitative Analysis
A1	Defender	Defender	Focus on: cost controls; risk management; quality; market dominance; long-term relationships/contracts
A2	Analyzer	Analyzer	Focus on: sales; risk management; adopting proven technologies; competitive intelligence; market scanning
B	Defender <sup>a</sup>	Defender	Focus on: cost controls; quality; economies of scale; long-term relationships/contracts
C	Prospector	Prospector	Focus on: technology innovation; customized products; market share growth
D	Prospector	Prospector	Focus on: innovation; interfirm collaboration; market share growth; market scanning; time-to-market
E	Prospector	Prospector	Focus on: research; innovation; collaboration; breadth of products; customer relationships

<sup>a</sup>One respondent from Case B chose the reactor paragraph but noted on the questionnaire that it was difficult to decide between that and their second choice, defender. The other respondents chose the defender paragraph for the case.

In step 3, for each case's archetype, the ideal level of support for each SCM IS capability was derived from Appendix A and converted to a five-point scale where 1 = very low, 2 = low, 3 = medium, 4 = high, and 5 = very high. In step 4, the perceived level of support the case's SCM IS provided for each capability was measured using a five-point Likert-type multi-item questionnaire adapted from existing studies (Bensaou 1997; Sabherwal and Chan 2001; Venkatraman and Ramanujam 1987; Zviran 1990). The questionnaire asked respondents to indicate the level of support their SCM IS provided for each capability relative to the level provided by their competitors' SCM IS. The answers from each respondent for a case were then averaged to create the perceived SCM IS capabilities profile for the case.

In step 5, the ideal and perceived SCM IS capabilities profiles were compared to identify the areas of misfit. The deviation or amount the perceived capabilities were below the ideal levels was found by subtracting the observed capabilities levels from the ideal levels and recording a zero if the result was negative. For example, for Case A2, the perceived capabilities profile [4.0, 2.0, 2.6, 3.3, 2.3] subtracted from the ideal profile [3.0, 3.0, 3.0, 4.0, 4.0] resulted in a deviation of [0.0, 1.0, 0.4, 0.7, 1.7]. This indicates a significant lack of strategic fit existed for support for operational efficiency and external analysis and lesser misfits existed for planning and internal analysis.

A numerical calculation of the overall strategic fit of the SCM IS capabilities was also obtained from the Euclidean distance between the two profiles. For Case A2, the overall level of strategic fit (where zero is perfect fit) was 2.2 (with a inter-rater range of 0.0). Table 2 summarizes the misfits and overall Euclidean distance (lack of strategic fit) for each of the cases studied. Deviations of 1.0 or greater are shown in bold to highlight misfits where the perceived level of support for a capability is significantly less than the theoretically ideal value for the case.

The traditional modeling of misfits as the absolute deviation from ideal was not well corroborated by qualitative evidence from interviews and archival documents. However, the modeling of misfit as the deviation *below* ideal was strongly corroborated. For example, qualitative evidence from Case A2 strongly matched the finding from Table 2 that Case A2's SCM IS did not provide an adequate level of support for external analysis. The qualitative evidence included reports of users frustrated with the inability to perform market scanning and competitive analyses, as well as evidence of *ad hoc* systems being developed to address the gap.

Based on the results from Table 2, summary case study analyses were prepared that identified the capabilities each case needed to focus on to improve the strategic fit of the firm's SCM IS. The developed measurement model and resulting analyses were reviewed with the most senior participant in each case. Semi-structured interviews were conducted to examine the validity and usefulness of the model. The responses indicated the theoretical model and the case analyses appeared to be very valid, in other words, to have strong face validity (Trochim 2000) as seen in the participant's comments attesting to its ability to accurately reflect their situation. For example,

**Table 2. Deviation of SCM IS Capabilities below Theoretically Ideal Levels**

Case	Average (Range) of Deviation below Ideal Level (0.0 = perfect fit between perceived and ideal capabilities)					Average (Range) of Euclidean Distance
	Operational Efficiency	Operational Flexibility	Planning	Internal Analysis	External Analysis	
A1	0.0 (0.0)	0.0 (0.0)	0.4 (0.8)	0.8 (0.5)	0.0 (0.0)	0.8 (0.8)
A2	0.0 (0.0)	<b>1.0</b> (0.0)	0.4 (0.8)	0.7 (0.5)	<b>1.7</b> (0.5)	2.2 (0.0)
B	<b>2.0</b> (0.0)	0.0 (0.0)	<b>1.0</b> (0.0)	<b>1.0</b> (0.0)	0.0 (0.0)	2.4 (0.0)
C	0.0 (0.0)	<b>1.5</b> (0.0)	0.1 (0.3)	0.0 (0.0)	<b>2.0</b> (0.0)	2.5 (0.0)
D	0.0 (0.0)	0.5 (0.0)	0.1 (0.8)	0.0 (0.0)	<b>1.0</b> (2.0)	1.1 (1.7)
E	0.0 (0.0)	0.8 (1.0)	0.0 (0.0)	0.0 (0.0)	<b>1.0</b> (1.0)	1.3 (0.0)

*AI-1: The outcome of [our retail and corporate business units having] two different [competitive strategy] types was a very interesting way of looking at things and looking at why [our retail] business is different and why it has different needs. Because the retail business [Case A2] has always said “we just need this” [even though these needs are not] necessarily aligned with the operational efficiency that the defender archetype [of Case A1] demands.*

The findings also appeared to have strong reliability as seen in corroboration of findings from multiple sources of data. The analyses generated from the model did not appear to be surprising to the case participants. The greatest contribution appeared to be in enabling the *communication* of the firms’ competitive strategies and the resultant SCM IS capabilities that would support those strategies,

*AI-1: I think it confirms a lot of what I and a number of my colleagues have been thinking. But it puts it in a nice framework to be able to have the IT people [and] business people down to the lowest level of corporation understand the link [between strategy and IS] and understand what it is that we’re trying to achieve.*

## Conclusions

The objective of this research was to develop and operationalize a theoretically and empirically supported model for measuring the strategic fit of a firm’s SCM IS. The model was developed to help firms better understand, assess, and improve the strategic fit of the capabilities supported by their SCM IS. These objectives were accomplished by proposing a theoretically grounded measurement model and gathering extensive empirical data from a multiple-case study to explore and refine the model and examine its operationalization.

Several IS studies have noted that organizational performance is associated with achieving strategic fit between competitive strategies and IS strategies (Gupta et al. 1997; Kearns and Lederer 2001; Sabherwal and Chan 2001). Although models exist for studying the fit of competitive strategies with various high-level IS concepts (e.g., Henderson et al. 1996; Luftman 2001; Papp 2001), they have not been developed to a level of detail sufficient for examining the strategic fit of specific types of IS—such as SCM IS. One reason may be because the dominant rational models of strategic fit do not distinguish between a firm’s intended and emergent strategies and IS capabilities.

However, by employing configurational theory and the concept of emergent strategies and capabilities, this paper developed an operationalized model for measuring the strategic fit of a firm’s SCM IS. The developed measurement model has strong theoretical and empirical support and can be easily implemented using two short questionnaire measures of emergent competitive strategy patterns and SCM IS capabilities.

The developed model of strategic fit of SCM IS can provide practitioners with a holistic yet parsimonious model for understanding and assessing the fit of their IS with their emergent competitive strategies. The model contributes to the body of knowledge by integrating theories of strategic fit, emergent competitive strategies, and information system capabilities. The measurement model

is sufficiently grounded theoretically and empirically to provide usefulness assessments of strategic fit of a firm's SCM IS and to enable further study.

## References

- Ansoff, H. I. *Corporate Strategy*, McGraw-Hill, New York, NY, 1965.
- Bensaou, M. "Inter-Organizational Cooperation: The Role for Information Technology. An Empirical Comparison of US and Japanese Supplier Relations," *Information Systems Research* (8:2), 1997, pp. 107-124.
- Camillus, J. C., and Lederer, A. L. "Corporate Strategy and the Design of Computerized Information Systems," *Sloan Management Review* (26:3), 1985, pp. 35-42.
- Chopra, S., and Meindl, P. *Supply Chain Management: Strategy, Planning, and Operation*, Prentice-Hall, Inc, Upper Saddle River, NJ, 2001.
- Christopher, M. *Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service* (2<sup>nd</sup> ed.), Financial Times, Prentice Hall, London., 1998.
- Ciborra, C. U. "A Critical Review of the Literature," in *From Control to Drift: The Dynamics of Corporate Information Infrastructures*, C.U. Ciborra (Ed.), Oxford University Press, Oxford, UK, 2000, pp. 20-33.
- Conant, J. S., Mokwa, M. P., and Varadarajan, P. R. "Strategic Types, Distinctive Marketing Competencies, and Organizational Performance: A Multiple Measures-Based Study," *Strategic Management Journal* (11:5), September 1990, pp. 365-383.
- Croteau, A.-M., and Bergeron, F. "An Information Technology Trilogy: Business Strategy, Technological Deployment and Organizational Performance," *Journal of Strategic Information Systems* (10), 2001, pp. 77-99.
- Dagenais, T., and Gautschi, D. *Net Markets: Driving Success in the B2B Networked Economy*, McGraw-Hill Ryerson Ltd., Toronto, ON, 2002.
- Doty, D. H., Glick, W. H., and Hubner, G. P. "Fit, Equifinality, and Organizational Effectiveness: A Test of Two Configurational Theories," *Academy of Management Journal* (36:6), 1993, pp. 1196-1250.
- Eisenhardt, K. M. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), 1989, pp. 532-550.
- Green, F. B. "Managing the Unmanageable: Integrating the Supply Chain with New Developments in Software," *Supply Chain Management: An International Journal* (6:5), 2001, pp. 208-211.
- Gupta, Y. P., Karimi, J., and Somers, T. M. "Alignment of a Firm's Competitive Strategy and Information Technology Management Sophistication: The Missing Link," *IEEE Transactions on Engineering Management* (44:4), November 1997, pp. 399-413.
- Hambrick, D. C. "Some Tests of the Effectiveness and Functional Attributes of Miles and Snow's Strategic Types," *Academy of Management Journal* (26:1), 1983, pp. 5-26.
- Henderson, J. C., and Venkatraman, N. "Strategic Alignment: A Model for Organizational Transformation through Information Technology," in *Transforming Organizations*, T. A. Kochan and M. Useem (Eds.), Oxford University Press, Oxford, United Kingdom, 1992.
- Henderson, J. C., Venkatraman, N., and Oldach, S. "Aligning Business and IT Strategies," in *Competing in the Information Age: Strategic Alignment in Practice*, J. N. Luftman (Ed.), Oxford University Press, New York, 1996, pp. 21-41.
- Kaplan, S., and Sawhney, M. "E-Hubs: The New B2B Marketplaces," *Harvard Business Review*, May/June 2000, pp. 97-103.
- Kearns, G. S., and Lederer, A. L. "Strategic IT Alignment: A Model for Competitive Advantage," in *Proceedings of the 22<sup>nd</sup> International Conference on Information Systems*, V. Storey, S. Sarkar and J. I. DeGross (Eds.), New Orleans, LA, December 16-19, 2001, pp. 1-12.
- Kumar, K. "Technologies for Supporting Supply Chain Management," *Communications of the ACM* (44:6), June 2001, pp. 58-61.
- Lee, H. G., Clark, T., and Tam, K. T. "Research Report. Can EDI Benefit Adopters?," *Information Systems Research* (10:2), 1999, pp. 186-195.
- Luftman, J. N. "Assessing Business-IT Alignment Maturity," in *Strategic Information Technology: Opportunities for Competitive Advantage*, R. Papp (Ed.), Idea Group Publishing, Hershey, PA, 2001.
- Markus, M. L., and Robey, D. "Information Technology and Organizational Change: Causal Structure in Theory and Research," *Management Science* (34:5), May 1998, pp. 583-598.
- McLaren, T. S., Head, M. M., and Yuan, Y. "Supply Chain Management Information Systems Capabilities: An Exploratory Study of Electronics Manufacturers," *Information Systems and e-Business Management* (in press), 2004a.
- McLaren, T. S., Head, M. M., and Yuan, Y. "Using Competitive Strategy Patterns to Determine Ideal Supply Chain Management Information Systems Capabilities," *International Journal of Internet and Enterprise Management* (2:1), 2004b, pp. 45-61.
- Miles, R. E., and Snow, C. C. *Organizational Strategy, Structure, and Process*, McGraw-Hill, New York, 1978.
- Miles, R. E., Snow, C. C., Meyer, A. D., and Coleman Jr., H. J. "Organizational Strategy, Structure, and Process," *Academy of Management Review* (3:3), 1978, pp. 546-562.



- Mintzberg, H. "Patterns in Strategy Formulation," *Management Science* (24:9), 1978, pp. 934-948.
- Mukhopadhyay, T., Kekre, S., and Kalathur, S. "Business Value of Information Technology: A Study of Electronic Data Interchange," *MIS Quarterly* (19:2), 1995, pp. 137-156.
- Papp, R. "Introduction to Strategic Alignment," in *Strategic Information Technology: Opportunities for Competitive Advantage*, R. Papp (Ed.), Idea Group Publishing, Hershey, PA, 2001, pp. 1-24.
- Peppard, J., and Breu, K. "Beyond Alignment: A Coevolutionary View of the Information Systems Strategy Process," in *Proceedings of the 24<sup>th</sup> International Conference on Information Systems*, S. T. March, A. P. Massey, and J. I. DeGross (Eds.), Seattle, WA, 2003, pp. 743-750.
- Porter, M. E. *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, New York, 1985.
- Reddy, R., and Reddy, S. *Supply Chains to Virtual Integration*, McGraw-Hill, New York, 2001.
- Sabherwal, R., and Chan, Y. E. "Alignment between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders," *Information Systems Research* (12:1), March 2001, pp. 11-33.
- Sambamurthy, V., Bharadwaj, A., and Grover, V. "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," *MIS Quarterly* (27:2), June 2003, pp. 237-263.
- Sawyer, S. "Analysis by Long Walk: Some Approaches to the Synthesis of Multiple Sources of Evidence," in *Qualitative Research in IS: Issues and Trends*, E. M. Trauth (Ed.), Idea Group Publishing, Hershey, PA, 2001, pp. 163-189.
- Segev, E. "A Systematic Comparative Analysis and Synthesis of Two Business-level Strategic Typologies," *Strategic Management Journal* (10:5), 1989, pp. 487-505.
- Simons, R. "Accounting Control Systems and Business Strategy: An Empirical Analysis," *Accounting, Organizations and Society* (12:4), 1987, pp. 357-374.
- Straub, D., Boudreau, M.-C., and Gefen, D. "Validation Guidelines for IS Positivist Research," *Communications of the Association for Information Systems* (13), April 2004, pp. 380-427.
- Strauss, A., and Corbin, J. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (2<sup>nd</sup> ed.), Sage Publications, Inc., Thousand Oaks, CA, 1998.
- Subramani, M. "How Do Suppliers Benefit from Information Technology Use in Supply Chain Relationships?," *MIS Quarterly* (28:1), March 2004, pp. 45-73.
- Trochim, W. *The Research Methods Knowledge Base* (2<sup>nd</sup> ed.), Atomic Dog Publishing, Cincinnati, OH, 2000.
- Truex, D. P., Baskerville, R., and Klein, H. "Growing Systems in Emergent Organizations," *Communications of the ACM* (42:8), August 1999, pp. 117-123.
- Van de Ven, A. H., and Drazin, R. "The Concept of Fit in Contingency Theory," *Research in Organization Behavior* (7), 1985, pp. 333-365.
- Venkatraman, N. "The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence," *Academy of Management Review* (14:3), 1989, pp. 423-444.
- Venkatraman, N., and Ramanujam, V. "Planning System Success: A Conceptualization and an Operational Model," *Management Science* (33:6), June 1987, pp. 687-705.
- Yin, R. K. *Case Study Research: Design and Methods* (3<sup>rd</sup> ed.), Sage Publications, Inc., Beverly Hills, CA, 2003.
- Zahra, S. A., and Pierce, J. A. "Research Evidence on the Miles-Snow Typology," *Journal of Management* (16:4), 1990, pp. 751-768.
- Zviran, M. "Relationships between Organizational and Information Systems Objectives: Some Empirical Evidence," *Journal of Management Information Systems* (7:1), Summer 1990, pp. 65-84.

## Appendix A. Competitive Strategy Archetype and Support for SCM IS Capabilities

SCM IS Capability and Ideal Level of Support	Justification from Previous Studies
<b>Operational Efficiency</b> Defenders – High Prospectors – Low Analyzers – Medium	Defenders invest heavily in cost and technological efficiency while Prospectors have inherent inefficiency. Analyzers require efficiency for their mature product lines but not to the level of Defenders overall (Miles et al. 1978). Supported by other empirical studies (Conant et al. 1990; Doty et al. 1993; Miles and Snow 1978; Segev 1989; Simons 1987).
<b>Operational Flexibility</b> Defenders – Low Prospectors – High Analyzers – Medium	Defenders less focused on responding to shifts in market environment while Prospectors require a large degree of technological and operational flexibility. Analyzers require flexibility for their immature product lines but not to the level of Prospectors overall (Miles et al. 1978). Supported by other empirical studies (Conant et al. 1990; Doty et al. 1993; Segev 1989; Simons 1987).
<b>Planning</b> Defenders – High Prospectors – Medium Analyzers – Medium	Defenders require intensive planning to meet cost and efficiency goals while decreasing risks, while Analyzers plan heavily for stable products but less for innovative products. Prospectors plan less intensively and for shorter terms, but have broader coverage (Miles et al. 1978). Supported by other empirical studies (Conant et al. 1990; Doty et al. 1993; Miles and Snow 1978).
<b>Internal Analysis</b> Defenders – High Prospectors – Low Analyzers – High	Defenders invest heavily in internal monitoring and controls for efficiency; Analyzers coordinate complex matrix administrative structures. Prospectors have low levels of internal controls and formalization hence require lower levels of internal analysis (Conant et al. 1990; Doty et al. 1993; Miles and Snow 1978).
<b>External Analysis</b> Defenders – Low Prospectors – High Analyzers – High	Prospectors invest heavily in scanning the environment for potential opportunities while Defenders tend to ignore external changes. Analyzers must frequently monitor the marketplace to adopt successful innovations (Miles et al. 1978). Supported by several empirical studies (Conant et al. 1990; Doty et al. 1993; Miles and Snow 1978).

Adapted from T. S. McLaren, M. M. Head, and Y. Yuan, "Using Competitive Strategy Patterns to Determine Ideal Supply Chain Management Information Systems Capabilities," *International Journal of Internet and Enterprise Management* (2:1), 2004, pp. 45-61.

## Appendix B. Summary of Case Descriptions

**Case A** produces and distributes energy products primarily in Canada. Throughout the firm, a centralized EDI-enabled ERP application is used for supply chain management, financial analysis, and procurement. For the corporate business unit represented by Case A1, the SCM IS are primarily used for internal supply chain transactions, planning, and analyses, with some usage for external procurement transactions and analyses. For the retail business unit represented by Case A2, the SCM IS are used more for external market scanning, product pricing analyses, and managing relationships and transactions with retail dealers and 3PL providers.

**Case B** is a global contract manufacturer of electronic devices and components. Case B fulfils the various manufacturing, design, and supply chain management requirements that its clients desire to outsource. Although Case B tends to have long-term relationships and contracts with its large clients, there are typically several other global contract manufacturers that compete for the same clients. The SCM IS used by Case B have advanced capabilities for coordinating and optimizing the supply chain. However, the diversity of product lines, geographic dispersion of the facilities, and frequency of mergers and acquisitions has resulted in Case B having a large number of different SCM IS, which are not always well integrated.

**Case C** designs and manufactures integrated circuits (electronics chips) for use in electronics products that are manufactured by other firms. The relatively small size of the company in Case C and the limited breadth of products has made it easier for them to deploy a fairly simple, integrated, and centralized SCM IS portfolio. Although there is interest in collaborative supply chain capabilities, the relatively low-volume, high-margin transactions have not required Case C to invest heavily in supply chain collaboration systems to date.

**Case D** is involved in the sales, service, manufacturing, and distribution of innovative high-end equipment for long-haul telecommunication networks. Case D outsources much of the product manufacturing to contract manufacturers including Case B and hence utilizes SCM IS primarily for order management and finance, rather than manufacturing and distribution. A centralized SCM IS is used throughout the firm to aggregate demand for parts between the business units of the firm and to manage purchasing.

**Case E** sells, services, manufacturers, and distributes equipment for long haul telecommunication networks. Case E outsources product manufacturing to contract manufacturers including Case B. However, the proportion of manufacturing outsourced by Case E is less than Case D. Although Case E's SCM IS are used primarily for order management and finance, manufacturing and distribution functionality is used more extensively than at Case D. In addition, Case E generally has a larger product and geographic range than Case D and has operated the business for a much longer period. Case E uses a variety of SCM IS including several different ERP systems, which are partially integrated with an enterprise-wide advanced planning and scheduling SCM IS. Separate order management, finance, and product lifecycle management IS are used to manage order fulfilment, product development, customer service, and market intelligence. There is some process integration with customers and suppliers; however, the information exchanged is limited mostly to capturing customer requirements and aggregating purchase orders.

## Appendix C. Overview of Cases Studied

	Case A1/A2	Case B	Case C	Case D	Case E
Business	Production and distribution of energy products	Contract electronics manufacturing	Design and manufacturing of integrated circuits	Sales, service, manufacturing of networking, communication devices	Sales, service, manufacturing of networking, communication devices
Sales for FY2002 (in US\$ millions)	>10,000	>10,000	~100	>10,000	>10,000
Profit Margin for FY2002	>5%	<0%	>10%	>10%	<0%
Employees in FY2002	>5,000	>30,000	<500	>30,000	>30,000