Strategic Outsourcing through Specifications

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ABSTRACT

Outsourcing is one of the top priorities on the strategic agenda of Original Equipment Manufacturers [OEMs] in many industries. The decision of outsourcing an activity as opposed to doing it in-house and the development of a part or parts system is one of the most complex decisions facing today's industrial managers. Several models have been developed in order to aid in this process. The present paper analyses some of these models, and proposes an extension based on the role that specifications might play in outsourcing decisions. Based on how the specification is generated and on the nature of the data it contains, it can be of significant help in outsourcing decisions. The research reported in the paper is based on a longitudinal study of one automotive OEM [global family], one truck OEM and four medium sized expert supplier, all located in Europe. A procurement matrix is developed in which guidance for outsourcing decisions is provided in terms of specification generator, type of supplier, and contract relationship.

KEY WORDS

Outsourcing, Specifications, collaboration, automotive industry

INTRODUCTION

The research on product development and the involvement of suppliers in the development process has been substantial [23]. The benefits of early and integrated supplier involvement have been well researched and several models have been drawn up to distinguish between the activities, parts or parts systems that can be outsourced and those that need to be made in-house by the Original Equipment Manufacturers (OEMs). Consider a global automotive OEM in the process of defining a new car that should possess the following characteristics: Innovative, Fashionable, and Attractive. The project team defined that the vehicle's key differentiating characteristics would be in its interiors, more precisely in the flooring, the seats, and the interior colors. Concerning the flooring, the team defined that there would be no carpets but a specially constructed flooring material. This innovative flooring material would be developed and sourced from a leading interior global supplier since the OEM had no specific capability in the related material and process technologies. Faced with this problem, the development team asked several questions: What kind of relationship needs to be established with the supplier? Do the supplier have the capabilities of developing and delivering a component/system that is critical to the sales of the proposed vehicle? As the OEM does not have the capabilities to write the specifications, what should be the characteristics of the specification?

The above questions require that the make/buy decision is carefully analyzed. It is not a simple matter of just asking the vendor to deliver a product, but a process involving thinking about supply management (type of relationships with the supplier, capabilities of the supplier, etc) and specifications (capability to write specifications, characteristics of the specifications required, etc.). Two of the major "make-or-buy" models, incorporating more than one dominating decision making parameter, are those by Quinn & Hilmer [21] and Venkatesan [27]. These models have been developed in different industries and differ in detail as far as their descriptions of what can be outsourced/insourced is concerned. The model by Quinn & Hilmer best summarizes the entire make-or-buy spectrum based on two dimensions: the degree of strategic vulnerability (SV) in outsourcing an activity, and the potential for competitive advantage (PCA). Quinn & Hilmer [21] propose a matrix where three type-scenarios are developed. However, the remaining categories identified by the matrix are not analyzed. Moreover, none of these models have connected supply management and

specifications to the make or buy decision. Let us illustrate with an example. Specifications can be essentially qualitative (narrative), or essentially quantitative (encoded), or contain a mix of both qualitative and quantitative data (mixed). Narrative specifications would essentially appear to be linked to competitive advantages as they might provide an opportunity of conveying tacit knowledge. But does this mean that narrative specifications should be used for in-house development only? The models of make/buy decisions fail to answer this. In order to understand these and related problems, we will analyze the above mentioned models, and try to establish the link between the supply management and specifications.

The paper is structured as follows. First, a brief review of previous research on strategic outsourcing is presented. This will lead to the research questions followed by a discussion on the methodology. Then data from six case studies will be displayed, followed by an analysis of the data and conclusions/managerial implications.

STRATEGIC OUTSOURCING – WHAT DO WE KNOW

Product development is like solving a huge equation system, it consists of thousands or even tens of thousands of tasks that must be woven into a complex network of relationships between individuals, groups and firms [7, 28, 24]. Outsourcing the development of activities to suppliers creates a strategic, tactical and operational challenge, as both the OEMs and the suppliers need to take advantage of each other's domain of expertise [15, 24]. Inspired by the automotive industry, more and more firms in the entire manufacturing industry are opting for the outsourcing strategy. However, this does not mean that all activities traditionally performed in-house need to be outsourced. A careful assessment of a firm's assets and resources must precede any outsourcing decision so that only those activities for which the firm do not have any special capabilities or those for which the firm do not have a strategic need are outsourced [4]. Outsourcing is the consequence of the adoption of a resource-based strategy [29, 20] where firms concentrate on their set of core competencies through which they can provide unique value for the customers and outsource the rest of the activities. For clarification, we will use the word *activity* when discussing "making" or "buying" (i.e. insourcing or outsourcing), regardless of whether the object of the discussion is

an activity (such as design or testing), or a tangible product/part/parts system (such as a tool, a glass mirror or an engine).

Not all collaborations between the suppliers and the OEMs are successful; collaboration might have both positive and negative effects. The understanding of these effects can help in better understanding what and how to outsource, and also help to design and improve existing tools for managing the collaboration with suppliers. Let us take a closer look at these effects as they have been discussed in the literature.

Positive and Negative effects of Collaborations

Some of the benefits of collaboration include the following:

- Spreading and sharing the costs and risks of product development, and of business in general [10, 15].
- Reduced costs by using the cost reduction imperative as a driver for product innovation. The suppliers' cost base is also generally lower than that of OEMs. Open books allow to check the cost structure of suppliers, and successively reduced or at least stabilized supply prices can be obtained. [10, 15].
- With technological divergence, one company cannot exploit all the promising opportunities and the more the alliances it can pool, the more likely are the chances of a successful outcome. Access to technological expertise [core capabilities] and exploiting of technological synergies are central in this context [5].
- Reduced development lead-time through simultaneous development of components and systems that are on the critical path [8].

To sum up, strategic outsourcing can give a company «the full utilization of external suppliers investments, the innovations and specialized professional capabilities that would be prohibitively expensive or even impossible to duplicate internally.» [21]. Early involvement and strong collaborative ties with suppliers as integrated partners has become more or less a rule in the automotive development process [23], and many organizations such as Ford, Renault, Honda, and Fiat are rethinking and developing their internal functions in order to enable efficient ways of dealing with the suppliers and their involvement. Similar

development has helped many companies to slash development times by as much as thirty to fifty percent [2, 6].

However, not all collaborations are successful. The following risks and negative aspects can be identified:

- If the objectives or expectations are not met, or the collaboration is unsuccessful for reasons such as domination of one party, incompatibility in culture and management, or opportunistic behavior of either party, the collaboration can be very costly and represent an important strategic risk for the survival of either party [12].
- There might be high transaction costs associated with the time and effort needed to manage these collaborations. Three types of costs must be closely monitored [22]: set-up costs [including search costs and supplier development costs, e.g. training and technology transfer]; trading costs [including ongoing costs for coordinating exchanges as they occur, e.g. ordering, scheduling of delivery, and contract enforcement]; competitiveness cost [cost of lost sales or internal costs resulting from poor or unreliable supplier quality, etc].
- Care must be taken to harmonize the different cultures of the collaborators and regular reviews must be done to monitor the progress of the collaboration [30]. This takes time and effort.
- Most alliances are unstable as alliances are directly related to the trust between the collaborating parties [19]. Trust is something that is subjective and cannot be measured, hence the problem of instability.
- Given the degree of communication and openness required at various levels within a collaboration, core capabilities, which are the source of the company's competitive advantage, can be difficult to keep confidential [11]. This is a particularly delicate problem when supplier are having business with several competing OEMs.

In view of the risks associated with the decision to outsource, managers must be cautious when deciding whether to outsource or insource. In other words, not only the advantages of collaboration (which translate into a buy decision) but also the disadvantages (which translate into a make decision) need to be examined. In order to articulate the make/buy decision, several authors like Quinn & Hilmer [21], Olsen & Ellram [18] and Venkatesan [27] have developed models that allow the make/buy decision to be based on multiple

criteria, thereby compensating for the disadvantages of collaboration. Let us discuss these models one after the other.

Outsourcing Models of Quinn & Hilmer

Quinn and Hilmer [21] link many of the parameters that form both advantages and disadvantages in collaborations, and develop two dimensions for classifying the many different activities [development / production of components or products, service or support activities] that a firm deals with, namely *the potential for competitive edge* and *the degree of strategic vulnerability.* The different activities, that require different types of relationships with the suppliers, are classified into three groups [Figure 1].

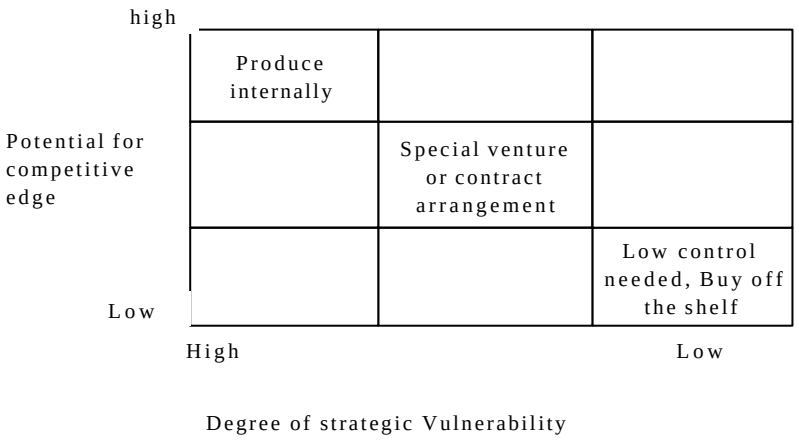

Figure 1, Strategic sourcing, adopted from Quinn and Hilmer [1994].

It is to be noted that Quinn & Hilmer talk about activities in general without making an explicit difference between parts and intangibles. This corresponds to the perspective chosen in the paper, as explained in the introduction. The model of Quinn & Hilmer suggests that activities with a high potential for competitive edge and a high degree of strategic vulnerability should be realized in house. Moderate strategic vulnerability and moderate potential for competitive edge represent activities that call for a range of relationships like short-term contracts, call options, long term contracts, retainer, joint development, partial ownership or full ownership in relation to the suppliers. Lastly,

activities with low vulnerability and low potential for competitive edge call for arm's-length relationships with the suppliers.

A careful analysis of the model reveals that it considers only three possibilities out of a total of nine. This leads to question whether there are no activities that are high in terms of strategic vulnerability and yet low on the competitive edge scale, or conversely, that are high on the competitive edge dimension and yet low in terms of strategic vulnerability ? This question can be extended to all the six possibilities that Quinn & Hilmer have not considered.

Outsourcing Model of Venkatesan

This model indicates that there are two types of products, namely core [that are strictly produced in-house, because they are critical for the performance of the end product and the OEM is distinctively good at making them] and non-core [that are produced with the help of the suppliers, because they are less critical and the OEM lacks the expertise for producing them efficiently]. The core products of Venkatesan [27] correspond to the in-house products of Quinn & Hilmer as both the core and in-house products are produced internally without any supplier involvement. However, Venkatesan [27] does not specify the type of relationships that could be used when engaging suppliers for the non-core products.

Outsourcing Model of Olsen & Ellram

Olsen & Ellram's [18] model does not discuss the outsourcing decision. It focuses on products where the decision to outsource is already taken. However, it provides an interesting analysis of the types of relationships that could be used in the collaborative mode (corresponding to the intermediate situation in Quinn & Hilmer's model).

According to Olsen & Ellram, parts that are outsourced can fall into four different categories; strategic, bottleneck, leverage, and non-critical. These products are classified based on the difficulty of managing the purchasing situation and the importance of the project to the OEMs. Strategic products are highly important and highly difficult to manage. Non critical products are at the other extreme and thus are low on the importance and are easy to manage. Bottleneck products are difficult to manage and the importance of bottleneck projects is low. Finally, leverage products are easy to manage and the importance of the

leverage products is high. All the identified product categories with the exception of the non-critical products require some form of collaboration. This is true because the non-critical products are to be developed either based on the complete specifications of the OEM or bought as a standard product from a catalogue requiring no collaboration between the suppliers and the OEMs [13].

Outsourcing Models – A Discussion

The three models discussed above can be summarized as in Table 1. There is a clear correspondence between the categories for classifying activities proposed in the different models. Venkatesan does not specify the collaborative mode, while Olsen & Ellram proceed to an in-depth analysis of this situation.

Make or Buy	**Outsourcing Models**		
	Venkatesan	Quinn & Hilmer	Olsen & Ellram
Vertical Integration	*Core*	*Strategic Control*	-
Collaboration	-	*Moderate Control*	*Strategic* *Bottleneck* *Leverage*
Arm's-Length Supplier Relations	*Non-Core*	*Low Control*	*Non-critical*

Table 1, A Comparison of the different outsourcing models

In summary, Quinn & Hilmer's model provides the best vision of the continuum from in-house to adversarial relations. Therefore, we will base our analysis of strategic outsourcing on this model. The research question is directly derived from this model:

Q1: Do the six possibilities not depicted by Quinn & Hilmer exist? If so, what are these options?

The model proposed by Quinn & Hilmer has indicated a wide range of sourcing options. Simply stated, the products which fall into these sourcing options are different in terms of complexity. This places varying requirements on the capabilities and capacities of the suppliers. In other words, different types of suppliers must exist in order to deliver the varying complexity of products.

Understanding Suppliers

Authors like Kamath & Liker [13] or Cusumano & Takeishi [9] have attempted to distinguish between suppliers. In particular, the work done by Kamath & Liker [13] at Toyota Motor Corporation is of interest as we observe Toyota to be a world class company in the automotive industry. Kamath & Liker [13] classify suppliers into four different categories: partners, mature, child and contractual.

- Partner suppliers work on concepts on their own and present them to the OEMs for integration into the overall vehicle. They take responsibility for developing complex sub systems, and for integrating into the vehicle. Partner suppliers are jointly involved in the specification writing along with the OEM from the start.
- Mature suppliers wait for rough specifications containing envelopes of requirements from the OEM before they can start work. Nellore et al [17] have expanded the concept of mature suppliers to include suppliers who present rough specifications to the OEMs (instead of waiting for the OEM to take the first step).
- Child suppliers can only manufacture if they are given detailed specifications from the OEM.
- Contractual suppliers propose standard parts off-the-shelf, parts that are available through a catalogue

This analysis of the supplier categories corresponding to different supplier capabilities and roles leads to a second research question:

Q2: Which category of suppliers may be best connected to the different product/sourcing possibilities in the model proposed by Quinn & Hilmer?

We have seen that there can be different sourcing scenarios [based on Quinn & Hilmer's model] and different types of suppliers [based on Kamath & Liker's typology]. For each of the sourcing scenarios, the suppliers best suited in terms of their capacities and capabilities are to be engaged. During this engagement specifications are interchanged between the buyer and the supplier/s. In order to get a complete picture of the outsourcing decision problem we need to explore the meaning and nature of the specifications.

Understanding Specifications

A specification can be defined as the written description of a product [25]. This can be qualified as a narrow-based definition of the specification. A broader definition would consider the specification process, where the written document called the specification is seen as an open arena for joint discussion and negotiation between the OEM and the suppliers. In other words, the broad-based definition of specifications includes not only the written document, but the process of arriving at the written document. Moreover, in the broad-based view, the document is seen as a dynamic tool in the process.

These two perspectives can be named as the commissioning perspective and the mediating perspective [14]. In the commissioning perspective, there is one-way communication [from the OEM to the supplier], and the contents of the specifications are essentially ready and simply have to be executed. In the mediating perspective, the specification is a forum for dialogue, thus the specification is created by the joint effort of the different actors in the development process. With any form of supplier collaboration the mediating perspective plays an important role, as the suppliers are involved in the specification process. In the case of non-collaborative situations, the commissioning role of the specification will be predominant. For the purpose of this paper we will consider specifications in the broader sense and thus the mediating perspective.

Quinn & Hilmer [21], as well as the resource based theory in general, argues that companies must maintain absolute preeminence for their selected core capabilities. When

relating the specification perspectives to the outsourcing decision and the model of Quinn & Hilmer, it might be hypothesized that specifications handled in-house are more tacit and narrative in nature, i.e. essentially qualitative in order to preserve competitive advantages. Essentially qualitative specifications would be impossible to outsource unless the supplier is allowed to share the tacit dimension. This would imply a high strategic vulnerability. Concerning activities managed in an arm's length manner, it could be hypothesized that the corresponding specifications are essentially quantitative in nature. All details must be defined as there is absence of communication. As it would be easy for competitors to lay hands on such specifications, they would only concern activities where strategic vulnerability is low. Finally, if specifications contain both qualitative and quantitative data then they would be suitable for collaboration based outsourcing. This relates to the various contract arrangements in the model of Quinn & Hilmer. Would the nature of the specification have any impact on what is sourced internally and what is sourced externally? No explicit research has been done on this topic, which leads us to the third research question:

Q3: Are purely narrative specifications sourced internally, purely quantitative specifications supplier sourced in an arm's-length manner and mixed specifications sourced in a collaborative setting with the suppliers?

METHODOLOGY

A case study approach was employed to conduct this exploratory research. Data was collected primarily through interviews, participant observation, and archival sources. This manuscript benefits from in-depth case studies, conducted between 1996 and 1998, in one auto OEM, one truck OEM and four major suppliers supplying both the OEMs [one partner, one mature, one child and one contractual supplier]. All companies are based in Europe.

The persons interviewed were the Vice Presidents for purchasing, R&D, manufacturing, and engineering, Project Managers, Chief Engineers, Project Leaders, in the OEMs, and CEOs, Product Development Managers, and Design Engineers in the supplier companies. There were altogether thirty-five interviews for this report. The authors spent several months in the OEM and three weeks in the two supplier companies. The lead author used

to head the procurement strategy division of the truck OEM and currently works for the parent company of the auto OEM. Archival documentation was another major source of data used in the research. Feasibility studies, reports, memos, minutes of meetings, proposals, newspaper articles, and books that were available were reviewed and the contents analyzed. These documents were collected and analyzed both in order to identify and to validate data.

During the data collection, special attention was given to ascertaining whether evidence from different sources converged on a similar set of facts. Miles & Huberman's [16] guidelines on the enhancement of retrospective data accuracy were followed in the process of data collection. When all the evidence had been reviewed, and after an initial case study narrative was documented, the factual portion of the case study was reviewed by the major informants in the company. Such a review was not only a minimal procedure for validating the data collection process, but also a courtesy to those who had co-operated with the research.

Data from interviews and observations were analyzed according to the open coding technique [26]. When using this technique data are first broken down by taking apart an observation, a sentence, a paragraph and giving each separate idea or event a name. Data are then regrouped in categories that pull together around them groups of ideas and events that become sub categories. In order to improve reliability i.e. demonstrating that the data collection procedures can be repeated with the same results [31], data from interviews, open discussions and observations exist in three forms:

- Directly taken field notes - from interviews and observations,
- Expanded typed notes made as soon as possible after the field work [this includes comments on problems and ideas that arise during each stage of the fieldwork and that will guide further research],
- A running record of analysis and interpretation [open coding and axial coding].

Concerning validity, i.e. the establishment of operational measures for the concepts being studied, and establishing the domain to which a study's findings can be generalized [31], this was improved through the use of multiple sources of evidence, the establishment of a chain of evidence, and letting key informants review draft result reports. Firstly, each case study

relies on documents, semi-structured interviews and observations providing multiple measures of the same phenomenon. Secondly, the establishment of a chain of evidence is ensured by the existence of the documents listed above under the discussion of reliability. Thirdly, interview reports as well as analysis were sent to strategic actors for validation.

A TOUR OF THE CASE COMPANIES

Outsourcing decisions were top one priorities on the two case OEMs' strategic agendas. Both companies work with specifications that are developed and executed either internally [insourced] or externally [outsourced], in the latter case with the help of a wide range of supplier relationships. We asked the Procurement and R&D Managers in the two companies to identify three main activities in each one of the categories high, medium or low competitive advantage and high, medium or low strategic vulnerability. The managers were asked to think of both tangibles and intangibles. We confronted their responses and went back to them in order to obtain a consensus. The responses were also cross-examined between the two companies so that the identified activities to a large extent were common. Through this procedure, seven activities were identified in each of the two companies [Table 2, 3 and 4].

Once the activities defined, we identified, through further interviews and participant observation, the associated category and type of specification. The data collected at the auto OEM [table 2 and table 3] will be displayed first, followed by the data collected at the truck OEM [table 4].

ID No	Activity	Competitive Advantage	Strategic Vulnerability	Type of specification	Content of Specification
1	Styling of the car	High	High	Specifications generated and activities realized internally.	Essentially Qualitative data
2	Brackets	High	Low	Specifications generated wholly by the OEM and then executed by the supplier.	Essentially Quantitative data
3	Engine	High	Medium	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	A Mix of Qualitative and Quantitative data
4	Interior trims	Medium	Low	Specifications generated wholly by the OEM and then executed by the supplier.	Essentially Quantitative data
5	Chassis	Medium	Medium	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	A Mix of Qualitative and Quantitative data
6	Hand held tools	Low	Low	Specifications generated wholly by the supplier.	Essentially Quantitative data
7	Door Knobs	Low	Medium	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	A Mix of Qualitative and Quantitative data

Table 2, Activities in the auto OEM classified according to competitive advantage.

Table 2 shows that competitive advantage is not a discriminating criteria as far as type or content of specifications are concerned. We therefore regrouped the activities following the strategic vulnerability, in order to see if this dimension could discriminate the specification types and the specification contents. The result is shown in table 3.

ID No	Activity	Strategic Vulnerability	Competitive Advantage	Type of specification	Content of Specification
1	Styling of the car	High	High	Specifications generated and activities realized internally.	Essentially Qualitative data
3	Engine	Medium	High	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	A Mix of Qualitative and Quantitative data
5	Chassis	Medium	Medium	Idem	Idem
7	Door Knobs	Medium	Low	Idem	Idem
2	Brackets	Low	High	Specifications generated wholly by the OEM and then executed by the supplier.	Essentially Quantitative data
4	Interior trims	Low	Medium	Idem.	Idem
6	Hand held tools	Low	Low	Specifications generated wholly by the supplier.	Idem

Table 3, Activities in the auto OEM classified according to strategic vulnerability.

Table 3 illustrates a relationship between the strategic vulnerability and the type and content of the specification. In order to elaborate on the hypotheses made concerning the content of the specification and the outsourcing decision, four new categories were identified based on the content of the specification:

- The *first* category is one where the specifications are essentially qualitative in terms of content. These specifications are developed internally and the activity is also realized internally. The corresponding activities are high both on the strategic vulnerability and the competitive advantage dimensions.
- The *second* category of specifications are those that contain a well balanced mix of qualitative and quantitative data. They are initially developed either by the OEM, or by the supplier, and then co-developed by the party not generating the initial specifications. The corresponding activities are ranked medium on the strategic vulnerability dimension, while they range from high to low in terms of competitive advantage.
- The *third* category is representative of those specifications that are essentially quantitative in terms of content. These specifications are developed wholly by the OEM, then the corresponding activity is realized by the supplier to the exact

specifications of the OEM. A variant is when the suppliers generate the specifications wholly by themselves and proposes the activity off-the-shelf. In this category, the activities are ranked low on the strategic vulnerability dimension. At the same time, these activities range between high and low on the competitive advantage dimension.

These results seem to confirm the hypotheses that qualitative specifications are insourced, quantitative specifications are outsourced without co-development, while mixed specifications are subject to co-development.

Let us now turn to the data collected in the truck OEM which is displayed in table 4. The managers in the truck OEM identified similar activities with the exception of interior trims and door knobs where purchasing and R&D managers had diverging opinions in terms of classification on the two dimensions vulnerability - advantage. These activities were therefore not retained. Instead, the managers in the truck OEM proposed two activities, namely the validation of the audio-system and glass mirrors. These two activities were not clearly positioned in the auto OEM. Moreover, the type of specifications used for engine and styling differs in the two companies.

In order to test if the previous conclusions were valid also for the truck OEM, we used the same classification as that in table 3.

ID No	Activity	Strategic Vulnerability	Competitive Advantage	Type of specification	Content of Specification
1	Styling	High	Medium	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	Essentially Qualitative data
2	Audio-System Validation	High	Low	Idem	Idem
3	Engine	Medium	High	Specifications generated and activities realized internally.	A Mix of Qualitative and Quantitative data
4	Chassis	Medium	Medium	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	Idem
5	Glass Mirrors	Medium	Low	Idem	Idem

6	Brackets	Low	High	Specifications generated wholly by the OEM and then executed by the supplier	Essentially quantitative data
7	Hand Held Tools	Low	Low	Specifications generated wholly by the supplier	Idem

Table 4, Activities in the truck OEM classified according to strategic vulnerability

When applying the four categories developed from the data collected in the auto OEM to the data collected in the truck OEM, both similarities and differences can be found:

- When looking into category one, high strategic vulnerability does not exclude co-development in the truck OEM. Here, suppliers were called in to work on activities where the specifications were essentially qualitative in terms of content.
- Concerning category two -mixed specifications- two types of specifications were used in the truck OEM, namely specifications generated and executed internally and specifications initially developed either by the OEM, or by the supplier, and then co-developed by the party not generating the initial specifications.
- In terms of similarities, category three is identical.

The results from the data shows that neither the competitive advantage, nor the type of specification are discriminating variables in terms of outsourcing decisions. Moreover, the content of the specifications was not used as a discriminating variable in the truck OEM.

DATA ANALYSIS

Let us analyze the results in search for explanations to the identified similarities and differences. The objective of the analysis is also to assess to what extent the type and content of specifications can guide outsourcing decisions.

Essentially Qualitative Specifications

The more narrative a specification, the harder it becomes to articulate it and thus to imitate it. Engaging suppliers with this type of specification would mean to divulge essential and strongly tacit capabilities leading to high strategic vulnerability. In the case of narrative

specifications the complexity is high, the simulation difficult and the evaluation subjective. The essentially qualitative specifications previously identified are compared in table 5.

OEM	Category of Specification	Examples	Degree of Strategic Vulnerability	Competitive advantage
Auto	Specifications generated and activities realized internally.	Styling of the car	High	High
Truck	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	Styling of the truck	High	Medium
	Idem	Audio-System Validation	High	Low

Table 3, Comparison of Essentially qualitative specifications

In the auto OEM, this kind of specification concerns styling. Styling is also ranked high in terms of competitive advantage and this leads the auto OEM to insource the entire styling work. This concurs with the conclusions made by Quinn & Hilmer.

However, in the truck OEM, essentially qualitative specifications are used in collaboration with suppliers in the same manner as with the mixed specification discussed previously. Concerning styling, the explanation is that the truck OEM judges styling to be medium on the competitive advantage dimension. Customers' sensitivity to styling is not as important in the truck business as it is in the case of cars. Thus, the styling is insourced in the auto OEM and outsourced in the truck OEM. Further, the styling of the car cannot be easily modified, whereas the shape of the truck can be altered to suit variances in components or equipment.

The audio-system validation [i.e. the testing of the performance of the radio, cassette, CD-player, booster and loudspeakers] is considered to be low on the competitive advantage dimension in spite of an essentially qualitative specification. This explains in the same manner as above the decision to outsource this activity.

The comparison of the above examples with the supplier categories suggest the presence of partner suppliers. Partner suppliers have to be responsible for executing essentially normative specifications as the degree of strategic vulnerability on the suppliers is extremely high.

Mixed Specifications

Mixed specifications contain rough or more detailed envelopes for both qualitative and quantitative information and data needed for realizing the activity in question. Either the supplier or the OEM can initiate the generation of these envelopes. In the next step, the specification is co-developed together with the party not generating the initial envelopes. The objective is to come to an optimum solution where customer requirements are satisfied through leveraging supplier capabilities and product performance. Finally, the activities are realized by the supplier.

Examination of the data from the case companies indicates that the mixed specifications concern activities that range from high to low on the competitive advantage dimension, while the degree of strategic vulnerability is medium in all cases [table 6].

OEM	Category of Specification	Examples	Degree of Strategic Vulnerability	Competitive advantage
Auto	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	Engine	Medium	High
	Idem	Chassis	Medium	Medium
	Idem	Door Knobs	Medium	Low
Truck	Initial specifications developed either by the OEM or by the supplier, then co-developed by the party not generating the initial specification. Finally, realized by the supplier.	Engine	Medium	High
	Idem	Chassis	Medium	Medium
	Idem	Glass Mirrors	Medium	Low

Table 6, Comparison of the mixed specifications

Chassis are medium on the competitive advantage dimension in both the companies. Engines rate high on the competitive advantage dimension in both the companies and finally, glass mirrors and door knobs fare low on the competitive advantage dimension in the truck and auto OEM respectively. It is to be observed that there is supplier input in mixed specifications though the extent of involvement may vary.

Given the supplier involvement and the complexity of the activities, mature suppliers seem most suited to fit into this situation. Mature supplier have been defined as able to work on

or themselves generate rough specifications and then continue collaborative development work with OEMs.

Essentially Quantitative Specifications

Two categories of specifications fall into this group: that for which specifications are generated wholly by the supplier, and that for which specifications are generated wholly by the OEM and then executed by the supplier. Since the corresponding activities are low on the strategic vulnerability dimension, they can be specified in a essentially quantitative manner. The essentially quantitative specifications previously identified are compared in table 7.

OEM	Category of Specification	Examples	Degree of strategic vulnerability	Competitive advantage
Auto	Specifications generated wholly by the OEM and then executed by the supplier	Brackets	Low	High
	Idem	Interior trims	Low	Medium
	Specifications generated wholly by the supplier	Hand held Tools	Low	Low
Truck	Specifications generated wholly by the OEM and then executed by the supplier	Brackets	Low	High
	Specifications generated wholly by the supplier	Hand held Tools	Low	Low

Table 7, Comparison of essentially quantitative specifications

The category "supplier generated specifications" concurs with the conclusions made by Quinn & Hilmer that products low on the strategic vulnerability dimension and also on the competitive advantage dimension are sourced to supplier specifications or simply bought off the shelf.

However, essentially quantitative specifications are not always low on the competitive advantage dimension. As seen in table 4, they can also be high and medium. In both the OEMs, brackets were considered high in the competitive advantage dimension. This pushed the OEMs to write the entire specifications in-house and simply let the suppliers execute, i.e. manufacture, according to the specifications. Concerning interior trims in the auto OEM, the case was identical to that of brackets, indicating that the company uses only off-the-shelf parts where competitive advantage is undoubtedly low.

Referring back to the different categories of suppliers it can be observed that child and contractual suppliers fit into the categories of suppliers with whom the OEMs feels the least vulnerable.

BUILDING ON THE QUINN & HILMER MODEL

The analysis has identified activities that represent all of the categories in the Quinn & Hilmer model. We therefore propose an enlargement of their model comprising the additional six categories, and also a discussion of specification generation and supplier types according to the previous analysis. We call this model the procurement matrix [see table 8]. The three scenarios indicated by Quinn & Hilmer are shadowed for the readers benefit.

POTENTIAL FOR COMPETITIVE EDGE	**HIGH**	• Specification Generator • Type of Supplier • Examples	• OEM • No supplier • Styling	• OEM-supplier generate specifications together • Mature • Engines	• OEM generates detailed specification • Child Supplier • Brackets
	MEDIUM	• Specification Generator • Type of Supplier • Examples	• Supplier generates rough specification which is then worked on by the OEM • Partner • Styling	• OEM generates rough specifications which is then worked on by the supplier • Mature • Chassis	• OEM generates detailed specification • Child Supplier • Interior Trims
	LOW	• Specification Generator • Type of Supplier • Examples	• Supplier generates specification • Partner • Audio-System Validation	• Supplier generates rough specification which is then worked on by the OEM • Mature Supplier • Door Knobs, glass mirrors	• Supplier generates the specification • Contractual Supplier • Hand held tools
			HIGH	**MEDIUM**	**LOW**
			Essentially Qualitative Specification	Mix [Qualitative and quantitative] Specification	Purely Quantitative Specification
			DEGREE OF STRATEGIC VULNERABILITY		

Table 8, The Procurement Matrix

Our study shows that there are activities that fit in all the possible boxes in the model proposed by Quinn & Hilmer. We have also identified an additional distinctive criteria based on the content of the specification in terms of the degree of qualitative or quantitative

information. Let's read the table vertically and comment on the scenarios left out by Quinn & Hilmer:

- In the high strategic vulnerability dimension, where specifications are essentially qualitative, two additional options exist namely, those where the suppliers generate the rough specification and then work with the OEM or when the supplier generates the entire specification. Audio-system validation is an example of the later category while styling is an example of the former category. When styling is classified as high on the competitive advantage dimension it is made internally, corresponding to Quinn & Hilmer's first category, while if styling is classified as medium on the competitive advantage dimension it could be outsourced to supplier specification which is later worked on together by both the OEM and the supplier.
- In the medium strategic vulnerability dimension, two additional options exist namely, when the OEM and the supplier generate the specifications together such as in the case of engines where the potential for competitive advantage is high and secondly, when the potential for competitive advantage is low as in door knobs and glass mirrors.
- Finally, the two additional scenarios in terms of low strategic vulnerability are those where the OEM generates an essentially quantitative specification executed by the supplier, and where competitive advantage is high or medium [brackets and interior trims]. Brackets that are an integral part of the braking system represent a high potential for competitive advantage. Both in a truck and in a car the brackets must be stable irrespective of the way the customer drives the vehicle. The domain of brackets is also concerned with public safety regulations. Concerning the example of interior trims in the above figure, the OEM detail controls the specifications given the impact on the comfort levels experienced by the passengers.

The complexity and subjectivity in the outsourcing decision as well as the difficulty of simulating solutions were found to decrease when the specifications move from being essentially qualitative to essentially quantitative. Conversely, the resources required and the level of detail were found to increase.

EXPLORING THE RANGE OF RELATIONSHIPS FOR THE SIX SCENARIOS COMPLEMENTING QUINN AND HILMER'S MODEL

Quinn & Hilmer have indicated a number of possible relationships between the suppliers and the OEM when the degree of strategic vulnerability and the competitive advantage are medium. Since we have expanded the number of possible scenarios in the model from three to nine, it would be appropriate to comment on the relationship modes for all the different scenarios. Though Quinn & Hilmer have not indicated the required relationship for low competitive advantage and low strategic vulnerability we will attempt to propose relationships for not only this scenario but also the remaining scenarios that Quinn & Hilmer do not discuss.

In the case of low strategic vulnerability and competitive advantage the suppliers can be engaged through short term contracts and through contract orders whenever there is standardization of parts within the industry. Low strategic vulnerability products are predominantly catered to by child suppliers. The same applies for products falling in the medium competitive advantage and low strategic vulnerability dimensions. This is because there is no initiative for the OEMs to offer longer term contracts as the competitive advantage is not high. The presence of long term contracts become predominant as the competitive advantage is high while strategic vulnerability remains low.

In the case of medium strategic vulnerability, the presence of mature suppliers is predominant. In the case where the competitive advantage is low the suppliers work on long term contracts. The long term contracts can be supplemented by retainers [where the suppliers are given incentives that are more than what the long term contract can offer] whenever activities where the purchasing situation is particularly difficult [for example few qualified suppliers] are present. Retainers are present along with joint development as a relationship mode when the competitive advantage dimension changes to medium. However, when the competitive advantage dimension changes to high, the type of relationship change to full or at least partial ownership. This was observed in the truck OEM. The truck OEM formed a joint venture with another firm specializing in engine development/manufacture to manufacture fuel injection systems for its engines. The truck OEM had controlling ownership of the joint venture company.

In the case of high strategic vulnerability, partner suppliers are engaged. When the competitive advantage is low, joint development is encouraged as the OEM must try to exercise some control over the specifications. As the competitive advantage rises to a medium, level joint development relationships are complemented by partial ownership's. This was observed at the truck OEM where a small stake in the styling supplier firm was present.

Table 9 complements table 8 with the different contractual relationships.

POTENTIAL FOR COMPETITIVE EDGE	**HIGH**	• Specification Generator • Type of Supplier • Examples • Contract Relationships	• OEM • No supplier • Styling • Not applicable	• OEM-supplier generate specifications together • Mature • Engines • Full or Partial ownership	• OEM generates detailed specification • Child Supplier • Brackets • Long-term contracts
	MEDIUM	• Specification Generator • Type of Supplier • Examples • Contract Relationships	• Supplier generates rough specification which is then worked on by the OEM • Partner • Styling • Joint development, Partial ownership	• OEM generates rough specifications which is then worked on by the supplier • Mature • Chassis • Joint development, Retainers	• OEM generates detailed specification • Child Supplier • Interior Trims • Short-term contracts, Contract orders
	LOW	• Specification Generator • Type of Supplier • Examples • Contract Relationships	• Supplier generates specification • Partner • Audio-System Validation • Joint development	• Supplier generates rough specification which is then worked on by the OEM • Mature Supplier • Door Knobs, glass mirrors • Long-term contracts, Retainers	• Supplier generates the specification • Contractual Supplier • Hand held tools • Short-term contracts, Contract orders
			HIGH	**MEDIUM**	**LOW**
			Essentially Qualitative Specification	Mix [Qualitative and quantitative] Specification	Purely Quantitative Specification
			DEGREE OF STRATEGIC VULNERABILITY		

Table 9, The Procurement Matrix complemented by contract relationships.

CONTRIBIUTIONS AND MANAGERIAL IMPLICATIONS

Emphasizing the role of specifications in making outsourcing decisions, is an attempt to aid managers and senior staff working in the area of procurement and its management. These managers need as many tools as possible to support their decision-making. The procurement matrix can help companies to leverage their resources by carefully placing all the different types of products into one of the boxes in the procurement matrix. This will allow a match between the type of the supplier required, the product in question, the generator of the specification and the nature of the specification, in addition to the assessment in terms of potential for competitive advantage and strategic vulnerability. Further, this will also allow a match between the above described parameters and the type of relationship that is preferred. This genuinely strategic framework utilizes the entire variety of strategic options available and by analyzing the positioning of its activities into the procurement matrix, companies can overcome many of the risks associated with outsourcing. The procurement matrix, building on the model of Quinn & Hilmer [1994] can help in building long lasting relationships with the suppliers, in improving return on capital, in allocating internal resources, and in enhancing the decision-making process in terms of strategic outsourcing decisions.

By simply changing the resource allocation in order to change the nature of the specifications from quantitative to mixed to qualitative or vice-versa, the involvement of the suppliers, the decision to outsource and the product to be outsourced can be changed.

Future Research

Future research should attempt to explore decision parameters in procurement further so that a framework can be constituted. Specifications form one decision parameter, but many more can be identified. Relations between these parameters can also be an interesting angle to the proposed framework as the effects of each parameter on the other parameters can be analyzed and made available to the decision-makers. Currently there are a number of isolated models susceptible to help make procurement decisions and these models have been developed in different industries. These models are isolated in the sense that they do

not take into consideration the parameters developed by one another so as to form a holistic decision making aid.

The proposed procurement matrix framework could be tested for generalizability across different industries and the varying importance of the different decision parameters would be of utmost help to managers that shift jobs within and between industries and have to deal with these procurement decisions. Specifically, empirical studies using questionnaires may be helpful in validating specific findings of this study. Finally, subsequent research efforts should be directed at furthering our understanding of the other roles that the specifications can perform.

Post Script

The term procurement has been used in the broader sense to reflect all the people/departments that are pivotal in getting the inputs in the outsourcing decision making process. Used in the broader sense, engineers, purchasers, after sales staff amongst others are involved in such decisions. The role of specifications in outsourcing decisions help in connecting the different functions and people together. For example, engineers can contribute in terms of product engineering knowledge, and at the same time they can assess their ability in writing an appropriate specification laying ground for co-development with suppliers. Sometimes it could only be a rough or functional specification [where rough descriptions of the functionality are written down] while at other times it could be a detailed specification for systems/components.

The competency sought and developed by the organization also depends on what the organization sees as vital to its brands and their survival. The extent of engineering involvement on a self declared basis could allow the purchasers to bring in the suppliers with matched competencies and capabilities at the right time. This might further enhance interaction between functions. The role of specifications in outsourcing decisions will also help to facilitate cross-functional communication and help aligning the entire company in the same direction. Finally, utilizing specifications in outsourcing decisions would make these decisions much more visible throughout the organization.

REFERENCES

1. Adler, P.S, Mandelbaum, A., Nguyen, V. & Schwerer, E. "Getting the most out of your product development process", *Harvard Business Review*, Vol. 74, No. 2 1996, pp. 135-152.

2. Asmus, D. & Griffin, J. "Harnessing the power of your suppliers", *The McKinsey Quarterly*, No. 3, 1993, pp. 63-78.

3. Birou, L.M. & Fawcett, S.E. "Supplier Involvement in Integrated Product Development", *International Journal of Physical Distribution & Logistics Management*, Vol.24, No.5, 1993, pp. 4-14.

4. Black, J.A. & Boal, K.B. "Strategic Resources: Traits, Configurations and Paths to Sustainable Competitive Advantage", *Strategic Management Journal*, vol. 15, Special Issue, Summer, 1994, pp. 131-148.

5. Blonder, C. & Pritzl, R. "Developing strategic alliances, a conceptual framework of successful co-operation", *European Management Journal*, Vol.10, No.4, 1992.

6. Bruce, M., Fiona, L., Dale, L., & Dominic, W. "Success Factors for Collaborative Product Development", *R&D Management*, Vol. 25, No.1, 1995, pp. 33-44.

7. Clark, K. & Fujimoto, T. (1991), *Product Development Performance. Strategy, Organization and Management in the World Auto Industry*, Boston, MA: Harvard Business School Press.

8. Clark, K. "Project scope and project performance: the effects of parts strategy and supplier involvement in product development", *Management Science*, Vol.35, No.10, 1989, pp. 1247-1263.

9. Cusumano, M. & Takeishi, A. "Supplier relations and supplier management: A survey of Japanese, Japanese-transplant and US auto plants", *Strategic Management Journal*, Vol.12, 1991, pp. 563-588.

10. Ellram, L.M. "A managerial guideline for the development and implementation of purchasing partnerships", *International Journal of Purchasing and Materials Management*, Vol. 31, No. 2, 1991, pp. 9-16.

11. Gugler, P., "Building transnational alliances to create competitive advantage", *Long Range Planning*, Vol. 25, No.1, 1992, pp. 90-99.

12. Harrigan, K.R. *Managing for joint venture success*, Lexington MA, Lexington Books, 1986.

13. Kamath, R.R & Liker, J.J. "A second look at Japanese Product Development", *Harvard Business Review*, Nov-Dec 1994, pp. 154-170.

14. Kaulio, M. A. "Specifications as mediating objects: on the [tactical] use of specifications in technical product development work", *Proceedings from the 3rd EIASM International Product Development Management Conference*, INSEAD, Fontainebleau, Part 2, 1996, pp. 491-500.

15. Lamming, R. *Beyond partnership, strategies for innovation and lean supply*, Hertfordshire: Prentice Hall International, 1993.

16. Miles, M. B. & Huberman, A. M. *Qualitative Data Analyses, An Expanded Sourcebook*, Thousand Oaks, CA: Sage Publications, 1994.

17. Nellore R & Soderquist, K., "Portfolio Approaches in Procurement – Analyzing The Missing Link to Specifications", *Long Range Planning*, forthcoming 2000

18. Olsen, R.F. & Ellram, L.M. "A Portfolio Approach to Supplier Relationships", *Industrial Marketing Management*, vol. 26, 1997, pp. 101-113.

19. Porter, M.E. "Don't collaborate compete", *The Economist*, 9th June, 1990, pp. 26-29.

20. Prahalad, C. K. & Hamel, G. "The Core Competence of the Corporation", *Harvard Business Review*, Vol. 68, No. 3, 1990, pp. 79-91.

21. Quinn, J.B & Hilmer, F.G., "Strategic outsourcing", *Sloan Management Review*, Vol. 35, No. 4, 1994, pp. 43-55.

22. Richardson, J. "Parallel Sourcing and Supplier Performance in the Japanese Automobile Industry", *Strategic Management Journal*, Vol. 14, 1993, pp. 339-350.

23. Schilling, M.A. & Hill, C.W, "Managing the New Product Development Process: Strategic Imperatives", *Academy of Management Executive*, vol. 12, no. 3, 1998, pp. 67-81.

24. Schrader, S. & Göpfert. J. "Structuring manufacture-supplier interaction in new product development teams: An empirical analysis", *IMVP Working Paper*, MIT, MA, USA, December 1994.

25. Smith, P. & Reinartsen, D. *Developing products in half the time*, Van Nordstrand Reinold, New York 1991.

26. Strauss, A., & Corbin, J., (1990), *Basics of Qualitative Research, Grounded Theory Procedures and Techniques*, Newbury Park CA: Sage Publications

27. Venkatesan, R. "Strategic sourcing: to make or not to make", *Harvard Business Review*, Nov-Dec, 1992, pp. 98-108.

28. Von Hippel, E. (1988), *The Sources of Innovation*, New York: Oxford University Press.

29. Wernerfelt, B. "A Resource-Based View of the Firm", *Strategic Management Journal*, vol. 5, no. 2, 1984, pp.4-12.

30. Womack, J. P. Jones, D. T. & Roos, D. *The machine that changed the world*, New York: Rawson Associates, 1990.

31. Yin, R., K., (1989), *Case Study Research, Design and Methods*, Newbury Park, CA: Sage Publications.