Strategic Supplier Selection, Supplier Integration and Buyer Outcomes: Direct and Indirect Effects?

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Abstract: This research examines whether the strategic selection of suppliers based on certain criteria directly and/or indirectly enhances the buyer's competitive performance capabilities in the corresponding domains. Two supplier integration mechanisms -- relational exchanges and supplier development -- are modeled as mediators for evaluating the indirect paths. The hypotheses concern direct or indirect *matching*: (1) selecting suppliers based on new product development capability with buyer product innovation, (2) selecting suppliers based on quality capability with buyer quality, and (3) selecting suppliers based on cost capability with buyer competitive pricing. The results indicate that the *direct* effects are supported, but that the indirect effects of domain-specific strategic supplier selection through supplier integration are not. These results suggest that additional firm investments in supplier development and relational exchanges are not efficacious; rather, any additional firm resources should be devoted to investment in initial strategic selection of suppliers.

Keywords: Procurement, Supplier Selection, Supplier Integration,

I. Introduction

A firm's ability to compete over time rests on both efficiency and innovativeness. [79] advance the notion of the ambidextrous organization and they use a "juggler" metaphor to describe the need to both exploit and explore; [21] argue that dynamic capabilities result from a blend of exploitation and exploration (see also [5] and [32]). The capability to exploit or explore may however depend not only on the native abilities of a single firm, but rather on the contributions of supply chain partners who are first carefully **selected** and then **integrated** into the firm's network. Very little empirical research has examined whether strategically-guided supplier selection actually leads to enhanced capabilities in the intended domain. In fact, [13] note the paucity of empirical research and call for investigation of such factors as strategic supplier selection and supplier integration. [65] concur, noting that the contribution of supplier management to creating firm value lacks empirical support; they point out that [54] was one of the first empirical studies examining the relationship between a firm's supply development efforts and the buyer's own performance. Our research addresses this gap by first focusing on suppliers who are strategically selected based on: (1) their new product development capabilities, thus fortifying the firm's ability to explore; or (2) their quality or cost capabilities, with the goal of enhancing the firm's capability to exploit. We then examine close relational exchange *versus* supplier development as integration mechanisms.

[65] and [61] suggest that supplier selection in particular is a fundamental strategic task undertaken by the buyer's supply management function. [54] further state that supplier selection can be viewed as a surrogate for management's competitive priorities. These authors suggest that **selection** is paramount. Once selected, integrating suppliers into the firm's network may ensure that supplier contributions can be fully realized. There is some empirical evidence demonstrating that relational exchanges and supplier development (i.e., **integration**) do in fact benefit the buyer, but are these benefits domain-specific, and will they still be evident once the impact of careful strategic selection is accounted for? Given the resources, time and effort expended in maintaining close relationships or developing suppliers (i.e., integrating suppliers), what are, if any, the additional contributions towards specific firm competitive capabilities *beyond those derived from strategic supplier selection*?

II. Theoretical Framework

Firms face two important issues concerning their supplier networks: *choosing network members* and *managing network integration*. This distinction between "inputs" such as partner choice versus ongoing collaboration management has been noted, for example, in studies of collaborative product development success factors [59]. First, choosing the "correct" or most appropriate partners (given a firm's purpose) is important because partners can enable or disable access to resources and thus determine success or failure. For example, the [17] survey of firms involved in product co-development projects revealed that the most important concern was "poor foundation for collaboration" from the beginning. More generally, across different contexts and different countries, [18], [22], [24], and [33] link partnership

or alliance or joint venture success to partner selection. We thus examine the **strategic selection of suppliers** for three particular purposes and the direct impact on the three corresponding firm outcomes.

We chose new product development *versus* quality/cost criteria for suppliers, and product innovation *versus* quality/competitive pricing capabilities for the focal firm, because these seem to be representative of innovativeness *versus* efficiency, or exploration *versus* exploitation [21] and [79]. More specifically, a supplier network can enhance the product innovation capability of a focal firm because collectively the network has extensive access to know-how and an immense ability to process relevant information; hence we study strategic selection based on new product development capability of the supplier and its impact on the product innovation capability of the firm. A network's knowledge and resources can also potentially lead to improvements in the focal firm's quality and pricing capabilities, and thus we examine whether strategic selection based on the quality capability of the supplier impacts the quality capability of the focal firm (and, whether selecting for cost capability impacts the firm's competitive pricing capability).

The second important issue is **supplier integration management**. Managing a network in an integrative way may be necessary in order to ensure trust and dependability. We examine the role of close *relational exchanges* first. Close ties and intense collaboration promote the trustworthy behavior that dampens concerns about opportunistic behavior ([26] cf. the Transaction Cost Economics school), thus further increasing the possibilities of future ties [21]. Close relationships make it more likely that all parties share valuable information and that this information will be absorbed and acted upon [73 and 80]. Next, we examine the role of *supplier development* (assistance and training). The ability of a supplier to contribute to the purpose for which it was selected may be significantly enhanced if the firm offers supplier development as an integration vehicle.

Our key research questions are thus as follows. First, does strategic supplier selection for a particular purpose *directly* impact the corresponding performance outcome in terms of the firm's capability in that arena? Second, does strategic supplier selection for a particular purpose *indirectly* impact performance outcomes *through* supplier integration management (given that the direct impact has been accounted for)? To answer the second question concerning indirect effects, two distinct parts must be addressed: whether strategic supplier selection is related to supplier integration, and whether supplier integration affects performance.

The new product development (NPD) process is one of the primary means through which companies can pursue *exploration*. In the absence of product innovation, firms remain stagnant despite carefully crafted exploitation activities to extend the life-cycles of existing products. Many firms understand the value of NPD but at the same time recognize that handling NPD processes and activities on their own is a risky, expensive, and time consuming endeavor. The acquisition of new skills, information, and tacit knowledge from the network is crucial for product innovation, and thus choosing the "right" suppliers is paramount [22 and 66]. Thus, firms often rely on a network carefully selected for the suppliers' NPD knowledge, expertise and resources in order to enhance their own abilities in the product innovation domain.

H1a: Selecting suppliers based on NPD capabilities is positively related to product innovation.

A firm driven by *exploitation* motives seeks suppliers based on criteria such as quality and cost because such suppliers assist the firm in exploiting its existing competencies. For example, [65] point out that quality and competitive pricing ability may be dependent not only on the firm's capabilities but also on the supplier network's quality and cost.

H2a: Selecting suppliers based on quality capabilities is positively related to quality.

H3a: Selecting suppliers based on cost capabilities is positively related to competitive pricing.

It is important to note these direct effects hypotheses concern the **matching** of strategically selected supplier capabilities with firm outcomes: specifically, H1a concerns supplier new product development→ buyer product innovation, H2a concerns supplier quality→ buyer quality, and H3a concerns supplier cost → buyer competitive pricing.

H1 (con't): The effect of selecting suppliers based on NPD capabilities on product innovation is mediated by (b) relational exchanges and (c) supplier development.
H2 (con't): The effects of selecting suppliers based on quality capabilities on the firm's quality are mediated by (b) relational exchanges and (c) supplier development.
H3 (con't): The effects of selecting suppliers based on cost capabilities on the firm's competitive pricing are mediated by (b) relational exchanges and (c) supplier development.

III. Methods

A key informant approach was used to collect data [69]. Questionnaires were sent out to supply management professionals in 1,000 randomly selected discrete-part manufacturing firms with 100+ employees located in the U.S. The list of firms was derived from the National 100 Manufacturers industrial database (with over 200,000 firms listed), produced by Manufacturer's News, Inc. Five SIC codes were targeted because they are some of the most visible and important industries. A notification card was sent two weeks before the survey questionnaire. Respondents were offered a report as an incentive to participate. We

received 170 surveys of which 157 were complete, useable responses. The 17% response rate is not unusual for extensive organizational-level surveys. The sample descriptors show that 91% came from targeted SIC codes. The majority of respondents were supply management professionals from firms with less than 500 employees, i.e., small firms. To assess for non-respondent bias, we examined the differences in the mean responses between the late respondents (i.e., last 25%) and the rest of the respondents (as in [11]). There were no statistically significant differences in any of the variable mean responses. Some of the measures were based on existing scales while others relied on the development of new scales. After generating items for each construct, they were reviewed by ten practitioners, all members of the National Association of Purchasing Managers (NAPM). These practitioners commented on the appropriateness of the items and the construct definitions provided.

To test for indirect effects two approaches were followed. First, the indirect path coefficients were examined for statistical significance using Sobel's approach. Second, we constructed six additional structural models to scrutinize potential mediating effects that may be masked due to model complexity. For example, the indirect effect of supplier selection based on NPD capabilities on the buyer's product innovation may be mediated by relational exchanges and supplier development simultaneously. Thus, we developed two structural models: the first model relates to the first mediator, while the second separate model analyzes the second mediator.

IV. Results

We began examining the measurement model with exploratory analyses. Each construct's items were first factor analyzed (EFA) separately to assess unidimensionality; only one factor emerged for each case. Internal consistency (reliability) was assessed using Cronbach's alpha. Other than one construct (i.e., supplier selection based on quality, with Cronbach's alpha=0.78), all constructs had Cronbach's alphas in excess of 0.80. Finally, since a single informant provided responses, we assessed common method bias using EFA. All 26 variables were subjected to principal axis factoring without rotation (Harman's one factor approach). If only one factor with eigenvalue>1 is extracted explaining a sizable proportion of variance, common method bias may be a problem. Five factors with eigenvalue>1 emerged, with the first explaining about 25% of the variance. This indicates that common method bias is not a significant problem.

Confirmatory measurement analyses were then run. The posited measurement model was supported overall: χ^2= 438.89 (272 df), χ^2/df= 1.61, NNFI= .92, CFI= .93, RMSEA= .059. All items are statistically related to their respective factors (p<.001), providing evidence of convergent validity. Discriminant validity was assessed by comparing the average variance extracted (AVE) with the squared correlation between constructs [23]. The highest squared correlation was between supplier development and relational exchanges (0.38) and it was lower than the respective AVEs. Reliability evaluation involved AVE and composite reliability (CR) ([23], [29]. CR estimates were above 0.80 except of supplier selection based on quality and supplier development, which are both above 0.60. Overall, there is support for the measurement model.

The results for the hypothesized structural model indicate a well fitting model: χ^2= 504.49 (285 df), χ^2/df= 1.77, NNFI=0.90, CFI=0 .91, RMSEA= 0.067. Hypothesis 1a relates supplier selection based on NPD capability directly to product innovation. H1a is supported (γ=0.19, p<0.046). To assess whether H1b and H1c can be supported, two links must be evaluated because these are indirect effects: (1) supplier selection based on NPD capability linked to each of the two mediators (i.e., relational exchanges and supplier development); and (2) each of the two mediators linked to product innovation. Table 4 shows that supplier selection based on NPD capability is indeed related to the two mediators (γ=0.27, p<0.002; γ=0.55; p<0.000 respectively); however neither of the mediators is related to innovation (β=.06, p>0.262; β=.15, p>0.114 respectively; ns.). The indirect effect on product innovation via relational exchanges and supplier development is not statistically significant (p>0.074).

In order to examine potential mediating effects in more depth, two additional models were constructed including only supplier selection based on NPD capability, integration constructs, and product innovation (Models 1 & 2). While in both cases supplier selection based on NPD capability is related to each of the mediators, each mediator fails to impact product innovation (model 1: β=.12, p>0.192; model 2: β=.40, p>0.060). Both indirect effects of supplier selection based on NPD capability on product innovation are nonsignificant (model 1: p>0.195; model 2: p>0.057) and thus there is sufficient evidence to reject Hypotheses H1b and H1c. Selecting suppliers based on quality impacts the ability of the buying firm to compete based on quality (γ=0.28, p<0.004). This supports H2a concerning the direct effect.

In order to examine whether relational exchanges and supplier development mediate this effect of supplier selection based on quality, the overall model is examined first followed by an assessment of two additional models (Models 3 & 4), as was done in the previous analysis of supplier selection based on NPD capability. Selecting suppliers based on quality capability appears to be followed by investments in relational exchanges and supplier development (γ=0.38, p<0.000; γ=0.24, p<0.013 respectively). However the two potentially mediating variables are not statistically related to quality capability. The results also attest to the lack of mediating effects because the potential mediators do not impact quality capability (model 3: β=-.04; model 4: β=-.14, ns) and thus

the indirect effects are nonsignificant (model 3: p>0.370; model 4: p>0.206 respectively). H2b and H2c are rejected. Selecting suppliers based on cost capability was expected to directly impact the competitive pricing capability of the buying firm; Hypotheses 3a is supported at p<=0.061.

The findings also show that supplier selection based on cost capability does *not* lead to relational exchanges (γ=0.04, p>0.484) and only moderately impacts supplier development (γ=0.14, p<=0.062). Consequently, the indirect effect of supplier selection based on cost on competitive price capability is nonsignificant (p>0.382). Likewise, results based on Models 5 & 6 demonstrate nonsignificance (model 5: p>0.074; model 6: p>0.480). H3b and H3c are rejected. We also tested an alternate model in which each of the supplier selection criteria constructs directly impacted each of the competitive performance capabilities.

V. Discussion and Conclusions

In this manuscript, we examined whether firms that select suppliers based on certain criteria can be expected to directly and/or indirectly derive enhanced competitive capabilities corresponding to those criteria's domains. Our model's hypotheses concerned directly or indirectly ***matching;*** we asked whether selecting suppliers strategically based on supplier capabilities in *product development* versus *quality* versus *cost* can directly affect the buying firm's capabilities in, respectively, *product innovation, quality*, and *competitive pricing*. In other words, we examined whether supplier selection affects the buying firm's outcomes in matched domains, as opposed to some other domain, or overall. Given these three hypothesized *direct effects* (supplier product development → buyer product innovation, supplier quality → buyer quality, supplier cost → buyer competitive pricing), we next focused on *indirect effects.* In particular, we examine whether the effects of strategic supplier selection are *mediated* by supplier integration (relational exchanges and supplier development). The mediation hypotheses ask whether domain-specific, strategic supplier selection is more likely to be followed by supplier integration mechanisms, which then in turn lead to enhanced competitive capabilities for the buyer.

We found *no significant indirect effects* of supplier selection through either of the two supplier integration constructs (relational exchanges and supplier development), given that the direct effects are in the model. After extensive testing, we concluded that none of the *matched* indirect effects were supported. Specifically, selecting suppliers based on NPD capability has no indirect effect on buyer product innovation *through* relational exchanges and supplier development. While selecting suppliers based on NPD capability impacts both relational exchanges and supplier development, neither of these integration constructs impacts buyer product innovation and thus neither serves as mediator. The same pattern of results held for quality: the mediation hypotheses fail because neither integration construct impacts buyer quality (while both integration constructs are affected by supplier selection based on quality). Selecting suppliers based on cost was related to supplier development only, but supplier development was not related to enhanced competitive pricing for the buyer; thus there are no indirect effects in this domain either.

Overall, the mediation hypotheses lack support primarily because the integration constructs were not related to enhanced buyer product innovation, quality and competitive pricing. This is an interesting finding given the sizable investments, financial and otherwise, that relational exchanges, supplier development, or other supplier integration mechanisms demand. The results support authors who suggest that supplier **selection** is paramount; for example, [54] and [61] all focus on supplier selection.

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