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Supplier Selection Practices among Small Firms in the United States: Testing Three Models

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One of the issues investigated in recent studies on small business enterprises involves the role of supply chain management. Supply chain management has become an important part of strategic planning in both large and small businesses in the 1990s as firms increasingly choose outsourcing as an externally-driven strategic growth path. This study examines the supplier selection practices among 78 small business executives in the midwest United States by testing three models: rational/normative, external control, and strategic choice. Although the results show support for all three models, the rational/normative model emerges as the most significant model for predicting the supplier selection practices of small firms.

In the 1990s, small business has become one of the mainstays of the U.S. economy (Schwenk and Shrader 1993). One of the reasons for this can be attributed to an increasing number of employees, who, consequent to being laid off by the larger corporations in the 1980s and early 1990s, have joined the small business workforce (Pearson and Ellram 1995). Second has been the trend in large firms to outsource some of their activities to smaller firms, facilitated, to some extent, by the growth of the Internet. Third, the relative stability of the U.S. economy since the early 1990s has encouraged entrepreneurial activity. Fourth, the emergence of new economies around the world has accelerated global development, and this has also encouraged entrepreneurial activity in the U.S. Small businesses will, therefore, continue to play a major role in both job creation and economic growth in the next decade (Watkins 1993).

Recognizing the importance of small businesses as major contributors to job creation and economic growth, especially during the past decade, academic research on small business management practice has grown dramatically in the recent past. In particular, topics involving the strategic growth of small businesses have received much attention from researchers. In order to grow, many small businesses choose outsourcing (that is, strategically building

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and maintaining both upstream and downstream portions of their supply chain) as an externally driven strategic growth path (Birley and Westhead 1990; Covin, Slevin, and Covin 1990; Fombrun and Wally 1989; Lyles et al. 1993; Merz, Weber, and Laetz 1994; O'Farrell and Hitchens 1988; Pearson and Ellram 1995; Wilson 1994). Supply chain management in the context of small businesses is of critical importance because of its impact on the company's long-term performance. To respond to the challenges of the 1990s and beyond, many firms, both large and small, have integrated their purchasing function into the strategic planning process. It is, therefore, a critical source of strategic competence and competitiveness (Cavinato 1992). According to Tan, Kannan, and Handfield (1998), the study of supply chain management encompasses materials/supply management from the supply of basic raw materials to final product and focuses on how firms utilize their suppliers' processes, technology, and capabilities to enhance competitive advantage. There are several issues involving supply chain management which offer ample opportunities for further research. This study examines one aspect of supply chain practices (in particular, the selection of suppliers) among small businesses. Johanneson (1994) argues that supply chain management is a strategic management process involving both internal and external assessments of the organization, identification of its strategic orientation, and implementation of strategies.

Recent studies have focused on one important domain of supply chain management: the selection of suppliers (Ellram 1990; Lambert, Adams, and Emmelhainz 1997; Pearson and Ellram 1995; Vokurka, Choobineh, and Vadi 1996; Wilson 1994). The selection of suppliers is critical to small firms for several reasons. First, the increased trend towards "just-in-time" manufacturing practices has resulted in a supply base reduction (Pearson and Ellram 1995). Second, owing to resource scarcity, there is a need for greater interaction between the buyer and the supplier. Third, many firms involve their suppliers early on in the planning process so that they are able to deliver superior value to their customers (Trent and Monczka 1998). Finally, small firms have a greater need to gain a competitive advantage by controlling unit costs. Besides investigating what small firms actually do in selecting suppliers, prior research has also focused on what firms should do to ensure that their suppliers contribute to the long-term success of their enterprise.

The purpose of this study is to build on existing research in the area of supplier selection practices in small businesses by testing three different models. O'Farrell and Hitchens (1988) have examined several models and perspectives in order to identify the characteristics of successfully growing businesses. They argue that in order to succeed in the segments where small businesses compete, firms should be able to identify the key criteria for success and build a competitive advantage based upon them. One of the strategies for gaining competitive advantage is to use acquisitive growth and/or outsourcing.

In small firms, executives play a critical role in deciding the firm's supply chain management practices (Merz and Sauber 1995). Therefore, an investigation of the context in which these executives choose their suppliers will be valuable to both researchers and practitioners. First, such a study extends the "upper echelons perspective" which postulates that a firm's strategic, structural choices and performance levels are influenced by top managers' characteristics (Hambrick and Mason 1984). Second, an investigation of this issue is consistent with the trend in small business research emphasizing the executives' behaviors and activities in addition to their personal characteristics (Stevenson and Jarillo 1990). Third, the use of managerial activities as a predictor or an indicator of strategic intent contributes significantly to understanding the strategic

growth and success of small businesses (D'Amboise and Muldowney 1988).

A review of previous literature on small business growth reveals three sets of studies relevant to this research. One set of studies examined the relationship between certain management and organizational characteristics and business growth, including supply chain development (Bracker, Keats and Pearson 1988; Covin 1991; Lyles et al. 1993). A second set of studies examined the relationship between management and organization characteristics and various stages of growth (Birley and Westhead 1990; Hanks 1990; Kazajian and Drazin 1989). Finally, a third group examined the relationship between the dynamics of growth and various aspects of management of that growth (Fombrun and Wally 1989; Shuman and Seeger 1986). These studies have adopted the rational normative, external control, and/or strategic choice models. The current study draws heavily on these three models to examine the factors affecting the supply chain management practice of small businesses.

Hypotheses

The following section briefly describes the major tenets of the three models and their applicability to our current study.

Rational Normative Model Hypothesis

The rational normative model is based on the assumption that within certain boundaries, executives exhibit rational behavior (Simon 1947). Therefore, the rational model assumes that executives use a set of objective criteria to analyze and evaluate target suppliers. Small business executives analyze both external (opportunities and threats) and internal environments (strengths and weaknesses) in formulating their growth strategies (Pearce, Robbins, and Robinson 1987). The data gathered from the external and internal environments are then subject to rational judgement on the part of the executives. There is considerable support in previous research on strategic management for the role and relevance of rational decision-making (Freeman 1999). As supply chain management is an important aspect of strategic management, it is hypothesized here that the principles of rational behavior can be applied to the selection of suppliers in small businesses. Lang, Calantone, and Gudmundson (1997) argue that selective perception often takes place when executives in small firms seek information about the environment. Such selective perception forces executives to exercise rational judgement. This argument leads to the first hypothesis:

H_1: A set of objective criteria explains a significant amount of variance in small business executives' selection of suppliers, above and beyond the variance explained by other variables.

External Control Model Hypotheses

The external control model includes studies from resource dependence and natural selection models (Pfeffer and Salancik 1978; Hannan and Freeman 1989) as well as organizational economics model (Porter 1980). The model assumes that the external environment (in particular, industry or industrial structure) is a major determinant of the growth and performance of small businesses. More specifically, this model assumes that the absence or presence of resources in the external environment can have a major influence on a firm's strategies. Thus firms that adjust their strategies to the external environment are more likely to succeed than firms that are unable to cope with the requirements of their environment. Several researchers have used the external control model to understand firm behavior and performance in small businesses. While Aldrich (1990) used the external control model to study such outcome variables as small business growth and success, Covin, Slevin, and Covin (1990) examined the environment's potential effects on the strategies employed by small business. Pearson and Ellram (1995) argue that the

nature of the industry and its competitive environment can have a strong influence on supplier selection in small firms. Extending the arguments of previous researchers who have applied the external control model to small business, we argue that a similar case can be made for applying the model to supply chain management practices. That is, industry factors can have a powerful influence on the small firm's selection of suppliers. Besides directly influencing the supplier selection process, empirical evidence reveals that industry also has a moderating influence on several other variables affecting small business (Zahra 1996). The above arguments lead to the following two hypotheses derived from the external control model.

H_2: Industry explains a significant amount of variance in small business executives' selection of suppliers, above and beyond the variance explained by other variables.

H_3: Industry moderates the relationship between objective criteria and supplier selection.

Strategic Choice Model Hypotheses

Unlike the rational and external control models which assume that objective data and external environment are strong influences on a firm's strategies and performance, the strategic choice model suggests that individual characteristics of small business executives have a strong influence on the direction and performance of businesses (Eisenhardt and Schoonhoven 1990; Hambrick and Mason 1984; Wiersema and Bantel 1992). In this context, the "upper echelons" perspective, espoused by Hambrick and Mason (1984), has gained a considerable popularity among both researchers and practitioners. The executive traits investigated by researchers include age, educational background, functional background, and organizational tenure. One main conclusion that can be drawn from work in this area is that the traits of executives affect their choice of strategies and, consequently, affect organizational outcomes (Bantel and Jackson 1989; Hitt and Tyler 1991; Wiersema and Bantel 1992). Thus, upper echelon traits are an important aspect of both strategy formulation and implementation.

Further, researchers in this area argue that the impact of upper echelon traits on organizational strategies and outcomes is just as applicable to small businesses as it is to large enterprises (Hambrick and Mason 1984). There is support for this argument in a recent empirical study by Weinzimmer (1997) which reveals that the upper echelon theory is applicable to small businesses. More specifically, Weinzimmer's (1997) study reveals that the age and functional background of top executives can have an impact on small business growth. The above arguments lead to the third set of hypotheses.

H_4: Small business executives' personal characteristics explain a significant amount of variance in supplier selection, above and beyond the variance explained by other variables.

H_5: Small business executives' age moderates the relationship between objective criteria and selection of suppliers.

H_6: Small business executives' type of education moderates the relationship between objective criteria and selection of suppliers.

H_7: Small business executives' type of work experience moderates the relationship between objective criteria and selection of suppliers.

Method

Sample

Data to test the hypotheses were obtained through a survey instrument mailed to 200 small business executives in 1998.

They were chosen randomly from a directory of 6,000 businesses in the midwestern United States. In choosing the sample, this study employed the commonly accepted U.S. definition of small businesses as having 500 or fewer employees and annual sales of $20 million or less (Baird, Lyles, and Orris 1994; D'Amboise and Muldowney 1988). Dillman's (1978) "total design method" was used to ensure a strong response rate. A total of 83 responses were returned, for a 42 percent response rate. Five of the responses had missing data on at least one of the instruments and were removed from the sample, resulting in a usable sample of 78.

Non-response bias was tested by examining the differences in mean revenues between firms that responded to the survey and firms that did not. *T*-tests revealed no systematic differences between respondents (78 firms) and nonrespondents (122 firms) in the original sample. A test for non-response bias between firms included in the random sample (200 firms) and a set of firms excluded from the random sample (about 100 firms) was also carried out. Once again, *t*-tests showed no systematic differences in the mean revenues between the two groups. Thus, the final sample of 78 firms is considered representative of the 6,000 firms in the population. Among the firms that responded, the average age of the respondents was 45, with an average of 21 years of total work experience. The average firm size had $18 million in annual sales and 103 total employees.

Measurement of Variables

Objective Criteria. Nutt (1979) has described two different types of decision models: the analytical model and the interactive model. The analytical model emphasizes the evaluative phase of decision-making, whereas the interactive model stresses the judgmental phase. Drawing on these two decision models, strategy researchers who espouse the strategic choice perspective have provided a complex set of analyses designed to help executives formulate an effective competitive strategy. These researchers argue that strategic decisions are based on a set of objective criteria and that each strategic alternative should be evaluated with these criteria (Ackoff 1981; Camillus 1982). Consistent with this work, objective criteria were used here to describe the executives' selection of suppliers. The 15 objective criteria used to select target suppliers were adopted from Ellram's (1990) study: strategic fit, top management compatibility, management attitude/outlook for the future, feeling of trust, compatibility across levels and functions of buyer and supplier firms, supplier's organizational structure and personnel, assessment of current manufacturing facilities/capabilities, assessment of future manufacturing capabilities, supplier's design capabilities, supplier's speed in development, economic performance/financial outlook, financial stability, supplier's safety record, business references, and supplier's customer base. These objective criteria were used to develop cases on 30 target suppliers.

Industry. To examine the effects of industry, each small business was classified into one of five industry categories including consumer goods (manufacturers), capital goods, producer goods, financial services, and professional services. Industry type was then coded as a dummy variable.

Personal Characteristics. Empirical studies in this area reveal a significant moderating impact of an executive's age, education, and work experiences on strategy formulation and implementation (Hitt and Tyler 1991; Wiersema and Bantel, 1992); these are the three traits measured in this study. To measure these traits, the method used by previous researchers in upper echelons studies was adopted. For education, a dummy variable was used. That is, if respondents held a college degree, education was coded as 1; if not, it was coded 0. Additionally, respondents who held a college degree were asked to denote the major area of study (for example,

business, engineering, others (liberal arts and sciences)). Work experience was classified along the following functional areas: business, technology/production, and broad-based (business and technology). To measure work experience, the respondents were asked to indicate whether they had work experience in one or more of the functional areas. Each was coded as a dummy variable (1=experience, 0=no experience).

Strategic Decision Model. The procedure known as "policy capturing" was used to obtain and analyze the data to test this model. Such a procedure has been used in past research to model managers' decision processes (Ireland et al. 1987). The method is similar to a repeated measures design and allows assessment of what Argyris and Schon (1974) described as "theories in use" as opposed to "espoused theories of action." Thus, policy capturing involves analysis of actual decisions by developing a quantitative decision model that incorporates the decision criteria used and their respective weights assigned by an individual. For this study, 30 cases were constructed by randomly varying the level of each of the 15 supplier firm characteristics (criteria) on a scale of one (low) to five (high) across the cases. The random assignment of criteria levels controlled for potential collinearity among the independent variables. The highest r value between any pair of criteria was .35, for a common variance of less than 12 percent. Most intercorrelations were less than .30. The lack of collinearity lends more credence to the decision models derived.

Small business executives were asked to examine each case describing a target supply firm by 15 criteria, to rate the attractiveness of the target firm as a supplier (on a one to seven scale), and to rate the probability that this firm would be a partner on their supply chains (on a one to seven scale). The coefficient alpha for the scale combining these two questions was .89. This combined scale is the dependent variable that reflects supplier selection decisions. This method is consistent with the approach adopted by Hitt and Tyler (1991) and Hitt et al. (1997).

Results

The means, standard deviations and intercorrelations for the variables in the study are presented in Table 1.

Hypotheses 1, 2, and 4 were analyzed using hierarchical regression. The results of these analyses are shown in Table 2. To control for the effects of size, annual sales was entered into each regression model. The differences in R^2 were tested using a procedure recommended by Cohen (1968) which accounts for the degrees of freedom.

As shown in Table 2, Hypotheses 1, 2, and 4 were all supported. In Model 1, industry, personal characteristics, and annual sales accounted for 7 percent of the variance. Our results show that the main effects for objective criteria explained a significant portion of the variation in the dependent variable ($R^2 = .34$; $p < .01$). This finding provides strong support for Hypothesis 1 and the arguments advanced by prior researchers that objective indicators have a considerable impact on the supplier selection practices of organizations. Second, the addition of industry variables to the hierarchical regression models (Model 2) increased the R^2 by 3 percent. This change was statistically significant ($p < .01$) and thus Hypothesis 2 was supported. Third, with the addition of personal characteristics variables to the hierarchical regression model (Model 3), the variance explained in the dependent variable increased by 5 percent. This change was also statistically significant ($p < .01$) and thus, Hypothesis 4 was supported. These three findings reinforce our arguments that all three models (namely, rational, external control, and strategic choice) do impact executive decision making in organizations.

Hypotheses 3, 5, 6, and 7 were tested using moderated regression analysis. In moderated regression analysis, the re-

Table 1
Intercorrelation Matrix for Supplier Selection Evaluation, Industry, Executive Characteristics, and Size

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Selection Evaluation	7.61	2.98														
2. Consumer Goods	.09	.28	−.01													
3. Capital Goods	.16	.35	−.02	−.11												
4. Producer Goods	.33	.47	.00	−.17	−.21											
5. Financial Services	.11	.31	.01	−.14	−.11	−.23										
6. Professional Services	.22	.41	.00	−.29	−.21	−.31	−.18									
7. Age	45	10	−.03	.02	.01	.17	−.35	.00								
8. Engineering Degree	.28	.45	.00	.13	.12	.11	−.21	.37	−.20							
9. Business Degrees	.23	.43	.03	−.11	−.13	−.14	.38	.17	−.35	−.12						
10. Other Degree	.20	.40	−.05	−.03	−.07	−.10	−.02	.01	−.11	−.15	−.22					
11. Broad Experience	.65	.46	.05	.17	−.03	.06	−.09	−.11	.19	−.21	.18	.17				
12. Business Experience	.43	.49	.03	.08	.00	.01	.05	−.09	.10	.12	−.22	−.15	.13			
13. Technical Experience	.26	.44	−.01	.12	−.06	.13	−.09	−.10	.22	−.06	.24	−.10	−.09	.20		
14. Size 1 ($millions in sales)	18	33	−.08	−.09	.03	.26	−.07	−.09	.10	−.13	−.11	−.09	.04	.07	−.13	
15. Size 2 (number of employees)	73	111	−.13	−.15	.12	−.02	−.05	−.01	.19	−.08	−.22	−.12	.07	.09	−.20	−.19

Table 2
Hierarchical Regression Model Results

Model 1 Independent Variables	R^2	$\hat{}R^2$	F	*Model 2* Independent Variables	R^2	$\hat{}R^2$	F	*Model 3* Independent Variables	R^2	$\hat{}R^2$	F
Industry, personal characteristics, and sales	.070			Personal characteristics, objective criteria, and sales	.378			Industry, objective criteria, and sales	.360		
Objective criteria	.409	.339	43.06*	Industry	.409	.031	13.78*	Personal characteristics	.409	.049	14.52*

* $p < .01$

stricted model includes the main effects of the independent variable(s) and hypothesized moderator. The full model includes these main effects and the interaction term(s) between the independent variable(s) and the hypothesized moderator. The same method used for the hierarchical regression analysis (Cohen 1968) was used to test the change in R^2 between the restricted and full models. The results of these analyses are presented in Table 3.

As the table shows, industry, the executive's age, type of education, and type of work experiences were all found to be statistically significant moderators of the relationship between objective criteria and selection of suppliers. These results thus support our hypotheses that in addition to the direct effects of the independent variables, their moderating effects should also be taken into consideration.

Discussion and Conclusion

The results provide strong support for employing the rational normative, external control, and strategic choice models in an attempt to better understand the supply chain practices of small businesses. The dominance of the use of objective criteria in small business executives' supplier selection provides strong support for the rational normative perspective. Small business executives may use a rational analytical approach widely in formulating and implementing their supply chain management strategy. This finding thus supports the bounded rationality principle that managers often act rationally within certain bounds. Second, the results reveal that, to a limited extent, the industry in which the small business competes influences its supply selection practices. The finding therefore provides support for the external control model and corroborates the arguments of previous researchers (Bourgeois 1984; Starbuck and Milliken 1988). Third, the findings reveal that the supply chain management practice of small business enterprises is also a function of the personal characteristics of executives (age, level of education, and work experience). This finding provides support for the notion that although small business executives use rational analytic decision-making approaches to select sup-

Table 3
Moderated Regression Model Results

Moderator	Model	R^2	$\hat{}R^2$	F
Industry (5 categories)	Restricted	.314		
	Full	.381	.067	1.44*
Age	Restricted	.332		
	Full	.351	.019	2.19**
Type of education	Restricted	.334		
(3 categories)	Full	.377	.043	1.59*
Type of work experience	Restricted	.325		
(3 categories)	Full	.369	.041	1.50*

* $p < .05$
** $p < .01$

pliers, their decisions are often influenced by their own personal characteristics and industry (Merz and Sauber 1995).

One of the major contributions of this research is the finding that the activities of executives can have a considerable influence on the supply chain management practices of small firms. It is argued, therefore, that research into the role of managerial activities as a predictor or indicator of strategic orientation can shed light on our understanding of small business dynamics (D'Amboise and Muldowney 1988; Stevenson and Jarillo 1990). The results reinforce the notion that strategic management activities, such as supply chain management, are complex phenomena that can be better understood by applying all the decision models, namely, rational/normative, external control, and strategic choice. Small businesses are more likely to succeed if they are able to position themselves in the competitive environment (Hamel and Prahalad 1989). To position themselves, they need a good understanding of critical strategic dimensions and take adequate steps to control these dimensions. That is, in order to manage the flow of materials and information from supply sources to end-users, it is important to invest in information technology, quality control systems, and a strong focus on customers.

In this regard, the results of this study provide practical guidelines for small business executives who want to manage their supply chain so that it can be a source of competitive advantage. In addition, this study should be extended to include other types of strategic growth decisions by small business executives. These decisions include the choice of international cooperative strategies. Baird, Lyles, and Orris (1994) argue that the "international strategic options of small firms have not been studied in depth . . . global strategies and structures of small firms may differ from those of larger firms" (p. 48). Future research should examine this by integrating the elements of rational normative, external control, and strategic choice perspectives.

Our study adds to the literature on supply chain management which is still unfolding. Mabert and Venkataraman (1998) argue that studies are warranted not just on the flow of materials from supply sources to customers but also on information flows in marketing, finance, and human resources management that parallel and assist the material flow. This issue is particularly relevant because of the increasing dominance of the Internet in the supply chain management practices of organizations.

This area of research is extremely important in light of the exponential growth in transcontinental strategic alliances. As firms increasingly focus on their core business and core competence and outsource activities in which they lack expertise, relationships with their suppliers are critical to developing a sustainable competitive advantage. It is imperative that firms realize that interdependencies are increasing in today's business world and that managing these interdependencies is critical to survival.

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