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The Impact of Strategy and IS Flexibility on Performance in the Supply Chain Context: A Path Analysis

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79F. The Impact of Strategy and IS Flexibility on Performance in the Supply Chain Context: A Path Analysis Approach

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Abstract
Little is known about the interrelationships among flexibility, strategy, and performance in the supply chain context. This paper reports the effect of various types of strategy and information systems flexibility (ISF) on performance in the supply chain. Using the data collected from 175 small- and medium-sized manufacturing (SME) firms in Canada, we examine the effect that three different strategies with ISF have on performance. The study produced three main conclusions. First, the findings provide evidence of the direct effects of strategy on ISF. Second, the total effect of strategy and ISF positively impacted non-financial performance. Third, the total effect strategy and ISF have no impact on financial performance. The main implication is that the investment in ISF should be involved in the strategic decision-making.

Keywords
Strategy, Flexibility, Performance, Supply chain, Information Systems

1. Introduction
Flexibility in supply chains represents a potential means of improving a company's efficiency and is one significant measure of supply chain performance. Supply chain flexibility is defined as encompassing those flexibility dimensions that directly impact a firm's customers (Vickery et al., 1999, Kumar et al., 2006). Very few studies have focused on supply chain flexibility and there are even fewer studies about the relationship between flexibility and strategy in the supply chain context; this topic offers a research opportunity (Sanchez and Perez, 2005).

With advanced information technology and information systems (IT/IS) applications – such as SCM, ERP, CRM, and EDI – it is possible for an organization to achieve high levels of flexibility because the speed and accuracy of data flow accelerate the ordering process. Weill (1993) suggests that IT/IS flexibility must be able to handle increased customer demands without increased costs. Lambert and Stock (1993) state that "IT/IS must share responsibility for much of the rigidity and inflexibility of organizations" and explain that certain "rigid" IS have inhibited the ability of organizations to exploit business opportunities by preventing a change in business strategy.

Over the last two decades, supply chain flexibility has become much more important to firms and less expensive to acquire. Among the most important types of supply chain flexibility is ISF. Duclos et al. (2003) define ISF as "the ability to align information system architectures and systems with the changing information needs of the organization as it responds to changing customer demand." For this research, ISF is defined as "the ability of the supply chain information systems (functions whether internal or external) to share the strategic information and support changing requirements of the business with respect to the changing customer's request."

Drawing upon the manufacturing flexibility, supply chain management, and information systems literature, this research study empirically examines the effect of strategy and ISF on performance in the supply chain context in SMEs. Using the data collected from 175 firms that were manufacturing industries in Canada, the identified constructs have been used to test a theoretical relationship using the path analysis technique. The paper is structured in the following way. Section 2 explains the research model and hypotheses. Section 3 outlines the research methodology of the empirical study. Section 4 presents the LISREL ISF path model. Section 5 provides results and data analysis. Section 6 presents a discussion of the research study. Finally, the paper concludes with the limitations of the study and directions for further research in Section 7.

2. Research Model and Hypotheses

2.1 Basic Model

Part a of Figure 1 displays the conceptual basic relationship model of manufacturing strategy, manufacturing flexibility, and an organization's performance. Our adaptation of various conceptual models (Gerwin, 1993; Suarez et al., 1996; Vokurka and O'Leary Kelly, 2000; and Kumar et al., 2006), shown in part a of Figure 1, clearly shows the expected links among three variables: strategy, flexibility, and organizational performance. The basic model, shown in part a of Figure 1, has the hypothesis that the manufacturing strategy will initiate the development and the implementation of manufacturing flexibility dimensions. As a result, the introduction of manufacturing flexibility enhances the organization's performance.

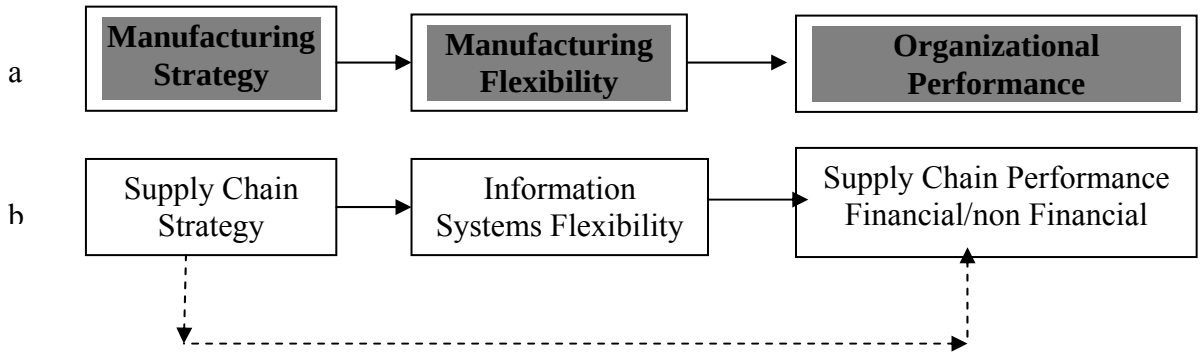

Figure 1: The Conceptual Basic Model

(Gerwin, 1993; Suarez, el al., 1996; Gupta and Somers, 1996; Vokurka and O'Leary Kelly's, 2000; and Kumar et al., 2006)

As shown in the conceptual basic model, part b of Figure 1, we have used supply chain strategy instead of manufacturing strategy. The rationale behind this is based on the fact that flexibility is not only an element of manufacturing strategy but is also related to marketing, R&D, and supply chain strategies (Kumar et al., 2006). Moreover, several researchers have argued that an organization should develop a manufacturing strategy that is consistent with and linked to its supply chain strategy to enhance business strategy (Kim, 2006). In the basic model shown in part b of Figure 1, we used ISF instead of manufacturing flexibility. This research study extends these concepts of manufacturing flexibility and flexible organizations to the supply chain. The supply chain extends beyond the enterprise, which means that supply chain flexibility must also extend beyond one firm's internal flexibility (Duclos et al., 2003). Ody and Newman (1991) suggest that IT can be seen as a way of reducing lead times for selling, reordering, and increasing an organization's flexibility. Duclos et al. (2003) have also suggested that flexible information systems are one of the elements of supply chain flexibility: "supply chain partners must be willing to adapt their information systems to meet the needs of all partners and upgrade the business processes as the market evolves." With the advent of the SCM concepts, business communities have been realizing that being competitive as a single company is no longer adequate; instead, competitiveness requires consideration of all channels in the supply chain. Finally, in the conceptual basic model shown in part b of Figure 1, we have used supply chain performance instead of organizational performance. In the context of the supply chain environment it is more appropriate to examine supply chain performance than organizational performance. A key point in SCM is that the entire process must be viewed as one system. The performance of each member of the supply chain (suppliers, manufacturing plants, warehouses, customers, etc.) affects the overall performance of the supply chain.

2.2 Research Model

Figure 2 represents the research model based on the three supply chain strategies, ISF, and four supply chain performance dimensions. It should be pointed out that the antecedents of strategy, supply, and performance identified in this research cannot be considered complete. Although other dimensions are of great interest, they are not included due to the length of the survey and the concerns regarding the parsimony of this research. For the purpose of simplicity, the diagram

shown in Figure 2 does not show all direct paths (i.e., strategy and performance) expressed by the model.

2.3 Research Hypotheses

The first group of hypotheses in this study deals with the relationship between strategy and ISF. The link between strategy and flexibility is well established in the literature. There are empirical studies as well as theoretical studies supporting the link between strategies and flexibility. One of the earliest empirical studies to examine the relationship between strategy and manufacturing flexibility was by Ettlie and Penner-Hahn (1994). In a large-scale study, Gupta and Somers (1996) examined the impact of a firm's strategy on nine separate dimensions of manufacturing flexibility. The literature has also suggested the theoretical relationship between flexibility and strategy (Gerwin, 1993; Kumar et al., 2006; Vokurka and O'Leary Kelly, 2000). These studies provide initial support for the existence of a contingency-based relationship between ISF and the supply chain strategy adopted by a firm. In general, the researcher studies the hypotheses that supply chain strategy has a direct positive effect on ISF. According to the information systems flexibility model presented in Figure 2 the research study proposes the following hypotheses.

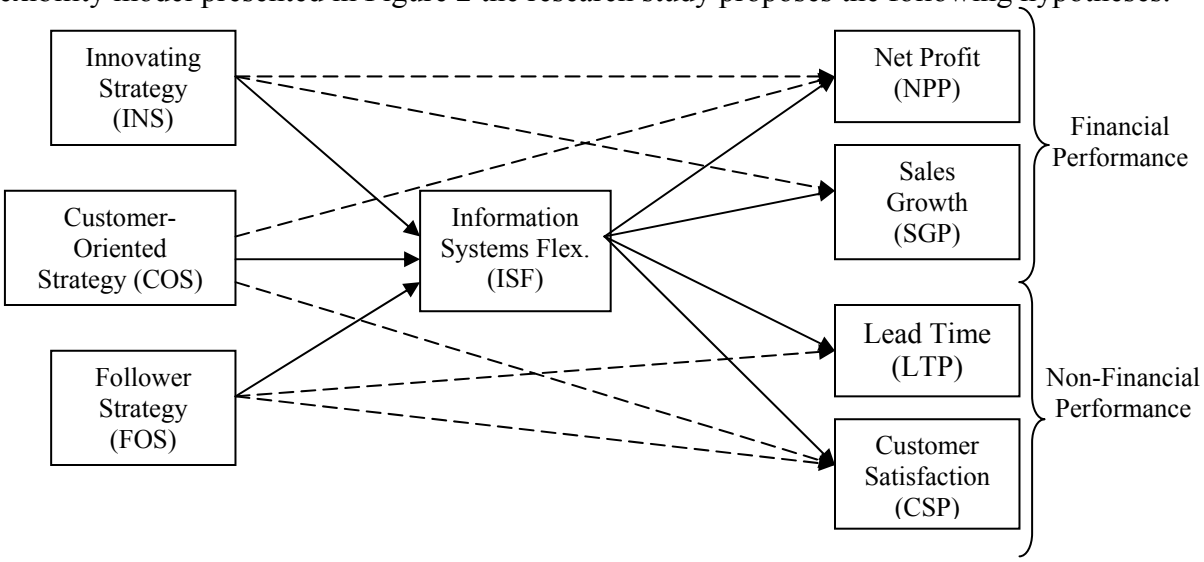

Figure 2: Information Systems Flexibility Model

H1a: Innovative strategy has direct effects on the adoption of information systems flexibility.
H1b Customer-oriented strategy has directs effects on the adoption of information systems flexibility.
H1c: Follower strategy has direct effects on the adoption information systems flexibility.

Besides direct effects, supply chain strategy also indirectly affects supply chain performance through the ISF dimension. The second group of hypotheses deals with the total effect of strategy and ISF on performance. The total effect is simply the sum of the direct effects and all the indirect effects that occur through intervening variables. This group of hypotheses proposes that the positive effect of supply chain strategy on performance can be enhanced by linking it with ISF. The indirect effects of strategy, through flexibility, on performance have been put forward by several researchers – for example, Gerwin (1993) and Vokurka and O'Leary Kelly's (2000).

Gupta and Somers (1996) examined the total effects of business strategy and manufacturing flexibility on organizational performance. However, there is a lack of empirical studies in the context of the supply chain that address the total effect of supply chain strategy and ISF dimension on performance. Managers in industry would benefit greatly from knowledge of these interrelationships, as they use and build their flexibility capability to improve their competitive advantage. The research study proposes the following hypotheses for the total effects of supply chain strategy on performance through its effect on the ISF dimension.

H2a: Besides direct effects, supply chain strategy also indirectly affects the supply chain's financial performance (net profit) through its effect on the information systems flexibility dimension.
H2b: Besides direct effects, supply chain strategy also indirectly affects the supply chain's financial performance (sales growth) through its effect on the information systems flexibility dimension.
H2c: Besides direct effects, supply chain strategy also indirectly affects the supply chain's non-financial performance (lead-time) through its effect on the information systems flexibility dimension.
H2d: Besides direct effects, supply chain strategy also indirectly affects the supply chain's non-financial performance (customer satisfaction) through its effect on the information systems flexibility dimension.

3. Research Methodology

The research is based primarily on a quantitative approach using a questionnaire survey and interviews to collect data across multiple settings (industries) pertaining to the research hypotheses. The population for the research includes SME supply chain firms in the Canadian manufacturing industry. The sampling frame for this study comprises the CEO, owner, president and/or vice president, general manager, staff, and supply chain managers. The industries selected for this study are in the following codes of the North American Industry Classification System (NAICS): 314 (Textile Product Mills), 333 (Machinery Manufacturing), 334 (Computer and Electronic Product Manufacturing), 335 (Electrical Equipment, Appliance, and Component Manufacturing), 336 (Transportation Equipment Manufacturing), and 337 (Furniture and Related Product Manufacturing).

3.1 Operational Measures of the Variables

In designing the questionnaire, a schema based on a combination of 7-point Likert-type scale questions was used for the preliminary test version of the questionnaire. A final version was then designed on the basis of the feedback received from a selected number in a trail sample.[1] Overall, the questionnaire was divided into four main sections: basic data, supply chain strategy, information systems flexibility, and supply chain performance.

Basic Data: This section collects information on the profiles of the firms, such as firm name, address, respondent's position within the company, type of manufacturing industry, number of employees in the organization, type of products produced, approximate turnover, and the number of years the firm has implemented supply chain program.

[1] The questionnaire is available from the authors.

Supply chain strategy: An 18-items scale was designed with references to the supply chain strategy model by Katz et al. (2003) and Chang et al. (2003), to measure three supply chain strategies: INS, COS, and FOS. Respondents were asked to indicate the importance of supply chain strategy variables, using a seven-point scale with the end points of "Least Important" (1) and "Extremely Important" (7). Also, in this section, were two questions considering the time as compared with the company's major competitors. Respondents were asked to indicate how early they adopt new manufacturing technology, with each item using a seven-point scale with the end points of "Late" (1) and "Early" (7). The internal reliability coefficients, Cronbach's (α) for each supply chain strategy type, are presented in Table 3.

Information systems Flexibility: Eight items affecting ISF were identified from the information systems literature and the limited literature on supply chain flexibility (Kumar et al., 2006; Byrd and Turner, 2000). This section collects data pertaining to a firm's relative competitive edge on the ISF. The criteria question employed a seven-point scale with end points of "Poor" (1) and "Excellent" (7). The internal reliability coefficients, Cronbach's (α) for ISF dimension, are presented in Table 3.

Supply Chain Performance: In this study, four dimensions are used to measure a firm's supply chain performance. Respondents were asked to rate overall performance using the following measures: NPP), SGP), LTP), and CSP). CSP was measured by multiple items and the remaining three dimensions were measured by a single item, adopted from (Gunasekaran et al., 2004; Chang et al., 2003). The criteria compared with the relative major competitors for the last three years and the response options were anchored on a seven-point scale with "1" being "Very Weak" and "7" being "Very Strong." The internal reliability coefficients, Cronbach's (α) for each supply chain performance dimension, are presented in Table 3.

3.2 Questionnaire Response Rate

The manufacturing firms were located nationwide. The firms were selected randomly from the Scott directory, Canadian electronic version 2006 database, within each industry. Of 1,500 questionnaires distributed, 197 questionnaires were returned. The exclusion of 22 questionnaires with incomplete data resulted in a final sample of 175 firms, representing a response rate of about 11.66 percent. The types of the organizations in the sample are presented in Table 1.

NAISC Code	Total Survey	% of Total Survey	Total Response	Unusable Response	Usable Response	% Usable Response
314	177	11.8%	23	0	23	12.99%
333	248	16.53%	30	1	29	11.69%
334	315	21%	49	7	42	13.33%
335	323	21.53%	38	2	36	11.14%
336	225	15%	28	4	24	10.66%
337	212	14.13%	29	8	21	9.90%
Total	1500	13.13%	197	22	175	11.66%

Table 1: The Types of the Organizations in the Sample

3.3 Non-Response Bias

One commonly used method is based on the assumption that the opinions of late responders are representative of non-respondents (Armstrong and Overton, 1977). For this research study, approximately 30 percent of the surveys were randomly selected from each of the first and second waves of surveys received (n_1= 25 and n_2= 25 for the two groups, respectively), and 18 items were used for the analysis. Then t-tests were performed on the responses of the two groups. The tests revealed no statistically significant differences across the two groups for any of the dependent variables or independent variables contained in the study. Therefore, we conclude that the non-response bias is not material in this study.

4. ISF Path Model

The best path analytic model obtained from LISREL software accepted for the study is illustrated in Figure 3, with path analysis determining the significance of the relationships between the independent and dependent variables. The path analytic model is a multivariate analysis methodology for empirically examining sets of relationships represented in the form of linear causal models (Joreskog and Sorbom, 2001). The correlations between the factors included in the full information systems flexibility model and their means and standard deviations used for statistical analysis are presented in Table 2.

	INS	COS	FOS	ISF	NPP	SGP	LTP	CSP
INS	1.00							
COS	0.26	1.00						
FOS	0.10	0.11	1.00					
ISF	0.40	0.55	0.10	1.00				
NPP	0.13	0.13	-0.07	0.09	1.00			
SGP	0.14	0.13	-0.01	0.11	0.30	1.00		
LTP	0.40	0.45	-0.02	0.43	0.16	0.14	1.00	
CSP	0.35	0.45	-0.04	0.55	0.06	0.07	0.21	1.00
Mean	3.73	2.91	3.41	4.29	3.29	3.23	5.47	5.93
St. D	1.843	0.892	1.296	1.356	1.02	1.008	1.317	1.000

Table 2: Correlation Matrix for Information Systems Flexibility Path Model

However, before applying path analysis to the research model, tests of internal consistency are needed. Cronbach's coefficient alpha (α) is commonly used to measure the reliability of a set of two or more construct indicators (Cronbach, 1951; Lynn, 2000). Although, a value of 0.70 was recommended by Nunnally (1978), a value of 0.60 is often used as the practical lower bound (e.g., Narasimhan and Jayaram, 1998). All of the measurements in this study have Cronbach alpha values that met the minimum criterion alpha value of 0.60. Table 3 lists the measurements of the internal reliability of all the constructs in this research model. As a result of the good internal consistency of the majority of the latent variables, their means can be used to produce uni-dimensional variables (Lynn, 2000).

Variables	Number of Items	α
Innovative Strategy	5	0.9436
Customer-Oriented Strategy	4	0.8413
Follower Strategy	5	0.9062

Information Systems Flexibility	8	0.9176
Net Profit Performance	1	-
Sales Growth Performance	1	-
Lead Time Performance	1	-
Customer Satisfaction Performance	3	0.8221

Table 3: Cronbach's Alpha (α) Values

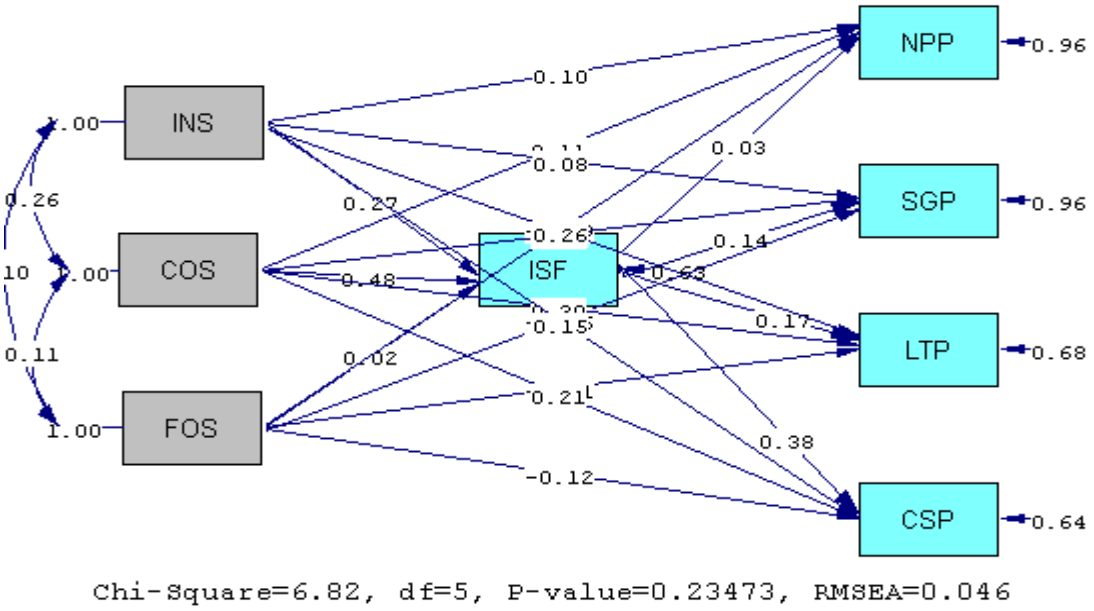

Figure 3: LISREL Information Systems Flexibility Path Model

4.1 Model Identification

Before we ran the path model, it is important to check the model identification for obtaining the correct estimate of the parameter values. The path model is over-identified. With 12 observed variables, there are (8*9)/2 = 36 observations; the number of parameters to be estimated is 30, including the variances of 8 variables (3 observed and 5 unobserved, that is the disturbance), 3 variances between the observed exogenous variables, and a total of 19 direct effects. Furthermore, to fit the model, 2-error co-variances were set to free. Thus, the model degrees of freedom are 36 - 30 - 1= 5 (*df* = 5). Since the number of observations is greater than the number of parameters to be estimated, we conclude that the information systems flexibility path model is over-identified and can be tested statistically.

4.2 Assessing Model Fit

The best path analytic model obtained from LISREL software accepted for the research model is illustrated in Figure 3, with path analysis determining the significance of the relationships between the independent and dependent variables. The LISREL output in the model refining process suggested adding an error covariance among the following variables: NPP and SGP. The research model presented in Figure 3 shows a good fit of strategy, IFS, and performance to the empirical data. The observed Chi Square was χ^2 = 6.82, degree of freedom df = 5, P-value =

0.23473, and RMSEA = 0.046. Generally, a rule of thumb is that RMSEA ≤ 0.05 indicates close approximate fit, values between 0.05 and 0.08 suggest a reasonable error of approximation (GFI = 0.99, AGFI = 0.93, NFI = 0.98, NNFI = 0.97, and CFI = 0.99) which all represents a good fit (Bentler and Bonett, 1980).

5. Results and Data Analysis

To test hypotheses H1a, H1b, and H1c the regression results and the standardized path coefficients representing the direct effects of supply chain strategy dimensions (INS, COS, and FOS) on ISF are shown in Table 4.

For Hypothesis H1a, the path coefficient for INS and IFS was 0.27 and significant at the 1 percent level. For Hypothesis H1b, the path coefficient for COS and ISF was 0.48; it was significant at the 1 percent level and positively correlated. COS was a significant predictor of ISF. Information systems are playing a crucial role by enabling both the customers as well as the competitors to move to higher levels of performance expectation (Wadhwa and Rao, 2003). For Hypothesis H1c, the path coefficient for FOS and ISF was 0.02, which indicates a weak positive relationship, and this is statistically insignificant. The lack of interest in ISF for FOS firms could be due to the limited resources available in these firms. However, in a study on information systems planning in SMEs, Hagmann and McCahon (1993) find that very few consider the ability of their information systems to adapt or evolve to changing circumstances. In short, the research data supported hypotheses H1a and H1b while it did not support hypothesis H1c.

Supply Chain Flexibility	Supply Chain Strategies			
	INS (H1a)	COS (H1b)	FOS (H1c)	
Information Systems Flexibility (ISF)	0.27***	0.48***	0.02	Path coefficient
	(0.06)	(0.06)	(0.06)	Standard Error
	4.36	7.57	0.33	t-Statistics

*** 1% significance level. ** 5% significance level. * 10% significance level. N = 175

Table 4: Direct Effects of Supply Chain Strategy on Information Systems Flexibility

To test hypotheses H2a, H2b, H2c, and H2d, the regression results and the standardized path coefficients representing the direct, indirect, and total effects of supply chain strategy dimensions (INS, COS, and FOS) and ISF on supply chain performance (NPP, SGP, LTP, and CSP) are shown in Table 5.

Hypothesis H2a examines the relationship of the total effects of strategy and ISF on NPP (direct effect and indirect effect through ISF). The INS total effects path coefficient was 0.11 and COS total effects path coefficient was 0.12; both indicated a moderate positive relationship. On the other hand, the FOS total effects path coefficient was -0.09, which showed a weak negative relationship with NPP. Hypothesis H2b examines the total effects of strategy and ISF on SGP. The total effects path coefficient for INS was 0.12; this has a moderate positive relationship with SGP. The total effects path coefficient for COS was 0.10, which also indicated a moderate positive correlation with SGP. However, the total effects path coefficient for FOS was –0.04, which indicates a weak negative relationship. Contrary to expectations, INS, COS, and FOS all

are statistically insignificant with financial performance. It is conceivable that, since ISF is still a relatively new supply chain flexibility dimension, Canadian manufacturing managers may not yet have recognized this linkage between ISF and financial performance. Additionally, the results indicate that most Canadian manufacturers have not taken advantage of emerging IT to enhance collaboration with their suppliers for improving their financial performance.

Hypothesis H2c examines the relationship of the total effects of strategy and ISF on LTP (direct effect and indirect effect through ISF). The total effects path coefficient of INS was 0.31; this has a positive relationship with LTP and is statistically significant at the 1 percent level. The total effects path coefficient for COS was 0.38; this has a strong positive relationship with LTP and is statistically significant at the 1 percent level. On the other hand, the total effects path coefficient for FOS was –0.10, which is statistically insignificant. Hypothesis H2d examines the impact of the total effects of strategy and ISF on CSP. The total effects path coefficient for COS was 0.39; this has a strong positive correlation with CSP and was statistically significant at the 1 percent level. The total effects path coefficient for INS was 0.26; this also has a positive relationship with CSP and is statistically significant at the 1 percent level. The total effects path coefficient for FOS was –0.11 and statistically insignificant. The total effects of strategy and ISF seem to have greater impact on non-financial performance rather than on financial performance.

	Innovative Strategy (INS)			**Customer Oriented Strategy (COS)**			**Follower Strategy (FOS)**		
	Indirect	**Direct**	**Total**	**Indirect**	**Direct**	**Total**	**Indirect**	**Direct**	**Total**
NPP	0.01	0.099	**0.11**	0.01	0.11	**0.12**	0.00	-0.095	**-0.09**
H2a	(0.03)	(0.082)	**(0.08)**	(0.05)	(0.090)	**(0.08)**	(0.01)	(0.076)	**(0.08)**
	0.32	1.21	**1.38**	0.32	1.20	**1.57**	0.23	-1.25	**-1.24**
SGP	0.04	0.078	**0.12**	0.07	0.036	**0.10**	0.00	-0.046	**-0.04**
H2b	(0.03)	(0.082)	**(0.08)**	(0.05)	(0.090)	**(0.08)**	(0.01)	(0.075)	**(0.08)**
	1.44	0.95	**1.50**	1.49	0.40	**1.33**	0.32	-0.61	**-0.57**
LTP	0.05	0.26	**0.31*** **	0.08	0.30	**0.38*** **	0.00	-0.11	**-0.10**
H2c	(0.02)	(0.069)	**(0.07)**	(0.04)	(0.076)	**(0.07)**	(0.01)	(0.064)	**(0.06)**
	1.91	2.13	**4.68**	2.05	3.83	**5.71**	0.33	-3.94	**-1.59**
CSP	0.11	015	**0.26*** **	0.18	0.21	**0.39*** **	0.01	-0.12	**-0.11**
H2d	(0.03)	(0.077)	**(0.07)**	(0.04)	(0.067)	**(0.07)**	(0.02)	(0.073)	**(0.07)**
	3.28	4.99	**3.81**	4.16	2.29	**5.82**	0.33	-2.89	**-1.66**

***1% significance level. **5% significance level. *10% significance level. N = 175

Table 5: Total Effects of Supply Chain Strategy on Supply Chain Performance

The results presented in Table 5 demonstrate partial support for the notion, which had claimed that flexibility would play a mediating role between strategy and performance. In other words, that the total effect, which includes the direct effect and indirect effect through ISF, will have a significant effect on performance. Comparing the results of the two columns in Table 5 for the direct effect of strategy on performance and for the total effects, we notice that the role of ISF as a moderating variable is confirmed by the finding that COS achieved 0.39 with CSP through ISF; this compares with 0.21 for the direct effect of strategy on performance. This means that ISF as moderating variable enhanced CSP by 0.18. Furthermore, COS achieved 0.38 with LTP; this compares with 0.30 for the direct effect of strategy on performance. This means that ISF as moderating variable enhanced LTP by 0.8. Similarly, INS achieved 0.26 with CSP through ISF; this compares with 0.15 for the direct effect of strategy on performance. This means that ISF as moderating variable enhanced CSP by 0.11.Furthermore, INS achieved 0.31 with LTP; this compares with 0.26 for the direct effect of strategy on performance. This means that ISF as moderating variable enhanced LTP by 0.05. INS and COS achieve a higher rate of non-financial

performance through ISF, however, ISF does not help to improve financial performance. In short, the research data supported hypotheses H2c and H2d while, it did not support hypotheses H2a and H2b.

6. Discussion and Managerial Implications

The main objective of this paper was to empirically investigate the relationship among supply chain strategy, ISF, and supply chain performance of small- and medium-sized enterprises within Canadian manufacturers. The first group of hypotheses provided evidence of the direct positive relationship between supply chain strategy and ISF. The second group of hypotheses provided partial evidence of the total significant relationships with non-financial performance and insignificant relationships with financial performance. Previous research examined the impact of IS on financial performance and ignored its impact on non-financial performance. The insignificant and weak positive relationship of the total effect of strategy and ISF on financial performance is supported by previous research. For example (Lucas & Spitler, 1999) stated that the debate on the "IT/IS-productivity paradox and other anecdotal evidence suggests that the impact of IT/IS on a firm's financial performance remains unclear." It is conceivable that, since ISF is still a relatively new dimension, Canadian manufacturing managers may not yet have recognized this linkage between ISF and financial performance. In any event, the inconsistencies in results suggest the need for additional field studies in this area.

Interviews with three managers responsible for IS were conducted. The interviews focused on (1) the importance of IS flexibility, (2) the types of IS used, (3) the flexibility of IS, and (4) the effect of IS on value chain flexibility. The prime reason for adopting IS was a desire to improve customer service and not a financial objective, which clearly supports our findings, discussed earlier. The three IS managers indicated that they started to use IS after a customer request; for most this was defensive not offensive. The adoption was required in order to "stay in the market". Firms view IS as a capability to service customers not to increase sales growth or make profit, while flexibility from an IS was not a stated objective. However, the intent, to improve responsiveness, is external, i.e., the flexibility benefits customers and so the focus is external.

These findings have very two important management implications. First, our results indicated that innovative strategy and customer-oriented strategy firms must invest time and resources in developing ISF to achieve their non-financial performance. Follower strategy needs no investment in ISF that focuses on cost reduction implementation. Second, IS are becoming critical to many manufacturing organizations who want to be world-class manufacturers (Fu Ho, 1996). Our results, supported by the findings reported in Table 5, indicate that most Canadian manufacturers have not taken advantage of emerging IS to achieve financial performance. In order to achieve the financial performance demanded by the new business environment, Canadian manufacturers must reconsider how they use IS (hardware and software) to effectively enhance ISF and improve financial performance.

7. Conclusions, Limitations, and Further Research

In conclusion, our findings include several empirical results regarding the relationships among strategy, ISF, and performance in the supply chain context. The findings provide evidence of the direct effects of strategy on ISF. The findings also propose that INS and COS firms are required to invest time and resources in developing ISF, while the FOS firms need no investment in ISF.

The research results supported by the findings reported in Table 5 indicate that ISF had a positive direct relationship with CSP and LTP (i.e., a non-financial performance). This is strong evidence that success in business today is not solely determined by a strong cash flow or meeting a financial budget. Instead, developing appropriate information systems, competency, and skills in areas such as team-based problem solving, customer service, quality, and innovation are much more important. These are, however, not easily measured in financial terms.

The measures of ISF and strategy dimensions used to rate the supply chain organizations are a possible limitation of the research study. Research in the area of supply chain flexibility should try to establish operationally useful measurement criteria across different industries to facilitate empirical study. However, since there has yet to be a consensus in the literature on the appropriate measures of ISF and supply chain strategy dimensions, we see the measures employed in this research as contributing to the ongoing debate. The research study was limited to the manufacturing industry in the Canadian geographical region. It will be very interesting to see if there are regional variations when compared to the findings of this research study. Though the sample in the study represents several industries, the research study focused only on SME firms. We recommend that managers use caution in generalizing the findings of this study to larger firms, which could be included in future research endeavors.

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