Determinants of Intra-firm Sourcing and Market Performance

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Abstract — Earlier studies have shown that internal sourcing of major components has a direct bearing on the multinational firm's market performance. However, factors that affect the extent to which the firm employs intra-firm (internal) sourcing have not been explored. In this study, we examine the determinants of internal sourcing of major components, and revisit the relationship between internal sourcing of major components and market performance. Our results show that process innovation, asset specificity, management's attitude, nationality, and availability of substitute components strongly affect the degree of internal sourcing of major components that subsequently has a bearing on a product's market performance.

Key Words — Sourcing, International Procurement, Global Competition, Competitiveness, Market Performance. Copyright © 1996 Elsevier Science Ltd

In increasingly intense global competition, multinational firms have to develop global competitive strategy to expand overseas, while protecting their home market. In recent years we have witnessed a dramatic increase in internal sourcing (intra-firm transactions) by multinational firms (Kotabe, 1992; Little, 1986, 1987). According to the survey by the United Nations Centre on Transnational Corporations, internal sourcing accounts for about 30% of US exports and about 40% of US imports. For both Japan and Western Europe, internal sourcing accounts for approx. 30% of their total trade flows (exports and imports combined) (United Nations Centre on Transnational Corporations, 1988). Kotabe (1992) demonstrated that firms adopt internal sourcing in the production of proprietary products to protect...
monopolistic advantages in know-how, while relying on external suppliers for standardized products.

Because global trade among affiliated firms (intra-firm transactions) may react differently to economic factors (e.g., currency exchange rate changes) than that among unaffiliated firms, traditional trade theories are inadequate in explaining the striking phenomenon of intra-firm transactions (Swamidass, 1993). Several empirical studies provide some insights on the factors relating to intra-firm transactions at the industry or country level (Cho, 1990; Helleiner and Lavergne, 1979; Lall, 1978). However, determinants of intra-firm transactions on component parts, which represent the highest percentage of global sourcing among manufactured products and services, were seldom examined (Carter and Narasimhan, 1990; Swamidass and Kotabe, 1993). Consistent with Prahalad and Hamel's core competency argument (1990), as applied to manufacturing companies, earlier findings suggest that internal sourcing of major components affects market performance.

The purpose of this study is to empirically test the role of product, firm, and industry characteristics on internal sourcing. Following the industrial organization economics framework of structure–strategy–performance, the determinants of internal sourcing of major components and performance implications is presented in Fig. 1. While a firm’s performance or competitive position may affect its strategy, and if oligopolistic, an industry structure in which it operates (Buzzell and Gale, 1987), our interest lies in examining the underlying factors that influence this phenomenon in order for multinational firms to develop competitive corporate strategy. The present study is the first

**Figure 1.**
Determinants of Internal Sourcing of Major Components and Market Performance
empirical test that investigates these characteristics on internal sourcing of major components. In addition, performance implications of internal sourcing of major components as a global competitive strategy are investigated with the latest data to confirm/disconfirm the past studies’ findings.

**Literature Review and Hypothesis Development**

Effective internal sourcing is recognized to enhance a firm’s competitiveness. The significant level of internal sourcing used by multinational firms is well documented in the international business literature. Recent empirical studies (e.g. Kotabe and Murray, 1990; Kotabe and Omura, 1989; Kotabe and Swan, 1994) concluded that global sourcing of major components influences a product’s market performance, provided that these activities are carried out on an intra-firm basis (internal sourcing).

In those studies, major components are defined as those intermediate products that could not be sourced in newly industrializing countries without technical assistance from the principal firm and thus reflect its proprietary technology. This definition is consistent with the proprietary nature of intermediated products in internalization theory (Buckley and Casson, 1976). Proprietary technology is a broad concept which includes both product innovation and manufacturing process innovation. In most cases, technical assistance involves a transfer and learning of manufacturing processes, which are generally hard to codify (Kogut and Zander, 1993). In the following section, the influence of product-, firm-, and industry-related factors on the degree of internal sourcing is examined, and hypotheses are developed.

**Determinants of Internal Sourcing of Major Components**

Leroy (1976), in delineating the rationale behind specific multinational product strategies in terms of product innovation and diffusion, concluded that strategic product decisions depend on product, firm, and industry characteristics. Following the direction of his findings, this study investigates product-, firm-, and industry-related variables as determinants of internal sourcing of major components. For this present study’s compatibility with earlier studies on global sourcing strategy, the variables used in this study correspond to those used earlier.

**Product-related Variables**

*Product and Process Innovations.* Internalization theory explains the benefits of internal sourcing of components with high product technology and expertise (Buckley and Casson, 1976; Dunning, 1977; Rugman, 1982). By internalizing highly proprietary technologies, a firm can keep them within its corporate system without passing them on to competitors or suppliers as if they were “public” goods. Also, the firm can reap the full economic rent of its technologies rather than receiving less by relying on market mechanisms, which may be imperfect. This is consistent with Cho's (1990), findings that the higher the technological content of a product, the more likely it is for US manufacturing multinational firms to source the product through intra-firm
transactions. Furthermore, in a competitive environment with an increasingly shorter product life cycle, outsourcing major components for a product from outside suppliers is a sure way to give product-related trade secrets to competitors since they also procure components from some of the same suppliers (Bermingham, 1991). As a result, product innovation tends to be reflected in those major components procured internally. Therefore, it is hypothesized that the magnitude of product innovations is positively related to the extent of internal sourcing of major components.

Process innovations constitute an alternative way of gaining and maintaining competitive advantage. Process innovations involve a great deal of intangible know-how (e.g. just-in-time inventory management, total quality control program, CAD/CAM) across a wide spectrum of the value-added chain (Porter, 1986). Such know-how is generally hard to codify and thus hard to be imitated by competition (Kogut and Zander, 1993). Therefore, a high level of manufacturing process capabilities equally provides a long-term competitive advantage over competition. Consequently, those firms with a high level of manufacturing capabilities tend to rely less on major components as a source of competitive advantage.

H1a: The magnitude of product innovations is positively related to the extent of internal sourcing of major components.
H1b: The magnitude of process innovations is negatively related to the extent of internal sourcing of major components.

**Asset Specificity.** Internal procurement of components requires capital investment. If components are standard and widely available on the open market, the firm will be best advised to purchase them on the open market. However, major or crucial components for the manufacture of the product almost always require deployment of specialized assets and make it necessary for the firm to choose between internal and external procurement (i.e. a “make or buy” decision). Asset specificity refers to investments made with idiosyncratic (nonmarketable) assets. When specific assets are employed, a supplier and a buyer are “locked into” the transaction. This is because the assets are specialized to that transaction and have little or no general use outside the transaction (Williamson, 1979). For example, the production of a crucial component tends to require special configurations of work stations, specially trained labor, or specialized equipment. Transactions of this kind pose a greater risk to the sourcing firm as the supplier may not make the component according to specifications, or may not meet the specified deadline. Because the costs of control are likely more than offset by the benefits of integration in such a situation, it is expected that when asset specificity is relatively high, firms would rely more on internal sourcing for the sake of controlling the quality and availability of major components.

H2: The degree of asset specificity is positively related to the extent of internal sourcing of major components.
Firm-Related Variables

Management's Attitude. Within an organization, the strategy chosen to fulfill a business objective is partially dependent on management's attitude toward a specific action. There is extensive evidence to indicate that managerial decisions are driven by management's attitude and perceptions (Einhorn and Hogarth, 1981; March, 1978). Therefore, management typically attempts to decide on the extent of internal sourcing of major components only if its perceived benefits outweigh its expected costs (e.g. Geringer, 1991). For example, Honda realizes that its core competencies are in combustion engines and power trains; consequently, its management cultivates a favorable attitude toward internal sourcing because its ability to continuously design and manufacture these major components is critical to the firm's competitive advantage (Prahalad and Hamel, 1990; Cavusgil et al., 1993).

H3: Management's favorable attitude toward internal sourcing is positively related to the extent of internal sourcing of major components.

National Difference in Sourcing Behavior. Nationality of multinational firms plays an important role in their strategic decisions. Davidson (1989, p. 147) suggested that "there exists a strong correlation between the nationality of a corporation and its operating strategy." Graham and Krugman (1989) observed the high level of import propensity (thus the level of internal sourcing) of Japanese multinational firms operating in the US. They noticed that affiliates of Japanese multinational firms imported almost two-and-a-half times as much as other (e.g. European) foreign multinationals. Thus it may be attributed to the level and nature of Japanese foreign direct investment, which is newer and less mature than those of the European. It may also to some extent reflect Japanese reluctance to use US-made components sourced locally from independent suppliers due to their unsatisfactory quality (Fortune, 1986). But, as these firms become more experienced in the foreign market, they tend to source more from local independent suppliers. For example, Honda and Nissan in the US initially had local contents of 30 and 47%, respectively (mostly from external suppliers). However, in 1987, their local contents increased to 60 and 63%, respectively, because they had established contractual relationship with external suppliers in the US. Although the level of internal sourcing between Japanese and European multinationals is converging, Kotabe and Omura (1989) observed that, on average, Japanese multinational firms still used a higher level of internal component sourcing than European firms (56 and 41%, respectively).

H4: Japanese multinational firms emphasize more internal sourcing of major components than European firms do.

Industry-Related Variables

Switching Costs, Number of Suppliers, and Number of Substitutes. According to Porter (1980), switching costs, number of suppliers, and number
of substitutes determine the intensity of competition in an industry, which, in turn, may affect the behavior of firms (e.g. make or buy). Switching costs are one-time costs incurred by a firm when switching from one external supplier to another; for example, special toolings or equipment required for assembly when changing components of the product. If switching costs of major components are high, the sourcing firm’s ability to have price concessions or to request additional components during emergencies will be restricted; therefore, sourcing these major components internally will eliminate the costly dependence on its suppliers. While the number of suppliers dictates the availability of supply sources, the number of substitutes allows for the flexibility of the sourcing firm to turn to suppliers from another industry for its needs. These factors influence the level of bargaining power of suppliers, which, exercised through price, determines the costs of raw materials and other inputs. Therefore, it is expected that switching costs are positively related to internal sourcing, while the number of suppliers and the number of substitutes are negatively related to internal sourcing. This is because the sourcing firm has more control over the price and the supply of components, which helps manage the costs of production and eliminate production disruption.

Hₐ: The magnitude of switching costs for major components is positively related to the extent of internal sourcing of major components.

Hₐᵦ: The number of suppliers available for major components is negatively related to the extent of internal sourcing of major components.

Hₐₑ: The availability of substitute components for major components is negatively related to the extent of internal sourcing of major components.

Internal Sourcing and Market Performance

The significant extent of internal sourcing used by multinational firms is well documented in the global sourcing literature, but it was not until recently that performance implications at a product level were provided (Kotabe and Murray, 1990; Kotabe and Omura, 1989). They concluded that a product’s market performance (i.e. relative market share, sales growth rate, and pre-tax profitability) is positively related to internal sourcing of its major components. This finding is consistent with the prediction of internalization theory (Buckley and Casson, 1976) and also with the core competency argument popularized by Prahalad and Hamel (1990). Internalization theory underscores the importance of sourcing major components internally to protect monopolistic advantages in know-how while core competency argument emphasizes the strategic imperative of focusing on the production of major components that provide competitive advantage over rivals.

When markets for intermediate products (e.g. components) and proprietary technology are imperfect, a firm will create an internal governance structure within the corporate system to improve market performance. Market performance is not a unidimensional construct, however. In this study, market performance is measured by its strategic (market share and sales growth rate) and financial (return on sales and return on investment) dimensions. Often,
the objectives of strategic and financial dimensions of market performance may be in conflict with each other (Roth and Morrison, 1990). For example, internal sourcing of major components for the manufacture of a product can help fulfill the strategic aspect of market performance by securing consumers' goodwill and confidence (Casson, 1982; Prahalad and Hamel, 1990). However, the use of internal sourcing may be not necessarily related positively to financial performance because of huge investments on R&D, manufacturing, and distribution that may require strategic alliance partners for accelerated amortization (Ohmae, 1989).

H₆ₐ: The magnitude of a product's strategic market performance is positively related to the extent of internal sourcing of major components.  
H₆₉: The magnitude of a product's financial market performance is not positively related to the extent of internal sourcing of major components.

Research Method

Sample
A sample of US subsidiaries of foreign multinational firms was used. Sample parent firms were restricted to those that are listed in The Global 500 (Fortune, 1991) as they dominate global sourcing activities, and are in the following industries: electronics, transportation equipment, scientific and photographic equipment, motor vehicles and parts, aerospace, computers and office equipment, industrial and farm equipment, and metal products. These industries manufacture products that are made of easily identifiable and separable components, which facilitates the identification of the information required. Moreover, these firms have subsidiaries around the world, thus making it possible to investigate the degree of internal sourcing on a global scale. Using the International Directory of Corporate Affiliations (1991), 509 US subsidiaries of foreign multinational firms were identified.

A preliminary questionnaire was pretested and revised via personal interviews with subsidiaries of six multinational firms located in the midwestern region of the United States. Subsequently, a final questionnaire was sent to chief executive officers/presidents of 509 US subsidiaries of foreign multinational firms, and two follow-ups were subsequently used to increase responses. Of the 509 firms contacted, 42 firms were dropped due to unforwardable addresses, or because they reported they were no longer engaged in manufacturing. This reduced the maximum possible number of completed questionnaires to 467. Of the 467 questionnaires, 111 were returned, yielding an effective response rate of 24%. Several characteristics (country and sales volume of parent company, and type of products) of responding firms were compared between earlier and later respondents to provide an indication of non-response bias. The analysis showed no significant differences in the two samples. This result offered some assurance about the representativeness of the responding firms (Armstrong and Overton, 1977).
Most of responding firms' parents (70%) are from Western Europe, and the remaining from Japan. Firms from Sweden and Switzerland comprise nearly one-half of the European firms, with British and German firms constituting an additional one-third. More than one-third of the parent firms had an annual sales volume of $20 billion and over, and one-quarter with annual sales of $2.9 billion or less. Approximately 80% of the subsidiaries' products are industrial durables, with one-half of the industries in industrial and farm equipment (23%) and electronics (26%). The respondents are divided between top management and middle management.

**Measures**
The measures used in this study were developed based on the previous studies cited above (Kotabe and Murray, 1990; Kotabe and Omura, 1989) and by the authors of the present study. Multiple-item measures were factor analyzed using principal components analysis with varimax rotation to see if they could reliably represent market performance, product innovation, and process innovation. The other variables were based on single-item measures.

It was suspected that product maturity and product type might affect the performance measures differently due to the difference in product life cycle stage and the nature of the product (Swamidass and Kotabe, 1993). Therefore, product maturity and product type were also included in the analysis as control variables. The variables and their measurements used in this study are presented in the Appendix.

**Analysis and Results**
The objectives of this study are: (1) to examine the determinants influencing the extent of internal sourcing of major components, and (2) to investigate the relationship between a product's market performance and the extent of internal sourcing of its major components. Because there were both quantitative and categorical variables in the models, the analysis of covariance was used to test the hypotheses. The results of the analysis for internal sourcing of major components and strategic market performance are presented in Tables 1 and 2, respectively. The model for financial market performance was not significant. As control variables, type of product and product maturity, had no significant bearing on either model, the following discussions could be considered applicable to both industrial and consumer durable products introduced before or after 1976.

$H_1-H_5$
The results of the analysis of covariance for $H_1$ through $H_5$ are reported in Table 1.

$H_{1a}$ and $H_{1b}$ explore the strategic implications of product innovation and process innovation on the extent of internal sourcing of major components. As expected, process innovation was significant ($P = 0.02$) in influencing the extent of internal sourcing negatively. While product innovation had the same form of hypothesized relationship (i.e. positive) with internal sourcing, the
Table 1.
Analysis of Covariance Results for Internal Sourcing of Major Components

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated coefficient</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product innovation</td>
<td>0.15</td>
<td>1.24</td>
<td>0.11</td>
</tr>
<tr>
<td>Process innovation</td>
<td>-0.24</td>
<td>-2.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Asset specificity</td>
<td>0.16</td>
<td>1.68</td>
<td>0.05</td>
</tr>
<tr>
<td>Nationality</td>
<td>0</td>
<td>-0.87</td>
<td>0.00</td>
</tr>
<tr>
<td>Management’s attitude</td>
<td>0.52</td>
<td>5.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Switching costs</td>
<td>-0.12</td>
<td>-1.10</td>
<td>0.14</td>
</tr>
<tr>
<td>Number of suppliers</td>
<td>-0.02</td>
<td>-0.20</td>
<td>0.42</td>
</tr>
<tr>
<td>Number of substitutes</td>
<td>-0.16</td>
<td>-1.54</td>
<td>0.06</td>
</tr>
<tr>
<td>Type of product</td>
<td>0</td>
<td>0.09</td>
<td>0.72</td>
</tr>
<tr>
<td>Product maturity</td>
<td>0</td>
<td>0.20</td>
<td>0.37</td>
</tr>
</tbody>
</table>

$R^2 = 0.49, P = 0.0001.$

Note: One-tailed test was performed on the hypothesized relationships.

The relationship was a notch below a 0.10 significance level ($P = 0.11$). Therefore, strong support was found for $H_{b}$, while $H_{a}$ received tenuous support.

$H_{2}$ examines the relationship between asset specificity and internal sourcing of major components. It was hypothesized that components with high asset specificity were more prone to be internally sourced because of the firm’s ability to control the quality and availability of this type of component. As expected, this variable was significantly related ($P = 0.05$) to internal sourcing of major components. This finding supported $H_{2}$.

$H_{3}$ investigates the relationship between management’s attitude and internal sourcing of major components. It was confirmed that management’s attitude was highly significant ($P = 0.00$) in the sourcing behavior of multinational firms, thus in support of $H_{3}$.

$H_{4}$ focuses on the difference in the level of internal sourcing between European and Japanese multinational firms. Nationality was highly significant ($P = 0.00$) in determining sourcing behavior. On average, of the total value of major components in the product, 68.3% were internally sourced by the Japanese, as opposed to only 28.5% by the European. The finding supported $H_{4}$, indicating that Japanese multinational firms emphasized more on internal sourcing of major components than the European.

$H_{sa}$-$H_{sc}$ explore the impact of industry-related variables (switching costs, number of suppliers, and number of substitutes) on internal sourcing of major components. The results showed that number of substitutes was somewhat significant ($P = 0.06$) and had a negative impact on internal sourcing of major components. However, number of suppliers ($P = 0.42$) and switching costs ($P = 0.14$) were not significant, and a negative coefficient for switching costs was not expected. Therefore, the findings provided some support for $H_{sc}$, but not for $H_{sa}$ and $H_{sb}$.
The analysis of covariance was performed separately for strategic and financial dimensions of market performance. The overall results for the strategic dimension of market performance were significant ($P = 0.08$), while those for the financial dimension of market performance where not ($P = 0.47$). Therefore, only the results for the strategic market performance are presented in Table 2. Earlier studies by Kotabe and Murray (1990) and Kotabe and Omura (1989) found that product and process innovations also affect market performance directly and that performance differences exist between European and Japanese firms. At this phase of analysis, our interest was in testing to see if internal sourcing of major components alone has a direct impact on strategic and financial dimensions of market performance. Therefore, we included product and process innovation terms and nationality in the performance models as control variables along with others to remove their direct impact (if any) on market performance from the analysis, so that the impact of internal sourcing on market performance could be measured more precisely.

$H_{6a}$ and $H_{6b}$ relate to the important role of internal sourcing of major components on a product’s strategic and financial market performance, respectively. Previous studies concluded that the firm’s ability to procure major components within its corporate system would help improve its market performance. As expected, internal sourcing of major components had a significant effect ($P = 0.04$) on strategic market performance after the impact of product and process innovation terms was accounted for. Contrary to our expectation, however, the model for financial market performance was not at all significant. Thus, $H_{6a}$, but not $H_{6b}$, was supported.

Incidentally, process innovation was found to have a significant impact ($P = 0.02$) on strategic dimensions of performance, while no specific hypothesis was intended here. This finding seems to be consistent with the contention that process innovation is crucial for long-term competitive advantage (e.g. Kotabe, 1992; Teece, 1987).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated coefficient</th>
<th>$t$-value</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal sourcing of major components</td>
<td>0.16</td>
<td>1.73</td>
<td>0.04</td>
</tr>
<tr>
<td>Product innovation</td>
<td>-0.05</td>
<td>-0.40</td>
<td>0.64</td>
</tr>
<tr>
<td>Process innovation</td>
<td>0.28</td>
<td>2.37</td>
<td>0.02</td>
</tr>
<tr>
<td>Nationality</td>
<td>0.11</td>
<td>0.46</td>
<td>0.64</td>
</tr>
<tr>
<td>Type of product</td>
<td>0.04</td>
<td>0.21</td>
<td>0.84</td>
</tr>
<tr>
<td>Product maturity</td>
<td>-0.15</td>
<td>-0.62</td>
<td>0.54</td>
</tr>
</tbody>
</table>

$R^2 = 0.13$, $P = 0.08$.

Note: One-tailed test was performed on the hypothesized relationships.
Conclusions and Implications

This study generates several interesting findings. First, this study found that some of the product-, firm-, and industry-related factors are relevant determinants of multinational product strategy, as suggested by Leroy (1976). Among the determinants for internal sourcing of major components used in this study, product- and firm-related variables generally have more significant influence on internal sourcing than industry-related variables. This may be because internal sourcing of major components, which is a micro-level decision, is more apt to be influenced by controllable factors in the firm’s internal environments than uncontrollable external environmental factors (Thorelli, 1977). In addition, because of the strategic importance of major components, the use of internal sourcing is mostly influenced by strategic (process innovation and asset specificity), rather than cost (switching cost and number of suppliers) factors.

Second, asset specificity and management’s attitude are positively related to internal sourcing of major components. This confirms that when asset specificity is relatively high, the firm would be more likely to internalize the production of the components because the benefits of internal sourcing is likely to outweigh the costs of control. Moreover, the firm may be able to ensure that the components are made according to specifications and delivered on time. The finding supports Williamson’s (1979) suggestion that internal sourcing is appropriate if specific assets are used in a product. Management’s attitude also contributes significantly to the level of internal sourcing. This result was expected because it is a logical prerequisite for management to feel favorably toward a particular strategy in order for it to be adopted. The result is consistent with Cavusgil et al.’s (1993) recommendation that the key to achieving effective global sourcing is securing management involvement at both the strategic (top), and the tactical (middle) levels. In the case of internal sourcing, management commitment is particularly crucial due to the potential high costs involved in vertical integration, often without any immediate benefits obtained.

Third, a negative relationship is observed both for number of substitutes and process innovation with internal sourcing. If the supplier market provides the options for the sourcing firm to procure substitutes for the needed components, the sourcing firm may be able to procure substitutes for the needed components, the sourcing firm may be able to procure alternative components using external suppliers without any production disruptions. Also, by using external sourcing for components that involve high process innovation, the firm is able to shift the huge monetary and human investments to its suppliers, while at the same time enjoy the frequent technological changes involved in the manufacturing processes.

Fourth, it is confirmed that Japanese multinational firms do source more internally for major components than the Europeans. This reflects the strategic, cultural, and marketing experience differences between the two types of firms. Japanese multinational firms are relatively inexperienced in foreign operations, and they put much emphasis on product quality, and dependable supply.
Fifth, consistent with previous studies, the ability to internally source major components does provide the firm with higher strategic market performance, albeit not clear on financial performance. Major components are those components that possess unique qualities and are often not widely available in the marketplace. Therefore, the way major components is sourced has an impact on strategic market performance. This result is consistent with our earlier discussion that internal sourcing is mostly used because of strategic, rather than cost, factors; consequently, the use of internal sourcing influences strategic, rather than financial, market performance. This points toward the benefits of a certain vertical integration. It is the firm's ability to procure major components in house that gives it competitive advantage (Chandler, 1990; Mascarenhas, 1984). This point should not be interpreted to mean that any backward integration automatically leads to higher strategic market performance.

Limitations
This study has several limitations. First, the study is cross-sectional; hence, the analyses fail to capture the dynamic nature of the determinants influencing internal sourcing. Second, only large multinational firms were included in the sample. Large firms have the ability to set up subsidiaries in countries that can provide them with comparative advantages. Therefore, the results of the study may not be generalizable to small firms. Third, the dichotomous choice between internal and external sourcing fails to capture the increasing importance of quasi-firm or network sourcing (Shan et al., 1994). Finally, sourcing strategy may be mediated by the firm's competitive strategy (e.g. cost leadership vs differentiation strategy), but was not examined in this study.

References


**Appendix**

**Measurement**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Cronbach's Alpha*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Market performance</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic</td>
<td>A 2-item measure:</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Relative to the product’s three largest competitors,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The market share is ... (1 = much lower, 5 = much higher)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The sales growth rate is ... (1 = much lower, 5 = much higher)</td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>A 2-item measure:</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Relative to the product’s three largest competitors,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The return on sales is ... (1 = much lower, 5 = much higher)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The return on investment is ... (1 = much lower, 5 = much higher)</td>
<td></td>
</tr>
<tr>
<td>Extent of Internal Sourcing of Major Components</td>
<td>A single-item measure:</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>The percentage of total value of major components in the product that are procured within the corporate system;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>major components are those components that could not be sourced from local firms in newly industrialized countries (e.g. Taiwan, South Korea and Brazil) without technical assistance from the sourcing firm</td>
<td></td>
</tr>
<tr>
<td>Product innovation</td>
<td>A 3-item measure:</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>To your firm, the level of product innovation in the product (i.e. the set of innovative ideas involved in the product) is ... (0 = zero, 5 = very high)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relative to your competitors, the level of product innovations in your product is ... (1 = very low, 5 = very high)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The number of potential applications (or uses) in the product is ... (0 = zero, 5 = very high)</td>
<td></td>
</tr>
</tbody>
</table>

*Table A1. (Continued overleaf)*
### Intra-firm Sourcing and Market Performance

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process innovation</td>
<td>The same as above, asked for the set of innovative ideas involved in the manufacturing process</td>
<td>0.6</td>
</tr>
<tr>
<td>Asset specificity</td>
<td>In manufacturing the non-standardized components in product, the level of specific assets or resources (i.e. unique assets or resources, such as configurations of work stations, use of special raw materials and specially trained labor, invested in the product that have little or no use for other purposes) is... (0 = zero, 5 = very high)</td>
<td></td>
</tr>
<tr>
<td>Nationality</td>
<td>European (0) or Japanese (1)</td>
<td></td>
</tr>
<tr>
<td>Management’s attitude</td>
<td>In your opinion, the importance of component sourcing from internal members in achieving the desired level of market performance for the product is... (1 = very unimportant, 5 = very important)</td>
<td></td>
</tr>
<tr>
<td>Switching Costs</td>
<td>If your firm were to change suppliers for the non-standardized components in the product, the one-time cost involved in switching from one supplier to another would be... (0 = zero, 5 = very high)</td>
<td></td>
</tr>
<tr>
<td>Number of suppliers</td>
<td>On average, the number of external suppliers capable of providing the non-standardized components in the product is... (0 = zero, 5 = very many)</td>
<td></td>
</tr>
<tr>
<td>Number of substitutes</td>
<td>The number of substitutes for the non-standardized components in the product is... (0 = zero, 5 = very many)</td>
<td></td>
</tr>
<tr>
<td>Type of product</td>
<td>Consumer Durables (0) or Industrial Durables (1)</td>
<td></td>
</tr>
<tr>
<td>Product maturity</td>
<td>Product initially manufactured in the Untied States before and in 1976 (0) or in 1977 and after (1)</td>
<td></td>
</tr>
</tbody>
</table>

*Cronbach’s alpha measures the reliability in respect to internal consistency of items for a construct. Nunnally (1967) suggested that a reliability of 0.06 is acceptable in the preliminary stage of basic research. In addition, Cronbach (1951) asserted that alpha value is highly sensitive to the number of items in a scale and the sum of the correlations among the items. Therefore, the low alpha values for strategic market performance, product innovation and process innovation are partly due to the low number of items.*

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Table A1. (Continued overleaf)