Outsourcing, Supplier Relations and Internationalisation: Global Sourcing Strategy as a Chinese Puzzle

Outsourcing, supplier relations and internationalisation: Global sourcing strategy as a Chinese puzzle

Uitbesteden, leveranciersrelaties en internationalisering:

Mondiale inputstrategie als een Chinese puzzel

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Chinese puzzle[1]:
(1) A very difficult wooden puzzle, especially one that consists of a series of boxes which fit one inside the next
(2) Any highly complicated puzzle or problem

The latter is true for sourcing. Firms engage in productive activity in order to achieve their goals. Selling goods and services is the ultimate core business of a firm. In order to be able to sell products, they need human inputs, physical inputs, and information flows. All of these inputs originate from some source. Thus we speak of sourcing inputs. In management and organisation studies, sourcing is a highly relevant issue. To provide a first, broad definition sourcing is the *process of finding a source for the inputs for production and subsequently managing that source*. Therefore, a study of sourcing is not so much concerned with throughput or output, unless insofar as it affects the choice and management of inputs given the ultimate goal of production of goods and services.

Sourcing is by no means a new topic. In fact, all organisations need to source. However, over the development of modern economies, *organisations have become more complex and production chains have become longer*, which changes the nature and extent of sourcing. To provide an example: in the old days a farmer directly provided milk to a consumer. Thus most sourcing could be done internally, given that no external labour was used and that the farmer breaded the cows. In fact, if the consumer would bring her own bucket to fetch the milk, no other sourcing was needed. Looking at the common pattern in modern societies, the production and distribution process has become much more complex, requiring different sourcing. Although farmers often still breed their cows themselves, they do not milk the cows by hand anymore. The machines that are used to milk the cow are so complex that the farmer can not build them. Therefore it is seen as normal that another firm provides these machines. Furthermore the electricity that is necessary to run the machines can much more efficiently be produced by yet another company. These are only two examples connected to the production process. However, the distribution of milk has also changed tremendously. The consumer no longer gets the milk from the farmer, but from the supermarket. This implies a number of extra steps. First of all physical transport of the milk is needed. At the same time the milk has to be cooled. The transport devices used are fairly complicated, and thus externally produced and maintained, and the labour and capital input is usually from an external transport firm. The milk is then bottled in a plant and distributed to the supermarket. The bottling machines, the packaging materials and the storage are other activities that have been added to the production chain and are performed by others than the farmer. The scale of the operations has also increased multiple times.

This example is not the exception but the rule. Production chains have become more complex and longer. Production chains involve more players now who produce goods together. Furthermore many of these *production chains have extended geographically*.

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1 *Chambers 21st Century Dictionary: The Living Language*, Chambers, Edinburgh, 1996.

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This has been facilitated by the rapidly decreasing per unit costs of transportation over the last 200 years, combined with a much higher speed of transportation. More recently new Information Technology has caused severe drops in the costs of communication, which further induced the trend towards larger distances. This geographic extension has led to an increased ability of firms to produce, sell, and purchase across borders. Kotabe (1992: 6) states that global sourcing strategy is:

> "Management of the interfaces among R&D, manufacturing and marketing on a global basis and of logistics identifying which production units will serve which particular markets and how components will be supplied for production, such that the firm can exploit both its own advantages and the comparative advantages of various countries".

In this study a slightly different definition of global sourcing strategy will be used. When firms *start finding and managing sources for production of final products on a world-wide basis*, we use the term *global sourcing*. First of all, the element of *global* stands out when compared to *international*. As will be discussed in detail later, what distinguishes global from national is simultaneous international economic transfer and managerial integration across borders. Second, although the management of the interfaces among R&D, manufacturing, marketing and logistics is one of the ways in which a firm's global sourcing strategy can be optimised, it is not the goal of global sourcing strategy. The goal of global sourcing strategy is to optimise the supply chain in order to help create advantages for the firm vis-à-vis competitors. Thus, global sourcing strategy is an element of firm strategy, which is in strategic management generally defined as the way in which a firm creates sustainable competitive advantage (Barney, 1991). Furthermore the definition of sourcing in this dissertation is really how firms find sources to compose their final products both inside and outside of the firm. This does not involve the decision which production unit will supply a particular market, which is essentially a marketing decision, even though it has an impact on sourcing decisions and vice versa. The focus of this study is much more closely linked to outsourcing and supplier relations than to production – marketing decisions, which leads to a somewhat different definition:

> *"Global sourcing strategy is the decision-making process through which firms find and manage inputs for final production in an integrated, international context in order to contribute to the creation of sustainable competitive advantage by the firm".*

The *research question* this study attempts to answer is closely related to this definition. This study is rooted in the academic field of strategic management of the firm. The overarching goal of this field of study is to explain performance differentials between firms. Hence the main research question in this study is:

> *HOW DO FIRMS OBTAIN COMPETITIVE ADVANTAGE ON THE INPUT SIDE?*

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Competitive advantage of a firm is determined by looking at a firm's performance relative to that of competitors. Three possible strategies to obtain competitive advantage on the input side will be distinguished in this study. These three strategies are outsourcing, managing supplier relations and internationalising the supply base. Therefore three underlying questions emerge:

1. *Does outsourcing lead to improved firm performance?*
2. *Do co-operative supplier relations lead to improved firm performance?*
3. *Does internationalisation of the supply base lead to improved firm performance?*

Questions 2 and 3 are treated as extensions of question 1. This implies that supplier relations and international sourcing will be studied with regards to outsourced items. There are various reasons for this choice, which will be clarified at a later stage. *Studying sourcing strategy then, is very much like solving a Chinese puzzle*: it involves complex issues and a problem with multiple layers (first deciding whether to outsource or not, then deciding on the relation type with as well as the location of the supplier). The aim of this study is to help solve this Chinese puzzle. To achieve that goal, this study will venture far beyond the borders of strategic management into the domains of organisation theory, international business, purchasing management and industrial marketing.

The first chapter provides a broad overview of global sourcing strategy. It starts by reviewing several strands of previous research on the topic. Chapter 2 then defines some issues in sourcing research that have not been handled sufficiently. This helps to facilitate the construction of a research framework in the next chapter, which builds upon these gaps in existing literature. This framework in chapter 3 serves as the trigger for the empirical chapters of the dissertation. Chapter 4 deals with the methodology of the study, discussing both why certain methods are applied and how they will be applied. Chapter 5 is the first empirical chapter and discusses the relation between outsourcing and firm performance. Chapter 6 focuses on the impact of buyer-supplier relations on the firm's competitiveness. Chapter 7 deals with international sourcing strategy and how this contributes to firm performance. Chapter 8 attempts to empirically integrate the various topics and presents a framework for understanding trade-offs and interactions between the three topics discussed in chapters 5 through 7. The ninth and final chapter contains the conclusions of this study.

This study is written in such a way as to shed light on issues that managers struggle with. Most likely few managers will be able to grasp all it has to say, including the many data analyses, even if they were willing to and would have the time. Such is the discrepancy between scientific method and managerial practice. However, I am convinced they will be able to identify with the topics and outcomes and see these outcomes as a platform for discussion.

Chapter 1: Global sourcing strategy

In this chapter an initial overview is given of the topics of interest to this study. The literature is reviewed and classifications are provided to guide this review[2]. The need to review the existing literature on global sourcing strategy arises for a few different reasons. First, no full review has been given as yet, which may be caused by an underdeveloped body of knowledge. For example it is stated that (Swamidass & Kotabe, 1993: 82):

> "[T]he topic of international sourcing, which touches several disciplines including international trade, business strategy and manufacturing strategy, has not received the attention it deserves from researchers"[3].

In *International Business* studies some reviews have been given concerning topics that are intra-organisational in nature. Martinez and Jarillo (1989) discuss a vast number of studies on co-ordination mechanisms within MNCs. Birkinshaw (1994) focuses on the role of subsidiaries in MNC strategy making. Finally, Cheng and Bolton (1993) argue for greater interest in the topic of R&D and multinationals. However, inter-organisational topics have not been reviewed in an international context so far. Likewise there are a small number of authors that give an overview of sourcing or buyer-supplier relationships, but none of these explicitly addresses internationalisation. For example, Beije (1998) reviews publications on how the buyer-supplier relationship may facilitate innovation processes. Dyer and Singh (1998) discuss literature concerned with how buyer-supplier relations may lead to superior performance. Domberger (1998) deals with work on outsourcing. There is also a chapter in Nishiguchi's book on industrial sourcing in Japan (Nishiguchi, 1994) that deals with theoretical approaches to sourcing, but this is not internationally comparative in nature either. So *a review that combines sourcing issues and internationalisation is lacking.*

Second, *research on relations between firms is clearly on the increase in the organisation and strategy fields* (Gulati, 1998) as firms are seen to increase their number of interorganisational relations. To some extent the increase in scholarly research can be traced back to an increased occurrence of networks of firms in practice and their larger impact on business (Ford, 1998; Lorenzoni & Baden-Fuller, 1995). Given this increased academic interest in what is happening between firms, it would seem appropriate to expect a similar change in the international business area. Are international buyer-supplier relations emerging and what is their nature? A review of the state of the art in international sourcing strategy will lead to topics of future interest and may thus facilitate the development of knowledge on international sourcing.

Third, at a time when calls are being made to both increase the number of interdisciplinary studies (Eisenhardt, 1989; Oliver, 1997), and to investigate whether theories

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[2] This chapter draws heavily upon a paper which was first presented at the 1998 EIBA conference (Mol, 1998).

[3] One area of research that Swamidass and Kotabe do not explicitly mention is logistics. Other authors have picked up this point and stressed the urgency of good logistics in global sourcing (e.g. Levy, 1995; Murphy & Daley, 1994).

of management can be applied in different countries (Cheng, 1994; Shenkar & Von Glinow, 1994), global sourcing seems an especially suitable test case. For one, global sourcing definitely crosses both functional and disciplinary borders (Kotabe, 1992): analysis of global sourcing involves such key economic concepts as 'vertical integration' (Joskow, 1985), sociological concepts like 'trust' (Gambetta, 1988) and political science concepts like 'bargaining power' (March, 1962). Kotabe (1992, 1998) rightly suggests that global sourcing is a topic on the intersection of various functional areas. He particularly mentions the importance of the interfaces between R & D, marketing and manufacturing. Sourcing strategy relates to all of these functions since important considerations are what technologies to source, for what markets to source and what items can be manufactured internally. Then there is the issue of differences between countries. Concerning the application of theoretical constructs in different countries the case is made (Cheng, 1994) that research should either be applicable anywhere in the world or should incorporate the peculiarities of the society and locality where it is being done. Given the fact that buyer-supplier relationships may partly be the outcome of social and historical developments (Nishiguchi, 1994), it seems worthwhile to explore international sourcing strategies in different research settings. This may allow for testing whether theories apply universally. Sourcing takes place everywhere, but presumably not in an identical way all over the globe.

A review of the ProQuest database substantiates the notion that global sourcing is a topic of increasing interest to academics. The ProQuest database is widely used by academics in business studies and affiliated areas as a literature source. It provides search options for time periods, topics, authors and much more. This brief review looks at the number of peer reviewed articles appearing on *sourcing* and *global sourcing* every year. In figure 1 the yearly number of references containing the word 'sourcing' and the combination 'global and sourcing' is shown. The word 'sourcing' includes all forms of sourcing, including domestic and international sourcing. The combination with 'global' of course reduces the number of hits significantly. Over the entire 1970-1985 period only 29 articles feature the word 'sourcing'. Before 1986 not a single article containing 'global' and 'sourcing' appeared. After 1985 interest in global sourcing rose rapidly, particularly after the seminal article by Kotabe and Omura (1989) so it seems. In the latest time period under review, from 1998 to 2000, the average yearly number of articles on sourcing rose to 35, while the average yearly number of articles on global and sourcing rose to 7. In conclusion figure 1 reveals that the interest in global sourcing has risen from none at all to reasonable levels over the last 15 years.

This makes global sourcing an interesting topic to study for strategic management and international business scholars. Interestingly the pattern is little different for articles that are not peer reviewed (data not shown). This implies that practitioners have become equally interested in global sourcing in recent years.

Figure 1.1: Average yearly number of hits in the ProQuest database on sourcing and global sourcing for 6 different time periods. The scale on the *left-hand side* refers to hits (articles) on *sourcing*. The scale on the *right-hand side* refers to hits on *global and sourcing*.

Global sourcing strategy

| | Yearly articles on sourcing | Yearly articles on global & sourcing |
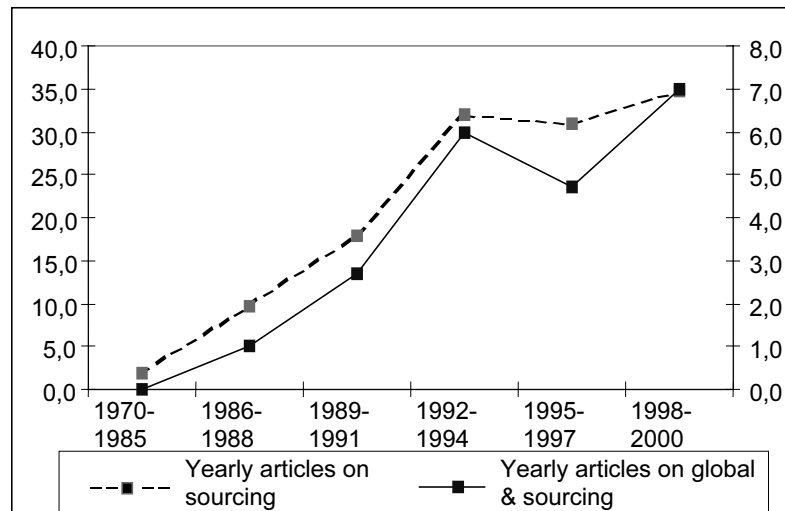
1.1 Five dimensions of international sourcing strategy

A survey of the literature resulted in a classification of international sourcing strategy along three areas of interest. The entire international sourcing strategy discussion has evolved in three areas that partly build upon each other but mostly develop independently. In the first area, make-or-buy decisions, authors are particularly concerned with the *content* of sourcing strategy, e.g. what parts are outsourced and what parts are not? In the second area the emphasis is on the *process* through which firms source, e.g. what is the nature and extent of interaction with and among suppliers? Finally, the third area, international sourcing, is concerned with the *context* in which a firm sources from suppliers, e.g. does the firm source from the home base or from abroad? These three areas can be subdivided into five dimensions, three of which are not necessarily international in nature.

Although other representations of the field are possible and viable, these five dimensions best characterise the decisions sourcing managers have to take with regard to their international sourcing strategy. They are key decisions with respect to the potential for improving performance of the firm and heavily dictate the daily activities sourcing managers have to undertake at later stages[4]. Furthermore it seems that all the core pieces in the existing literature on sourcing strategy fit well in one or two of these five dimensions. The five dimensions are:

1. *Ownership: the degree to which the source is a part of the sourcing company;*
2. *Relation: the type of relation between the source and the sourcing company;*
3. *Network: the nature and structure of the network of suppliers of the sourcing company;*
4. *Supplier internationalisation: the degree to which the location of the supplier differs from that of the buyer;*

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[4] To substantiate this from a managerial point of view, please consider the scope of these decisions: they involve what source to use, how to use that source and the institutional context of sourcing.

5. *International supply decisions: how decisions concerning the supplies of the firm are organised between countries.*

In order to briefly outline how these five dimensions together form international sourcing consider table 1 below. The table depicts a historical perspective of where the five dimensions first emerged and when they started to attract attention in the mainstream literature. These are the starting points of the literature discussion below, which is not to say that any of these discussions have faded since. The table is merely a rough overview that will be followed by more detailed qualifications later.

Topic	Triggered in particular by	Academic literature	Applied literature
Make-or-buy decisions • Ownership	Vertical integration discussion, re-emerging with Williamson (1975) and later by core business considerations	Developed particularly in the early 1980s with the work in Transaction Cost Economics, now also Resource Based View of the firm	Developed particularly in the early 1990s with the work of Quinn (1992) and work on IT outsourcing
Supplier management • Relation • Network	The emergence of the successful and 'different' Japanese business system in the 1980s	Developed particularly in the mid and late 1990s with the work on relational rent, network design and trust, the latter dating back to Granovetter (1985)	Developed particularly in the mid and late 1980s with the work on Japanese supply chain management practices
International sourcing • Supplier internationalisation • International supply decisions	The internationalisation of the world economy and increases in international buyer-supplier relations in the late 1980s and 1990s	Developed in the 1990s after the work of Kotabe and Omura (1989)	Developing since the early 1990s with a range of articles in purchasing, logistics and supply chain publications

Table 1.1: A brief historical overview of five dimensions of international sourcing.

Although these five dimensions can not all be investigated over the course of this or any single study, they will all be reviewed in order to assess the current status of the literature. The remainder of this chapter is structured along the five dimensions and three areas of study. The first three dimensions are discussed in section 1.2. Sections 1.3 and 1.4 cover the international aspects of sourcing. As the first three dimensions have generally been discussed more and the last two are of particular relevance to a study of international sourcing, there is an uneven treatment of topics. The first three dimensions are not necessarily international in nature. They shall be discussed mainly by references to existing overviews. The international dimensions will be discussed in more detail.

1.2   Outsourcing, supplier relations and networks

1.2.1   To make or to buy: is that the question?[5]

Sourcing is about setting the boundaries of the organisation. Which inputs are to be produced by the organisation itself and which are preferably to be dealt with by other organisations or to be bought on a spot market? Whatever theoretical perspective one chooses to study firm behaviour, it is a *sine qua non* to include at least some element of sourcing. Any effort of a theory of the firm that does not specify the boundaries of the organisation and the way it obtains inputs to produce its products is doomed to fail. Consider two important frameworks that currently compete with each other in the theory of the firm debate, transaction costs economics (Coase, 1937, Williamson, 1975) and the resource based view of the firm (Penrose, 1959; Wernerfelt, 1984). Based on the transaction costs approach many studies distinguish between the *make* and *buy* options (e.g. Walker, 1988; Walker & Weber, 1984). This equals a choice between internal and external sourcing, which will be used throughout this study. An explanation of whether a firm makes or buys something is found in the level of production and transaction costs. The transaction costs largely depend on the three variables *asset specificity, frequency* and *uncertainty*. Especially asset specificity is highly correlated to make or buy. The higher the asset specificity of a given transaction, the more likely a firm is to internalise the underlying activity (Walker & Weber, 1984). Based on the resource based view of the firm (see a/o Mahoney & Pandian, 1992), it has been proposed that firms ought to use their resource and competence base as a key to the sourcing decision (Quinn & Hilmer, 1994). Firms ought to make those items close to and within the core of their organisation's competence base, whereas other items can be sourced from the best external provider available worldwide (Quinn, Baruch, & Zien, 1997; Quinn & Hilmer, 1994).

So there is substantial academic debate on outsourcing. However, outside the walls of academia sourcing is also quite eminent. This may be considered from both a *buyer's* and a *supplier's* point of view. Any organisation that wants to provide a product has to engage in sourcing decision making. That organisation may end up as either a buyer or an in-house producer of (parts of) the product. If it decides to buy certain items, we find a supplier or spot market on the other end, providing the product. In the real world many, if not most, of the organisations that we observe are in fact suppliers to other organisations (Simon, 1991). Final (consumer) products are still regarded as highly important, but no longer constitute a majority of the world's economic activity as they once did, in the times of Adam Smith. In a sense many of the markets Smith (1976) and a string of economists after him discussed, where heaps of single suppliers fulfilled some aggregate demand, have been replaced by networks of firms that together produce some output. As the economist Richardson (1972: 883) frames it:

> "I was once in the habit of telling pupils that firms might be envisaged as islands
> of planned co-ordination in a sea of market relations. This now seems to me a
> highly misleading account of the way industry is in fact organised"

and (Richardson, 1972: 892):

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[5] Reviews of literature related to this topic can be found in Cheon, Grover and Teng (1995) and Domberger (1998).

> "Firms are not islands but are linked together in patterns of co-operation and affiliation. Planned co-ordination does not stop at the frontiers of the individual firm but can be effected through co-operation between firms. The dichotomy between firm and market, between directed and spontaneous co-ordination is misleading; it ignores the institutional fact of inter-firm co-operation and assumes away the distinct method of co-ordination this can provide".

While Smith (1976) is famed for his work on the internal division of labour, recall the example of the nail factory, we have now entered an era in which there is a much stronger external division of labour between firms. Products have become increasingly complex and are produced by a larger number of actors. This requires more co-ordination efforts on the one hand but allows for more efficient specialised production on the other hand.

1.2.2   Different types of relations[6]

Two different ways of managing (internal and external) suppliers exist: exit and voice (Helper, 1991; based on Hirschman, 1970). Exit-based relations tend to focus on maximising the buyer's short-term utility. As soon as a supplier does not fulfil expectations, buyers will switch under an exit-based approach. Voice-based relations on the other hand use buyer-supplier co-operation to improve in the long run. Helper (1991: 785) defines the two as:

> "1) exit, where the buyer's response to problems with a supplier is to find a new supplier, and 2) voice, where the buyer's response is to work with the original supplier until the problem is corrected."[7]

Helper and Sako (1995) raise the question whether cultural or environmental conditions do or do not influence sourcing behaviour. Based upon the exit-voice distinction Japanese and US suppliers are compared (Helper & Sako, 1995). They appear to converge in their management of sourcing. Where there used to be major differences, these are now shrinking. However, other research (Dyer, Cho & Chu, 1998) actually suggests that the differences between Japanese, Korean and US firms are still substantial.

Terms somewhat similar to exit and voice have been used for this distinction, including: non-co-operative and co-operative (Axelrod, 1984; Ring & Van de Ven, 1992); non-embedded and embedded (Granovetter, 1985; Uzzi, 1996); low and high trust (Gulati, 1995) and arms length and partnership relations (Matthyssens and Van den Bulte, 1994). All of these continuums carry slightly different meanings but share as a core element that the interaction intensity between the parties differs at the two ends of the continuum. In a voice relation the parties will exchange more information, communicate on a far more regular basis and exchange different kinds of information. Some important explanatory variables that have been

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[6] A well-developed review in this area of research is given by Ring and Van de Ven (1992) and Dyer & Singh (1998). For trust in particular see Mayer, Davis and Schoorman (1995).

[7] Note that a supplier to some extent faces the same choice when deciding whether or not to market a product to a certain buyer. For suppliers there is less leeway for voluntary decision-making though, since the need for turnover will largely determine the choice to engage in a relation with a buyer. In this study only the buyer's perspective will be discussed because this study deals with the input side of the firm.

mentioned for this difference include trustworthiness of partners, loyalty, uncertainty and dependence between parties.

Successful relations between buyer and suppliers are expected to involve at least some trust, especially in the longer run (Nooteboom, Berger and Noorderhaven 1997; Gulati, 1995). A buyer-supplier relationship that is embedded in a network and societal structure, is likely to survive more frictions and is therefore potentially more successful in a dynamic setting (Uzzi, 1997). In embedded relations parties to the exchange are connected within the surroundings of a tightly knit network (Granovetter, 1985). In Granovetter's terms the argument of embeddedness is (1985: 481-482):

> "the argument that the behavior and institutions to be analyzed are so constrained by ongoing social relations that to construe them as independent is a grievous misunderstanding".

The key variable in deciding upon exit or voice ties is uncertainty about future events (Gulati, 1998; Luhmann, 1968): the higher the uncertainty, the more beneficial voice ties seem to be. Voice relations are used to absorb uncertainty about future events. Once a strong tie has been established, firms can try to use it to create sustainable competitive advantage (Dyer & Singh, 1998). This is what Dyer and Singh (1998) refer to as relational rent, a term that intends to describe the potential synergy between buyer and supplier. From political science stems the idea that power and mutual dependence govern the relationship between buyers and suppliers (Pfeffer & Salancik, 1978). Firms can be seen as coalitions of interest that seek resources from the environment (Pfeffer & Salancik, 1978). In that sense relations with suppliers should to some extent also be seen as struggles for power between buyers and suppliers. This is obvious from the fact that terms are always negotiated. Relational rent is partly a matter of win-win situations but to some extent also a struggle for appropriating rents by both parties. This implies it is not only necessary to co-operate with another party but also to be aware that there are conflicting demands between the parties. Both will seek to appropriate as much of the joint profits as they can, which requires governance mechanisms to balance interests.

1.2.3 Supplier networks: structure and design[8]

Finally, a limited amount of work has been undertaken in the area of design and structuring of supplier networks. More and more buyers organise their suppliers as a network (Lorenzoni & Baden-Fuller, 1995; Miles & Snow, 1992). Through tiering of suppliers, a practice in which the automobile industry is particularly advanced (Dyer, 1996), indirect steering of smaller suppliers is obtained. Tiering implies developing a hierarchy between 1st level, 2nd level and 3rd level suppliers. A key aspect of tiering is modularisation whereby a supplier of the 1st level is given full responsibility for a single module of a product (Economist Intelligence Unit, 1995). This supplier organises the production of the module itself, such that the buyer is relieved from some supply chain co-ordination activities. This changes the nature of the supply network as it implies moving up responsibility in the chain towards large suppliers.

In the research tradition of Burt (1992) and others, Uzzi (1996; 1997) has investigated the antecendents of embeddedness in supply networks and the consequences that

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[8] For a review of work on sourcing networks see Ford (1998).

embeddedness has for performance. Embeddedness consists of three key components: trust, fine-grained information and joint problem-solving mechanisms. In Uzzi's terms (1997: 43-44) trust is based on heuristic-based processing instead of calculativeness and monitoring devices 'to catch a thief' are absent. Fine-grained information is, unlike prices in markets, characterised by detailed and tacit understanding that has a holistic structure (Uzzi, 1997: 45). Uzzi states of joint problem-solving mechanisms that (1997: 47):

> "[E]mbedded ties entail problem-solving mechanisms that enable actors to coordinate functions and work out problems 'on the fly'".

He further states that (1997: 47):

> "[j]oint problem solving mechanisms are mechanisms of voice. If a firm is able to design a supplier network to maximise the existence of these three mechanisms of trust, fine-grained information and joint problem-solving mechanisms, it can obtain the most benefits of them."

Dyer, Cho and Chu (1998) suggest that a network of suppliers is best segmented between durable arm's length suppliers and strategic partners. Their data suggest that Japanese automobile manufacturers have been able to do so, while Korean car companies are locked into the partner model and US firms into the arm's length model. Dyer et al (1998) state this accounts for the competitive advantage of Japanese firms in manufacturing. Partners are viewed as the firm's preferred suppliers. Accordingly Kamath and Liker (1994) find that, unlike the common assumption, first tier suppliers in Japan are not always employed in the same manner. Different roles exist, namely partner, mature, child and contractual. Ruigrok and van Tulder (1995: 79) come up with six ideal types of supplier networks. In each of these networks the division of suppliers is different as well as the responsibilities given to those suppliers. In some cases first tier suppliers are actively involved in the management of lower tiers, in others they are not. Japanese firms usually keep up a more tightly structured network of suppliers (Dyer et al, 1998; Ruigrok & Van Tulder, 1995). A major trend in supplier network management is the reduction of the number of suppliers. Firms now tend towards single sourcing. Single, multiple and parallel sourcing (Richardson, 1993) are three ways of approaching suppliers. Single sourcing implies that one organisation supplies all the quantities of a product or service. Multiple sourcing is based on the fact that two or more firms continuously compete for orders of a given product or service in a market-like fashion. Parallel sourcing is another way of stimulating competition between suppliers. One supplier supplies all the orders for product A, whereas another supplier covers product B (Richardson, 1993). These suppliers are expected to continuously improve their offers and compete with one another for new orders.

1.3   Global sourcing as a firm strategy

The internationalisation of firms has been a topic for academic research for over 40 years now. It has in fact grown into a whole new field of study, usually denoted as International Business (IB). International trade, as one of the predecessors of IB even goes back centuries, at least to Ricardo's comparative advantage concept. From trade the focus has slowly shifted, first to Foreign Direct Investment (FDI) and over the last 15 or so years also to the firm's

processes, strategies, and organisation[9]. This shift is the result of a conscious effort to open up the black box of the firm.

Different forms of internationalisation

Internationalisation takes various forms, a few of which are international sales, international licensing, international Research & Development (R & D), international Mergers & Acquisitions (M & A) activities, FDI and international sourcing. In fact firms can internationalise in all areas of management and there is neither a fixed sequence nor a fixed format for internationalisation[10]. International sales, through exports or local production, and advertising are forms of marketing across borders that serve to increase the potential market and size of a firm. International licensing and R & D are forms of international exploitation and accumulation of the knowledge base of the firm. International M & A is a form of expanding the firm's scale or scope to either increase the market share or expand the number of markets in which a firm competes. FDI is a form of internationalisation of a firm's primary processes, manufacturing or providing services, to increase the presence in foreign markets or to provide cheaper or better products and services for the home country. International sourcing is a form of internationalisation to optimise the supply base by either using internal or external suppliers that either possess innovative and unique capabilities or produce at a lower cost or both[11]. Much research has gone into explaining the motives for FDI flows and export patterns (Dunning, 1993). Far less is known about the reasons to source internationally.

So, why would firms want to engage in international sourcing? In the literature different reasons are mentioned that mostly fall under the header of increased competitiveness (e.g. Kotabe, 1998). These reasons can roughly be divided into two categories. The first category is a well-known layman interpretation of international supplies and concerns the search for the lowest costs (Dunning, 1993), which leads North American, Japanese, and European firms to South East Asia and other areas of the world with low labour costs. In reality firms hardly ever choose the countries with the lowest labour costs, but instead those with the lowest integral costs per unit and a guaranteed minimum quality level. This includes costs of transportation and productivity differences. This explains why it are not the countries with the lowest per hour labour costs, like many African countries, that receive inward investment or international sourcing orders. At the other end, in the second category, we find

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[9] International trade and FDI are of course still on the agenda, but are rarely seen as the single dominant force in the future of IB, see for instance the 1998 special issue of the Journal of International Business Studies, volume 29: 1.

[10] Many modern firms counter the thesis of Johanson and Wiedersheim-Paul (1975) that international sales is always the beginning of the internationalisation process. Internationalisation may also start with sourcing or finding international employees. To illustrate that there is no fixed format, consider global Internet start-ups or the firm from Antwerp that sells cookies in Belgium and then expands its geographical scope to include the Netherlands. Both follow very different internationalisation trajectories.

[11] Similar to Porter's (1980; 1985) positioning argument, a good supplier is one that offers either a differentiated product or a product with a superior cost position. Adding unique characteristics can differentiate a product. Please note that the term characteristics should be interpreted in the broadest possible sense here to include for instance counter-trade obligations or new capabilities. A more efficient transformation process leads to lower costs than competitors.

the more specialised, quality and innovation seeking international sourcing, which is discussed far less in public space but more frequently in academia. Firms look for specific bases of knowledge, which fairly often are centred in clusters of economic activity (Porter, 1998). The inputs produced in such clusters are often, though not necessarily, more high tech and more innovation intensive.

At the theoretical level this discussion of lowest cost versus highest value added has been captured by Zajac and Olsen (1993) who see this as two distinct research traditions. The cost minimising argument stems from Williamson's Transaction Cost Economics (1981) and maintains that firms are out to minimise their combined costs of transacting and producing[12]. The opposite argument, transaction value maximisation, requires a process view of transactions (Zajac & Olsen, 1993). It poses that a low cost of transacting is not competitively advantageous per se, if another exchange leads to a higher value outcome. Looking at both sides of this coin provides a healthier look at the problem. After all, what firms seek from transacting is to create added value, which comes not from either minimising costs or maximising outcomes, but from a joint maximisation of outcomes minus costs. Synergy between transaction cost economics and resource-based explanations lies at this crossing.

Global sourcing

Global sourcing has been identified as a separate research topic in the late 1980s (Kotabe & Omura, 1989). The earliest academic reference to international sourcing appears to be Leff's (1974) article in the Columbia Journal of World Business. Leff (1974) is concerned with production location decisions of U.S. firms that were seeking international expansion at the time. Leff seems to follow the argument of Aliber (1971) that plant location is essentially optimised by playing off currency fluctuations well. In the late 1970s more work emerged on the international sourcing pattern of firms (Buckley & Pearce, 1979; Lall, 1978). This was done under the header of intra-firm exports, with data obtained from trade statistics (Lall, 1978), or under the header of sourcing for final markets (Buckley & Pearce, 1979). However, none of this earlier work is concerned with internal and external sourcing as competing modes implying their definitions do not match what is currently thought of as sourcing.

Kotabe (1992), who made global sourcing into an IB topic in the first place, refers to global sourcing as involving sourcing for components as well as sourcing for final products. The sourcing part is thus rather straightforward: it simply involves all actions and transactions needed to obtain a marketable product (Kotabe, 1992). However, what makes it global often remains rather vague in most definitions. Consider the definition given by Murray, Kotabe, and Wildt (1995b):

> "Global sourcing involves setting up production operations in different countries to serve various markets, or buying and assembling components, parts or finished products world-wide".

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[12] Obviously the absolute level of transaction and production costs that a firm can achieve is to a large extent determined by the institutional and business environment in which it operates featuring issues like currencies and business-government relations. Section 1.6 will deal with this issue in some more detail.

Global sourcing strategy

This definition suggests that all MNCs producing abroad, and even domestic firms which use inputs from a number of countries, engage in global sourcing. Or is there a hidden sub-criterion in the definition? Other terms used besides global sourcing, include international sourcing (Levy & Dunning, 1993), multinational sourcing (Birou & Fawcett, 1993) and offshore sourcing (Frear, Metcalf & Alguire, 1992; Kotabe & Swann, 1994). International sourcing is defined as buying by a firm in one country from a firm in another country (Levy & Dunning, 1993). Multinational sourcing (Birou & Fawcett, 1993), though not formally defined, seems to have more or less the same connotation as international sourcing. Offshore sourcing (Frear et al, 1992; Kotabe & Swann, 1994) has only been applied to US firms that produce and purchase abroad and then export products to the United States. Thus, global sourcing appears to be the most comprehensive of the four terms and includes multinational, international and offshore sourcing. The term international sourcing will be used throughout most of this study since it is the most general term.

Two dimensions seem to be underlying the notion that sourcing or any other activity can be global. The first is plainly that activities need to take place across borders. Sourcing domestically from one US firm to another can not rightfully be called global. The second dimension, that is needed to distinguish international activities from global ones is the functional integration of activities across borders (Bartlett & Ghoshal, 1989; Gereffi & Korzeniewicz, 1994). For example, it is stated that a commodity chain only becomes global when an attempt is made to organise and optimise an already international commodity chain by parties in different countries (Gereffi & Korzeniewicz, 1994). Thus we cannot speak of global sourcing unless there is an integration of the sourcing function across geographical borders. In order to classify the various international and domestic sourcing strategies available, a framework will now be presented[13]. It is a rather general framework that can be applied at both the level of a single transaction and the level of a sourcing relationship. The first dimension is quantitative and concerns the internationalisation of the actual sourcing pattern. The second dimension is qualitative and concerns the level and location of decision making on international sourcing.

The first dimension of international sourcing is at the same time highly logical and not trivial. It indicates where the supplier to a certain transaction or the supplier in a relationship is located. Any statement on international sourcing strategy would at least seem to require some basic knowledge of the internationalisation pattern. For the sake of simplicity a dichotomy will be proposed between domestic and international sourcing. A much more refined categorisation is possible empirically, for example between different areas of the world. This categorisation will appear in section 1.4. Likewise, the measurement difficulties that may arise when suppliers themselves start locating across borders will be ignored for the time being. This first dimension is concerned with the content of a firm's international sourcing strategy.

> *The distinction between domestic sourcing and international sourcing is the first dimension of international sourcing strategy.*

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[13] Another useful classification is provided by Kotabe and Omura (1989). Their classification, however, does not deal with the extent of functional integration across borders.

The second dimension needs some more elaboration. In a seminal article, Perlmutter (1969) distinguished between three types of headquarters orientation. He also refers to these three as 'attitudes' and 'views of the world'. The three different types of headquarters orientation are ethnocentric, polycentric and geocentric. In ethnocentric organisations 'home standards are applied for persons and performance' (Perlmutter, 1969: 12). The headquarters of the organisation take the central role in ethnocentric organisations and subsidiaries are mainly replications of one another. In polycentric organisations standards are 'determined locally' (Perlmutter, 1969: 12). Here subsidiaries have a lot of initiative and they may actually be the decision making unit. Geocentric organisations try to find 'standards which are universal and local' (Perlmutter, 1969: 12). Geocentric organisations try to integrate the various subsidiaries and headquarters. Perlmutter refers to them as truly international companies that, at the same time, identify with national interests. Perlmutter's types will not be used to distinguish between different attitudes, but the three types will instead be applied to the location of decision making. A decision taken at headquarters can be said to be ethnocentric, one in an independently operating subsidiary is polycentric and an integrated international decision is geocentric. Although many, more recent attempts exist to classify organisations along the same 'attitude' dimension, of which the integration-responsiveness (IR) grid (Prahalad & Doz, 1987) is probably the most well-known, Perlmutter's original threefold distinction[14] will be maintained if only because it suffices for current purposes. This second dimension deals with the process through which a firm deals with international sourcing.

> *The distinction between ethnocentric, polycentric and geocentric organisational decision making is the second dimension of international sourcing strategy.*

Table 2 incorporates the two dimensions of internationalisation and decision making in a 3-by-2 matrix[15]. For any given sourcing transaction or sourcing relationship there is a cell available. However, this matrix cannot incorporate the entire sourcing strategy of a given firm. It only addresses the question of internationalisation: where a decision is taken and whether it involves cross-border transhipment. Six different possibilities exist. Centralised sourcing [1] occurs when a sourcing decision (either a single transaction or a buyer-supplier relationship) is taken at headquarters level and the actual source is within the same country. For example, an

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[14] The integration-responsiveness grid (Prahalad & Doz, 1987) and the types of Perlmutter have a lot in common. The key to the integration-responsiveness grid is that firms at the same time try to optimise global integration and local responsiveness. Perlmutter's ethnocentric organisation type fits the quadrant of high integration and low responsiveness. The polycentric organisation type fits the quadrant of low integration and high responsiveness. Finally, the geocentric organisation type fits the quadrant of high integration and high responsiveness. This geocentric type is very similar to Bartlett and Ghoshal's transnational type that also seeks to combine high integration and high responsiveness.

[15] It is recognised that the table bears some resemblance to Porter's framework of international co-ordination (Porter, 1986b: 27). However, Porter only distinguishes between 'low' and 'high' co-ordination without incorporating the notion that co-ordination may be achieved via different routes. 'High' co-ordination occurs in different forms, through centralised decision making and through extensive information flows at a decentralised level. Of course Porter (1986b) in his framework is not particularly concerned with sourcing either.

automobile company may use in-house engines, constructed at the corporate headquarters. Best-in-world sourcing [4] uses the same principle of centralised decision-making, but instead decides upon a source outside of the home country. This may be done to obtain scale economies with a best-in-world supplier (Quinn & Hilmer, 1994), e.g. in the area of semi-conductors. Local-for-local sourcing [2] on the contrary is both decentralised, with decisions being taken at the subsidiary level, and domestic. A standard example concerns the rental of storage capacity near a factory in the host country. Multinational sourcing [5] is decentralised and international. What actually occurs is that a unit that is independent from organisation units in other countries and therefore often locally oriented, sources internationally. This is essentially a replication of type 4 at the local level instead of the global level. Proximity-based sourcing [3] is domestic sourcing by an internationally interdependent organisation unit. For example, the subsidiaries or businesses of a firm together decide to opt for nearby delivery of electric power and consequently look for local suppliers. Finally, global sourcing [6] is both interdependent and international in scope. Consider the business unit of a chemicals firm, located outside the home country, which sources a catalyst from one supplier with a small number of production sites spread all over the world.

Decision Place	Ethnocentric (headquarters)	Polycentric (subsidiaries)	Geocentric (integrated)
Domestic sourcing	1. Centralised sourcing	2. Local-for-local sourcing	3. Proximity-based sourcing
International sourcing	4. Best-in-world sourcing	5. Multinational sourcing	6. Global sourcing

Table 1.2[16]: Six different strategies for sourcing by place (internationalisation) and decision (internal organisation). Decision making dimension is based on Perlmutter (1969).

1.4   Internationalisation of the supply base[17]

What do we know empirically about international flows of goods between buyers and suppliers? There is a lot of anecdotal evidence to support the notion that many firms have partially and some have entirely international supply chains and that most firms have an increasing number of international suppliers. It is this latter phenomenon, internationalisation of the supply base, which will be the focus of this section. There is also some literature, although it is not very sizeable, that supports this notion. Two types of research strategy have been unleashed in the literature to determine the extent of internationalisation in sourcing. The first type uses secondary, statistical data at the macro level, most notably Wyckoff (1993). The second type uses primary, firm level data from questionnaires or interviews (e.g. Kotabe & Omura, 1989).

Wyckoff (1993) estimates internationalisation of sourcing based on input-output tables of national economies. Six countries are mentioned: the US, where 13% of sourcing is

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[16] The categorisation developed here in table 1.2, as well as the categorisation in table 1.6, mainly serve the purpose of assessing current literature. They are not intended as building blocks for the theoretical framework to be developed in chapter 3. However, particularly in chapter 7 reference will once again be made to these frameworks.

[17] A part of this section draws upon Mol and Koppius (forthcoming).

international; Japan, with 7% international sourcing; France, with 38%; Germany, with 34%; the UK, with 37% and Canada, with 50%. A methodological remark is that these data are based on fairly rough international trade statistics, which disguise for example ownership effects and re-imports. Given these limitations, it is still obvious that firms in smaller and geographically less isolated countries source more from abroad.

For some 2,000 US firms with about 18,000 foreign affiliates Kotabe and Swan (1994) calculated an offshore sourcing ratio. This ratio is defined as the sum of US manufactured imports from foreign affiliates of US firms plus platform exports from these foreign affiliates to third countries, divided by parents' total sales. This ratio is a measure of the importance of foreign production activity as a part of the firm's total production (sales). This is not sourcing of components but sourcing of final products[18]. It was calculated for three points in time. In 1977 it stood at 6.2% and it subsequently increased to 7.8% in 1982 and 10.3% in 1989.

Buckley and Pearce (1979) similarly investigated sourcing for final markets, a measure of sourcing of final products. In a sample of 156 MNCs they found results similar to the Wyckoff study. For Japanese companies a ratio of overseas production to total sales was found of 2.4%. For French companies the ratio stood at 8.0%. For the Swiss (91.6%), Benelux (70.7%) and the 'joint and other' (69.7%) MNCs a much higher ratio was obtained. For other countries, such as the US, this ratio was not reported. From another ratio that Buckley and Pearce mentioned, overseas production as a percentage of overseas production plus the parent's extra group exports, it becomes clear that US MNCs used overseas production far more than exports. For Japanese firms the opposite pattern was visible at that time. As mentioned in section 1.3 sourcing as it was defined in the 1970s is mostly a measure of a firm's international manufacturing structure and did not include external sourcing.

The Kotabe and Omura (1989) study provides data on 43 European and 28 Japanese MNCs in the United States. The major sourcing strategies of these MNCs are described in terms of components sourcing and assembly location. Sixteen of the European firms both assemble and source components in the home country and seventeen both assemble and source components in the US. Of the ten remaining European MNCs, four both assemble and source components from another developed country (which may be European). Three firms source components from the home country and then assemble these in the US One firm sources components from less developed countries and assembles in the US. One firm sources components from the home country and assembles in the US. The remaining firm sources components from the US and assembles in a less developed country. Of the 28 Japanese firms in the sample 15 both assemble and source components in the home country as the major sourcing strategy. Five firms both assemble and source components in the US. Seven firms source components from the home country, which they subsequently assemble in the US. Only one firm relies on sourcing of components and assembly in a less developed country.

Based upon the same survey of Japanese and European MNCs, Swamidass and Kotabe (1993) calculate average component sourcing. For manufacturing in the US, 64.3% is sourced within the US, 29.9% in the home country 1.8% in other developed countries and 4%

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[18] This measure, like the next one, has very little to do with the make-or-buy decision discussed in section 1.2. It relates more closely to location theories like Vernon's (1979) product life cycle theory.

in less developed countries. For manufacturing in the home country with subsequent exports to the US, they find 6.5% sourcing in the US, 88.5% sourcing in the home country and 2.5% each in other developed countries and less developed countries. The latter data are the only data outside the US in the literature on component sourcing. However, no distinction is made here between Japan and Europe.

In a later study Murray, Kotabe and Wildt (1995a) used a survey among US subsidiaries of Fortune 500 companies. This time 104 responses were obtained, 71% of which were European and 21% Japanese. On average these firms sourced 73.7% of their components from the US, 15.9% from the home country, 7.6% from other developed countries and 2.8% from less developed countries. In terms of assembly, 85.7% took place in the US, 7.9% in the home country, 3.5% in other developed countries and 2.9% in less developed countries.

Other studies provide a less detailed view: Birou and Fawcett (1993) report 13% of sourcing to be international for a sample of 149 US firms in the US; Monczka and Trent (1991b), for a sample of US companies in the US, find 15% of sourcing to be international. Table 3 summarises these results.

Author(s)	Country	Dom.	Int.	Home	Host	Other	Devel.
(Wyckoff, 1993)	US	87%	13%	-	-	-	-
(Wyckoff, 1993)	Japan	93%	7%	-	-	-	-
(Wyckoff, 1993)	France	62%	38%	-	-	-	-
(Wyckoff, 1993)	Germany	66%	34%	-	-	-	-
(Wyckoff, 1993)	UK	63%	37%	-	-	-	-
(Wyckoff, 1993)	Canada	50%	50%	-	-	-	-
(Kotabe & Swann, 1994)	US (1977)	93.8%	6.2%	-	-	-	-
(Kotabe & Swann, 1994)	US (1982)	92.2%	7.8%	-	-	-	-
(Kotabe & Swann, 1994)	US (1989)	89.7%	10.3%	-	-	-	-
(Buckley & Pearce, 1979)	Japan	-	-	97.6%	2.4%	-	-
(Buckley & Pearce, 1979)	France	-	-	92.0%	8.0%	-	-
(Buckley & Pearce, 1979)	Switzerland	-	-	8.4%	91.6%	-	-
(Buckley & Pearce, 1979)	Benelux	-	-	29.3%	70.7%	-	-
(Kotabe & Omura, 1989)	US/ass.†	-	-	37.2%	48.8%	9.3%	4.7%
(Kotabe & Omura, 1989)	US/ass.‡	-	-	53.6%	42.6%	-	3.6%
(Kotabe & Omura, 1989)	US/comp.†	-	-	46.5%	41.9%	9.3%	2.3%
(Kotabe & Omura, 1989)	US/comp.‡	-	-	78.6%	17.9%	-	3.6%
(Swamidass & Kotabe, 1993)	US§	-	-	29.9%	64.3%	1.8%	4%
(Swamidass & Kotabe, 1993)	Eur./Jap.	88.5%	-	-	-	9%	2.5%
(Murray et al, 1995a)	US/ass.§	-	-	7.9%	85.7%	3.5%	2.9%
(Murray et al, 1995a)	US/comp.§	-	-	15.9%	73.7%	7.6%	2.7%
(Birou & Fawcett, 1993)	US	87%	13%	-	-	-	-
(Monczka & Trent, 1991b)	US	85%	15%	-	-	-	-

Table 1.3: Summary of quantitative research findings: domestic, international, home country, host country, other developed country and developing country sourcing. All findings have been recalculated into percentages. Note: authors use very different ratios and methods (see text). Sometimes assembly (ass.) and components (comp.) are distinguished.
† European MNCs in the United States
‡ Japanese MNCs in the United States

Chapter 1

§ A combination of European and Japanese MNCs in the United States

Although marked differences exist between the aforementioned empirical studies, some similarities appear too:

a. The degree of internationalisation in sourcing seems to be negatively related to the size of the focal country. This is entirely consistent with intuition. MNCs in smaller countries, such as Switzerland or Canada, use international sourcing more than Japanese or US MNCs do.

b. Inside the parent's home country MNCs do not make much use of international sourcing. Apparently these MNCs have over time built a large network of suppliers in their home country or even in their immediate proximity. This seems to be consistent with the idea of industrial districts (Marshall, 1919), such as Silicon Valley where firms lump together.

c. MNCs outside their home countries have the most internationalised sourcing pattern. Their sourcing pattern appears to be mainly bi-national, divided between the home country and the host country. However, some firms demonstrate dissimilitudes and source from other developed countries or less developed countries.

d. None of the studies addresses the effects of the formation of economic regions, such as the EU or NAFTA. Some studies were undertaken before these regional developments and others do not explicitly include these developments in their frameworks. It is reasonable to expect that the smaller countries mentioned before like Switzerland and Canada source much from within the economic areas in which they operate. Such regional sourcing is quite different from global sourcing.

1.5   On the internal organisation of international sourcing

Most of the research in the area of international sourcing focuses on the (dis)advantages of and sometimes the barriers to international sourcing (cf. Levy, 1995; Min et al, 1994; Monczka & Trent, 1991a; Murphy & Daley, 1994; Murray et al, 1995a). This area was largely discussed in the previous section. Only a smaller part is concerned with how the management of international sourcing takes place. Do firms centralise their sourcing decision-making or do they instead let their subsidiaries take these decisions (Faes, Matthyssens and Vandenbempt, 2000)? This part will now be highlighted.

The original Kotabe and Omura (1989: 113) study predicted a shift from a polycentric organisation to a more internationally co-ordinated, that is geocentric, organisation. This was based on the belief that strategy decision making became more global over the course of the 1980s (Porter, 1986a). However, the sourcing data that Kotabe and Omura had at their disposal did not allow for testing of this proposition. In a later study (Kotabe & Swann, 1994) there is some indirect evidence that a shift in decision making has indeed occurred in the (late) 1980s for US MNCs. R&D responsibilities are reported to be moved away from headquarters towards subsidiaries. Kotabe and Swan expect a related shift towards improved manufacturing capability of subsidiaries. Since their data do not shed any light on either the decision-making unit or the degree of interdependence between different subsidiaries, it is hard to achieve formal conclusions on this issue. Finally Murray, Kotabe and Wildt (1995a) report that the environment of the firm has a major impact on what is an effective way of sourcing. International sourcing strategy ought to be contingent upon the circumstances under which a

firm sources, it is maintained. Outside sourcing there is also evidence that that it can be effective to manage a firm by combining multiple centres of excellence (Doz, Asakawa, Santos and Williamson, 1997).

None of the studies described just now provides explicit data on the sourcing decision making unit. However, especially the last point made above seems an interesting starting point for analysis. If sourcing strategy is found to be contingent upon a number of conditions, then it seems reasonable to assume that organisation of sourcing may do so too. In fact, MNCs in Europe do indeed use different decision making units for their international sourcing activities. A sample of some 11 pilot interviews in Europe, that we held with some of the largest MNCs such as GE, Nissan, Royal Dutch / Shell and Unilever, pointed at different ways of internally organising sourcing strategy (Tecson, 1998) [19]. Some of the firms opted for local or national decision making in sourcing. Others co-ordinated their sourcing mainly on a European scale. Several firms were in fact in the process of integrating various national operations into a European sourcing organisation. Finally, a third category used global product divisions or business units as the decision-making unit. Often, however, there was a mixture of the three different ways of decision making. This might for example amount to centralised purchases of commodities, local purchases of low value, non-critical items such as basic steel constructions, and global purchases of division-specific components. What appeared to be important predictors of how these firms organised themselves internationally were the industry / product and the home country. Table 4 summarises some other empirical research that has been undertaken on the internal organisation of international sourcing. These findings are limited to the United States only.

Authors	Sample	Findings on mode of sourcing
(Guinipero & Monczka, 1990)	Survey of 24 large MNCs from the United States	All 24 operate some corporate purchasing staff Only 8 operate an international purchasing department Others operate on a more decentralised basis
(Frear, Metcalf, & Alguire, 1992)	Survey of 135 US purchasing managers	66%: user organization (decentralised) 35%: corporate purchasing (centralised) 10%: company-owned trading operation 11%: purchasing department of subsidiaries 8%: purchasing department of JV partners
(Min & Galle, 1991)	Survey of 141 US purchasing managers engaging in international sourcing	38.1 %: assigned buyer in purchasing unit 34.1%: manufacturer's representative 10.3%: foreign buying office 10.3%: import broker 7.9%: trading company 7.1%: foreign subsidiary 4.8%: import merchant 0.8%: state trading agency
(Handfield, 1994)	Survey of 97 US purchasing managers of which 56 used foreign sources	49.1%: directly between buyer and supplier 41.8%: supplier's US representative 5.5%: external trading company 3.6%: international procurement office 4.1%: face to face 1.9%: automatic order system

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[19] The current author was the co-investigator on the EU-sponsored research project in the Netherlands carried out by Gwen Tecson of the University of the Phillipines in 1998.

Table 1.4: Empirical research assessing the degree to which firms have integrated their international sourcing function across borders. Where is the international sourcing function located?

It appears that most firms treat their international sourcing operations as an extension of their existing domestic sourcing. In order to achieve functional integration across borders, a firm needs to construct some spatial organisation of sourcing. This could be achieved through a centralised international sourcing department, regional International Purchasing Offices (IPOs) or a globally integrated sourcing network. None of these three seems to be very prominent. Thus the integration across borders has not been well developed. Birou and Fawcett (1993: 37) conclude in their analysis of the extent to which there is such integration:

> "To date, relatively few firms have implemented truly global sourcing strategies; however, study results show that the international sourcing practices of some firms are directed at obtaining a systemwide competitive advantage".

With so little yet known, it seems that further fieldwork is needed. On the basis of a set of testable propositions the different ways of organising could be further investigated. There are three important issues to look into, *(1) scale economies, (2) home country effects, and (3) intra-industry effects*. First the nature of scale economies in the component or product influences sourcing decisions. Where large-scale economies exist with no need for local adaptation, centralisation seemed to persist in the interviews (Tecson, 1998). Similarly, in line with the general predictions of Prahalad and Doz (1987), with no scale economies present local subsidiaries take the main decisions. If scale economies do exist, but some form of adaptation is needed, flexible global contracts are often used.

A second issue concerns the home country. On the basis of earlier studies (Bartlett & Ghoshal, 1989; Chandler, 1986; Johansson & Yip, 1994; Whitley, 1992a) Japanese firms are thought to have lower local adaptation. European firms adapt to local circumstance to a far larger extent, whereas American firms tend to maximise global scale. This ought to be reflected in their sourcing strategies.

A third and final question is whether firms mimic one another (DiMaggio & Powell, 1983) and therefore replicate the sourcing organisation of direct competitors. Bandwagon effects may lead to synchronisation of decision making between firms (on IT outsourcing see Lacity & Hirschheim, 1995). Firms in an industry should show more or less the same pattern of organisation.

When firms go abroad they need to adapt to their newly found environments. The adaptation pattern refers to how and how easily a firm adapts to local conditions if it internationalises sourcing operations. This involves such processes as co-developing new suppliers to attain the desired levels, like Toyota has done in Australia (Langfield-Smith & Greenwood, 1998), or bringing in transplant suppliers as Japanese electronics firms in the U.S. have done (Kenney & Florida, 1995). Empirically this is an underdeveloped area of study, but conceptually some good understanding has arisen. Kotova and Zaheer (1999) develop a framework that increases understanding of what happens when a firm enters a host environment. Firms operating abroad are faced with what is generally referred to as the 'liability of foreignness'. Kostova and Zaheer (1999: 68) suggest the extent of this liability is

strongly determined by "the host environment's perception of and attitude toward foreign firms". If these attitudes and perceptions are hostile, MNCs will often be pressed to engage in local co-operation or other symbolic acts.

Limits to internationalisation

Combining the overviews in sections 1.4 and 1.5 leads to the notion that much sourcing can be located in cells 1 and 2 of table 1.2. That is, there is very substantial domestic sourcing that is organised either ethnocentrically or geocentrically. In addition, there appears to be some international sourcing going on that best fits cells 3 and 4. The amount of sourcing that can be categorised in cells 5 and 6, what was referred to as proximity-based sourcing and global sourcing respectively, is rather limited. Thus it seems fair to say that previous literature indicates that global sourcing is not a common firm strategy.

The results seem to point at a limited degree of internationalisation in sourcing until the mid 1990s, especially in the larger countries (U.S. and Japan). Where there is more international sourcing, this is often sourcing from the home country by foreign affiliates of MNCs. The studies discussed do not always allow for a comparison of internal and external sourcing in terms of their internationalisation. Generally speaking it appears that internal sourcing is more likely to be international than external sourcing. The functional integration, a second important trait of a global organisation, is not always achieved either. So far, there is no global sourcing across the board despite the contention that the lowest production costs are invariable found abroad. Apparently there still exist important inhibitors which offset these lower production costs and cause firms not to source globally.

Some authors explicitly discuss these inhibitors. Min, LaTour, and Williams (1994: 371) mention the following: political stability; tariff barriers; cultural and communication obstacles; trade regulations and agreements; currency exchange rates; cultural differences; variations in ethical and quality standards. Scully and Fawcett (1994: 43) put forward some similar reasons, but also some different ones: cultural/language differences; duty/customs requirements; JIT sourcing requirements; logistics support for longer supply lines; finding qualified foreign sources; fluctuations in currency exchange rates; knowledge of foreign business practices; nationalistic attitudes and behaviour; understanding the political environment.

A more general categorisation appears appropriate. There are three categories of cost drivers that exist solely in the international context, which together inhibit international sourcing, similar to Luostarinen's (1989) geographic, cultural and economic distance. Geography is solely concerned with the question 'from where to where'? The relational aspects are concerned with what happens in the buyer-supplier relation itself. Finally, the environmental aspects are concerned with what happens around the buyer and supplier, i.e. the context of the buyer-supplier relation. Distinct streams of social science research fit in with these issues.

The first category is related to *geography* and how it differs between buyer and supplier (geographic distance in Luostarinen, 1989). Both people and goods are imperfectly mobile, so physical distribution costs are an obvious part of geography-related costs: they are more or less linearly related to distance. These include increasing difficulties in logistics and physical supply and the problems of just-in-time delivery under a global sourcing policy. The role of

physical distance in economic transactions is one of the key objects of analysis in economic geography. Early work in economic geography (Weber, 1909) focuses on production costs as related to location. In Weber (1909) there is a cost penalty connected to increasing the distance of a supply line. In new economic geography (Krugman, 1991) this assumption is still an important part of simulation models. The nature of these distance–related costs is not really described by Krugman. Distribution costs are an obvious part of distance-related costs. Other costs are to be included too though. In international sourcing, synchronisation of business processes can be a problem as Levy (1995) describes, long delivery time may cause a product to lose value or run out of fashion. Therefore co-ordination problems between the marketing and production or purchasing functions increase with distance. Another case in point is a difference in time zones, which restricts joint work in some cases. In general, the larger the physical distance, the higher the transportation and co-ordination costs the firm faces in international sourcing.

A second category is in problems within the *buyer-supplier relationship* itself (economic distance in Luostarinen, 1989). This includes lack of information concerning the product offerings of a supplier, variations in quality standards, different business practices and language- or culture-based difficulties in buyer-supplier communication. The reasons for these problems have been addressed extensively in the economics of information and economic behaviour theory (Arrow, 1974; Simon, 1998). Information theory focuses on the limits of individuals and organisations in perceiving, receiving, storing and communicating information. These differences cause known information to be incomplete. This is expressed in a lack of information concerning a supplier's product offerings, variations in quality standards, different business practices and language- or culture-based difficulties in buyer-supplier communication (Min, LaTour & Williams, 1994; Scully & Fawcett, 1994). An example is that frequently, buyers will not have a good overview of all available suppliers world-wide. Similarly, insufficient knowledge of a particular culture may be an obstacle in international communication (Hofstede, 1980). Not being able to communicate with a partner efficiently makes the building of relationship harder. It is difficult for mutual trust to develop when partners do not know each other. This leads firms to stay within the confines of their existing social networks (Rangan, 2000). Thus in many cases firms will not even be exposed to international suppliers, and if they are, they are less likely to choose such a supplier over a local one. Of course, as the buying firm starts internationalising its manufacturing network through foreign direct investment, these problems may be tempered. Clearly, the more unfamiliar two firms are with one another, the more costly buyer-supplier differences are as time and investments are needed to get to know the other party in order to operate effectively.

The third and final category consists of differences in the *environments* of the buyer and supplier (cultural distance in Luostarinen, 1989). Having to get to know these different environments induces all kinds of deliberation costs and this phenomenon is generally referred to as the 'liability of foreignness' (Kostova & Zaheer, 1999). The environment contains business elements and institutional elements. Participants in the market represent business elements. Non-market organisations make up the institutional environment. Regulatory and political difficulties, tariff barriers as well as different ethical standards are part of the institutional environment. Fluctuations in currency exchange rates are part of the business environment. Political instability, regulatory and political difficulties, nationalistic attitudes, tariff barriers, trade regulations as well as different ethical standards are elements of

the institutional environment that raise the need for local responsiveness (Min et al, 1994; Scully & Fawcett, 1994). Fluctuations in currency exchange rates are a part of the business environment that strongly influences sourcing decisions (Min et al, 1994). The entire set of systematic differences among firms of different nationalities is the focus of the business systems literature (Whitley, 1992a; Whitley, 1992b). National business systems are complex systems in which firms, governments and other institutions interact. These business systems are highly idiosyncratic and difficult to change. Firms that establish themselves abroad usually bring along the national business system of their home country (Whitley, 1992b). How a business system is constituted influences both the sourcing strategy of a firm and where the suppliers of the firm are located (for the case of Britain and Germany see Lane and Bachmann, 1996). For example, firms that are strongly rooted in the Dutch business system are less likely to establish relations with Polish suppliers. And as noted before U.S. firms are more likely to steer relations at arm's length than are Japanese firms.

In general, the larger the environmental differences the higher the transaction costs the firm faces in international sourcing. It is clear that these three types of barriers interact with one another. For example, as physical distance increases, the likelihood of a different language or of cultural differences does too. Therefore the classification is not to be seen in terms of three strictly separate categories. However, separate measurements of each category appear to be possible. Table 5 briefly recaptures the previous discussion.

	Geography	Buyer-supplier relation	Environment
Based on	Products need to be physically relocated	Buyer and supplier need to become familiar with each other	Buyer and supplier must get to know a different environmental setting
Examples	• Logistical difficulties • Synchronisation becomes harder • No JIT delivery	• Lack of information • Linguistic and cultural difficulties • Higher evaluation costs	• Regulatory, political and ethical differences • Exchange rate shifts

Table 1.5: three categories of inhibitors of international sourcing.

1.6   Antecedents for cross-national differences[20]

A key methodological consideration in the area of global sourcing strategy is what to do with differences between firms from different countries. Institutional effects can have a profound impact on firms' sourcing strategies. The essence of comparative research is finding differences and similarities. Taking different nations as an independent variable in management research implies a quest for variables that express these differences and similarities in that particular context. Different classifications have been given of the type of variables needed. Cheng (1994) suggests that different contexts can be represented by political, legal, cultural and economic variables. According to Cheng, universality of knowledge could be obtained if cross-national variation can be explained by incorporating these context dependent variables into the research framework.

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[20] This section, as well as the next section on the role of information technology, does not discuss the content of global sourcing strategy but are included to provide an understanding of the background against which the field of global sourcing strategy is evolving.

Whitley gives a somewhat more detailed description of variables. He uses the concept of a business system (Whitley, 1992a; Whitley, 1992c), defined as (Whitley, 1992c: 6):

> "particular arrangements of hierarchy-market relations which become institutionalised and relatively successful in particular contexts."

Business systems can be seen to exist at different levels, for example at the national level. Any business system is characterised by (1) the nature of the firm, (2) market organisation and (3) authoritative co-ordination and control systems. Whitley (1992c) further describes 18 variables, all related to these three characteristics, to describe variations between business systems. Of these 18 variables, six appeared to be of special interest in the context of sourcing strategy. These six are (Whitley, 1992c: 9):

1. The degree to which private managerial hierarchies co-ordinate economic activities;
2. Specialisation of managerial capabilities and activities within authority hierarchies;
3. The extent to which risks are managed through mutual dependence with business partners and employees;
4. The extent of long-term co-operative relations between firms within and between sectors;
5. Stability, integration and scope of business groups;
6. Dependence of co-operative relations on personal ties and trust.

On the basis of these variables statements can be made concerning systematic (national) differences in the level of outsourcing, the nature of buyer-supplier relations and the scope of these relations.

No such specific categorisation is needed here to further develop the argument. Four important dimensions of nationality were mentioned above (Cheng, 1994): legal, political, cultural / institutional and economic systems. If these four contextual dimensions are matched with the five dimensions of international sourcing strategy, a set of 20 independent variables is obtained. Table 6 identifies these 20 variables and their relations to both sourcing strategy and national context. The effects of these 20 independent variables on the five key elements of sourcing strategy will now be discussed. It is rather obvious that important relations exist between the independent variables, but these will not be discussed here in order not to complicate matters too much.

	Legal	Political	Cultural / Institutional	Economic
Ownership	Contract law	Societal sensitivities	Uncertainty avoidance	Market imperfections
Relationship type	Competition law	Concept of control	Societal trust	Extent of business cycle fluctuations
Internationalisation	Local content regulation	Inclusion / exclusion	Openness towards other countries	Level of autarky
Network design	Competition law	Bargaining rules	Power distance	Distribution of firm size
Adaptation pattern	Technical standards	Receptivity of host country	Cultural distance	International trade patterns

Table 1.6: Contextual variables that influence key elements of international sourcing strategy.

Which are the key contextual variables that determine national differences between the extent of outsourcing, i.e. ownership? The nature of buyer-supplier contracts, repeatedly brought up by Williamson (1979), is to a large extent determined by the national system for contract law. If this law does not offer the appropriate protection or guarantees for a buyer, this is likely to lower the extent of outsourcing. On the political side of things, societal sensitivities can cause firms to not even consider outsourcing activities. If outsourcing means the shedding of some jobs or a total loss of jobs to another country, in case of international outsourcing, this may undermine a firm's legitimacy in its environment (Pfeffer & Salancik, 1978: chapter 3). The cultural context includes uncertainty avoidance (Hofstede, 1980), which is deeply rooted in outsourcing decisions. If there is uncertainty contracts with external suppliers will be incomplete. An uncertainty avoiding decision-maker wants to avoid risky contracts and will be more likely to outsource under such conditions. Finally a prominent economic explanation of internalisation is the imperfect functioning of markets (Coase, 1937). Firms can internalise activities if the market is a less than perfect instrument for production. Market imperfection clearly varies between countries, meaning that the pressure to internalise will differ between countries. Those countries with less market imperfection will generally have a lower extent of internal sourcing.

The comparative dimensions of supplier relations have only been researched to a limited extent so far. Comparisons have focused mainly on the United States and Japan, although not entirely. Helper and Sako (1995) discuss the possibility of convergence of sourcing relations in the U.S. and Japanese automobile industries. Dyer, Chun and Cho (1998) compare supplier relations in the U.S., Japanese and Korean automobile industries. Sako (1992) compares the functioning of trust in Japan and the U.K. Nishiguchi (1994) similarly compares relations in the British and Japanese electronics industries. A country's competition law dictates whether a particular relation is deemed legal. In some countries quasi-integration of a supplier is not tolerated. This makes a true voice type of relation more difficult to achieve, since a voice relation often involves (cross) shareholdings. Second, the political context of the home country provides the MNC with a particular concept of control (Ruigrok & Van Tulder, 1995). This concept of control determines to what extent and in which fashion a firm is willing to set up dependence relations with suppliers. Third, the level of trust has been shown to differ in societies and business systems, which has strong effects on supplier relations. As Sako (1992) argues high trust leads to a different type of relations than low trust. In Japan there is a large tendency towards these trust-based relations while in the U.K. there is a much smaller tendency (Sako, 1992). With high institutionalised trust it is easier to build voice relations than with low trust (Helper, 1991). Finally, Nishiguchi argues that business cycle fluctuations, a key element of a nation's economy, cause changes in supplier relations (Nishiguchi, 1994). With large business cycle fluctuations it becomes more profitable to use suppliers as a buffer. If the business cycle is low, suppliers will be parted from and once it rises they will be rehired. Thus if business cycle fluctuations are abundant, meaning the economy is unstable, the exit type of relations can be expected to be more popular.

The degree to which a firm internationalises its supplier network is connected to its home and host country, which determine the extent to which international sourcing is viable. International sourcing is more complicated for those firms that face strong local content regulation in their respective host environments (Kenney & Florida, 1995). LCR forces a firm

to redesign its sourcing strategy to one that is economically less than optimal. At the political level pressures may arise to include or exclude suppliers. If many long-term, solid relations characterise a country its firms will have a stronger tendency to include particular suppliers while excluding suppliers from rivalling groups (Ruigrok & Van Tulder, 1995). In politically sensitive industries such as aircraft construction or shipbuilding this is a common practice. In case of government orders, national states interrupt the supplier search process by assigning suppliers. This mechanism can strongly alter the internationalisation pattern of the firm. Similarly particular suppliers may have to be excluded from the process because of political unwillingness to deal with them. A cultural factor that influences this process of internationalisation is the degree to which the home and host countries are open to exchange (see for example Servan-Schreiber, 1968). A firm from a home country that is not open to exchange will have little experience in interacting with other national cultures. This will hinder internationalisation of its supply chain. The economic variable that influences internationalisation is the degree to which a country is self-sufficient. Firms from smaller home countries need to go international in a much earlier stage as they face a need for all kinds of resources and for a larger market that the home country can not fulfil.

Firms design supply networks in many different ways, affecting the structure and management of these networks as well as the number of suppliers. Competition law again determines the legality of particular supply network constructions. If shareholdings in suppliers, large market shares of vertical chains or single sourcing are not enticed by competition law, a firm will not use these to the full extent. The bargaining rules that form supply networks vary by country, as some social environments are more inductive to particular bargaining strategies (Tinsley & Pillutla, 1998). In particular it is shown that negotiators in different countries bring different goals to the table. As these goals of the bargaining strategy grow more towards give-and-take it becomes easier to form and structure solid supply networks. Furthermore, if the power distance within hierarchies that is known to vary across countries (Hofstede, 1980) can be extended to the inter-firm level, this has consequences for sourcing strategy. In countries with a high power distance it will be more common to structure a supply network and make it more hierarchical. How the firm size in a country's economy is distributed adds to these previous three variables. In a country with many small firms it is less common to find highly structured tiered supply networks. Roles change more frequently in such egalitarian networks. Buyers in one situation may be suppliers in another situation. However, if larger firms dominate the economy they may be able to dictate terms to their smaller counterparts, effectively introducing a tiered network.

The adaptation pattern of the firm indicates its ability to adjust its supply base when moving into a host environment. One problem of a legal nature is the different legal standards that are prescribed when a firm moves into a host environment. Pending upon how different these standards are from what a firm is used to at home this may create adaptation problems. If the national home standards are particularly idiosyncratic, a firm is likely to encounter more problems (David, 1985). Complementary to the 'distance between technical standards', the receptivity of the host country to receive firms from a particular home country matters when adapting. It is widely known that some combinations of home and host countries do not fare so well as others when it comes to FDI patterns due to political or societal resistance (Dunning, 1993: part 3). Thirdly, there is a cultural distance between home and host countries (Kogut & Singh, 1988) that affects the ease with which home and host partners interact with

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one another. How large the cultural distance is, will co-determine the adaptation pattern in the host environment. Finally, the history of previous economic interaction between the home and host country, as expressed by historical trade patterns, will be a factor in determining the ability to adapt to local conditions. If a long history of economic ties between two countries exists, this will generally make it easier to adapt.

1.7 Introducing the role of IT in sourcing

Recently it has been suggested that sourcing strategy is undergoing severe changes due to the rise of new technologies. Since the early 1990s multinational corporations have been actively restructuring their global supply bases. Information Technology (IT), in particular the internet, is providing new opportunities for supporting these restructuring efforts (Shapiro & Varian, 1998). Although most public attention was originally focused on the role of electronic commerce for marketing consumer goods, firms are increasingly opting for electronic forms of purchasing. Business-to-business trading over the Internet is considered to have a much more promising future than business-to-consumer trading in the long run. *Electronic sourcing, using electronic means to either initiate a transaction or a relationship with a supplier or to manage a relationship with a supplier*, is the general term for this phenomenon. However, as yet not very much is known about which types of products or transactions are suitable for trading over the Internet. Neither do we have a clear idea as to the form this type of trading will take. Will we see more long-term co-operative relationships or should we expect an increased number of auctions for single transactions? This may have obvious implications for the dimensions of sourcing discussed earlier.

In principle, *IT allows for more market-oriented international sourcing strategies*. For example, firms can conduct electronic auctions with their suppliers or set up Internet catalogues for selling and purchasing goods and services. Electronic auctions[21] are already enormously popular on the Internet within the business-to-consumer and consumer-to-consumer segments on sites like eBay.com, which started operations in 1995. By 2000 it had an annual turnover of more than $5 Billion spread among 29.7 million users. Academic research on electronic auctions has, so far, been scarce. One of the reasons is that electronic auctions have only recently started to find widespread application in business-to-business practice. In the business-to-business context this involves procurement auctions, and to a lesser extent, sales auctions. Internet catalogues, like Amazon.com, are the most familiar and popular form of electronic commerce activity.

However, there is not only a tendency towards improving the effectiveness of the market mechanism through IT. More idiosyncratic forms of IT have become available as well, like Intranet catalogues and dedicated electronic supplier networks. Their popularity would seem to run counter to the trend towards market-related forms of electronic trading. An example of more co-operative solutions is Cisco's Connection Online (CCO), in which Cisco's suppliers co-operate with each other to jointly produce the inputs that Cisco needs.

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[21] A typology of web-based auctions, based on the numbers of buyers and sellers is provided by van Heck and Vervest (1998). Appendix D will discuss the broader relation of electronic solutions to firm strategies. This section merely serves as an introduction and reflects the fact that the rise of new technologies is crucial to understanding changes in sourcing strategies.

Chapter 1

Many large firms are implementing Intranet catalogues to gather and display supplier data for ordering purposes. Ariba and CommerceOne are just two of the firms active in selling these applications. So *IT also supports close co-operation between buyer and supplier for example in the form of extranets*.

Electronic sourcing strategy combines two fields of interest, sourcing strategy and electronic markets, which are important for practical and academic reasons. A brief introduction of electronic market theory is therefore in place. Although some research has been done in this area, it has by no means been conclusive. Much theorising has already occurred as to what would be the effect of electronic markets on the choice between market and hierarchy, starting with Malone, Yates and Benjamin (1987). Most of this work occurs in a transaction cost framework. Most of the Information Management scholars involved in this 'markets vs. hierarchies' debate have tended to suggest that outsourcing becomes more beneficial after the introduction of IT in the sourcing process. Malone et al (1987) proposed that a shift would occur from the hierarchical mode of sourcing towards the market mode of sourcing. Thus, not only would firms outsource more, but the transaction costs in the market would also decrease tremendously. In a later counter-proposition a 'move to the middle' was suggested (Clemons, Reddi, & Row, 1993) as the transaction costs of building up networks of firms using electronic means will also decrease with the introduction of IT. IT enables further construction of inter-firm networks. More recently the idea has come up that it could go any way, that is towards market, hierarchy or network, pending upon the circumstances under which a firm operates (Holland & Lockett, 1997). Holland and Lockett (1997) include the type of product and the competition in a firm's markets as important predictors of the kind of swing that IT can induce in sourcing relations.

This literature suffers from two weaknesses. First, it is extremely difficult to measure the 'shifts' that the literature predicts. Given the length of time over which such changes are suggested to occur, and the inability to control for all other changes over this time period hypothesis testing seems difficult if not impossible. Hence this literature largely remains conceptual in nature unless one is willing to move from a 'shift' to a 'fit' discussion[22]. Second, the focus of this literature has largely been on predicting the form of sourcing meaning management of the buyer-supplier process and the (international) context have largely been ignored. Far less theorising has been undertaken to determine what IT will do to internationalise a firm's sourcing strategy or to analyse what IT does to trust in inter-firm relations. More research is needed to link new forms of IT to organisational strategies.

Thus a key question is: what are the effects of new IT and E-commerce on firms' sourcing strategies? Conceptually there are many different answers to this question. For buying companies electronic sourcing can potentially lower costs since many actions formerly performed by people can be automated. Furthermore other actions can become irrelevant altogether due to increased information availability. Electronic sourcing will certainly increase

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[22] In appendix D a *fit* framework is developed. If fit becomes the focus of analysis, the question is no longer what the consequences of IT are but how IT is best applied in supporting and improving existing sourcing relations given the characteristics of these relations. In the electronic markets area the work of Holland and Lockett (1997) probably comes closest to a fit perspective. Appendix D is best read right after chapter 6.

the range of potential suppliers as search costs will be substantially lower in international markets given the increased information availability and the use of automated search mechanisms like agents. Furthermore the transparency of markets will generally increase as a consequence of electronic sourcing since prices and other product attributes are only a click away. However, the costs of evaluating product offerings of suppliers will increase because there are more suppliers to evaluate and a possible information overload will occur. Evaluating distant and unknown suppliers will be more costly because firms can not rely on existing social networks (Rangan, 2000). Electronic sourcing also allows for the establishment of a far more integrated supply chain because linking different elements of the supply chain becomes easier. Using corporate information systems in sourcing (Clemons et al, 1993) can help overcome part of the friction between globalisation and localisation. These information systems can be both intra-organisational and inter-organisational in nature. One intra-organisational example is a large European MNC, which uses a central database of preferred suppliers (Tecson, 1998). Local plants or national subsidiaries can pick suppliers from this database at will. An inter-organisational example is the electronic sourcing system that has been set up by a large company like GE. These are essentially networks where buyers and suppliers connect.

It remains unclear to what extent sourcing will become more global as a consequence of new information technologies. As suggested before, current sourcing is mainly regional or bi-regional. Using electronic sourcing will increase the range of suppliers and decrease the costs associated with physical distance. Communication between buyers and suppliers will become less costly too. However, electronic sourcing will not influence environmental barriers to global sourcing, and especially not the institutional barriers in the environment. As the degree of international sourcing increases, firms will actually have to face these barriers more often. It can generally be expected that internationalisation in sourcing will increase as a consequence of electronic sourcing, but not to what extent this will happen. Electronic sourcing may facilitate international buyer-supplier relations and remove some of the barriers to international sourcing. Research in this area will generate both managerially relevant information and much needed academic knowledge on inter-firm relationships in the network era (Castells, 1996). Later some evidence will be presented that deals with this issue.

Chapter summary
Chapter 1 provided an overview of literature on global sourcing strategy, which is a relatively new field of study. Global sourcing is a field of interest for both academics and practitioners. It allows academics to deal with multifaceted theoretical problems, hence the reference to 'global sourcing as a Chinese puzzle'. Sourcing practitioners are increasingly engaged in global sourcing activities and would benefit from more research on this topic.

Three areas of global sourcing were distinguished: outsourcing, supplier management and international sourcing. Five dimensions within these three areas were discussed. Supplier management was subdivided in supplier relations and networks. International sourcing was subdivided in supplier internationalisation and international supply decisions. Then there was outsourcing. The review showed that there is an interesting and increasing literature on international sourcing strategy, in particular on the dimensions of outsourcing and supplier

management. The extent of supplier internationalisation is generally surprisingly limited. When firms do have international suppliers these are mostly located in the same economic region or in the home country of a host multinational. Internal sourcing is usually more international than external sourcing. Various categorisations of international sourcing strategies were produced. These categorisations served the purpose of ranking the literature. The chapter also addressed two key drivers of change in sourcing strategy, cross-national differences and new Information Technology to provide a background against which the field of global sourcing is evolving.

Chapter 2: The research agenda

The aim of this chapter is to identify important gaps in the sourcing literature and to propose how this study can contribute to this literature. The first section reviews the literature along the five dimensions proposed in chapter 1. Section 2 summarises the findings of this and the previous chapter and lists key points for future research. In section 3 the method through which this study attempts to contribute to the sourcing literature, replication with extension, is discussed in more detail. At the end of this chapter the necessary groundwork has been laid to start construction of a conceptual framework in chapter 3.

2.1 Gaps in previous literature

The five dimensions along which the literature was reviewed will now be revisited with the explicit aim of finding significant gaps in this literature. In section 1.1 these 5 dimensions were presented as:

1. *Ownership: the degree to which the source is a part of the sourcing company;*
2. *Relation: the type of relation between the source and the sourcing company;*
3. *Network: the nature and structure of the network of suppliers of the sourcing company;*
4. *Supplier internationalisation: the degree to which the location of the supplier differs from that of the buyer;*
5. *International supply decisions: in what parts of the firm decisions concerning the supplies of the firm are made.*

This section addresses these five dimensions again, particularly in terms of strengths and weaknesses of the literature and concerning the relation between the five dimensions and the concept of performance. The aim of this section then, is to locate key weaknesses and strengths of the existing literature. Similar to the previous chapter this implies that certain topics will now be reviewed that will neither be part of the theoretical framework nor of the empirical analysis following that.

1. Ownership

The ownership dimension is by far the most widely researched dimension of global sourcing strategy. Most academic attention on sourcing has gone to finding explanations for the make versus buy decision. For example we now know what the effects of asset specificity are on sourcing relations: high asset specificity decreases the likelihood that firms use a market mode of sourcing (Walker & Weber, 1984). Instead firms will opt for internal sourcing or for external sourcing with a strong co-operative ('voice') element. Likewise it is clear that uncertainty plays a major role in determining the type of sourcing. With high uncertainty firms will not outsource in the market mode of sourcing but opt for internal sourcing (Walker, 1988).

What has remained a highly controversial issue is the explanation of the relation between asset specificity and make-or-buy decisions. While transaction cost economics has maintained that

high asset specificity causes internalisation (Williamson, 1985), others have argued differently. Williamson (1985) and some of his colleagues (Heide & John, 1988; Masten, 1993) suggest that the need to provide safeguards against opportunism causes a firm to internalise activities. If these activities are sourced from an outside partner this partner might benefit from behaving opportunistically. Critics of TCE have addressed the role of opportunism and provided alternatives. They doubt that opportunism is such an omnipotent power because market parties are not anonymous actors (Granovetter, 1985). It is argued that the invisible hand of the market is itself the cap on opportunism (Hill, 1990). If a firm in the market behaves too opportunistically, its reputation among other firms will decrease and consequently its possibilities to acquire new business will drop. In that sense almost every transaction carries in it a 'shadow of the future' (Axelrod, 1984). The fact that an organisation knows it will deal with another party again at some point in the future strongly constrains opportunistic behaviour by that organisation. Others have argued that opportunism is not as dominant in the marketplace as Williamson suggested (Ghoshal & Moran, 1996). Ghoshal and Moran (1996) further point at the normative consequence of transaction cost economics: managers that are instructed that opportunism is the rule rather than the exception will adjust their own behaviour accordingly. This normative implication is seen as negative as it will encourage managers to behave opportunistically, thereby turning TCE's opportunism into a 'self-fulfilling prophecy' (Ghoshal and Moran, 1996). More opportunism in the marketplace is seen as an undesirable state.

The alternative explanation that has risen in the 1990s is usually referred to as the knowledge based view (Grant, 1996), which is seen as somewhat parallel to resource-based explanations. It claims that firms over time build capabilities and routines (Nelson & Winter, 1982) that allow it to perform certain activities better than outside parties. Every firm has some kind of inherent advantage or core competence (Prahalad and Hamel, 1990), which it is better able to exploit than other organisations are. This is where TCE and the resource and knowledge based approaches fundamentally differ. While TCE claims that internalisation of activities arises as a consequence of imperfections in the market primarily due to opportunism and bounded rationality, the other approaches see externalisation of activities as one appropriate route to follow in case a firm does not have internally available the needed resources and knowledge.

However, these two views need not be different regarding their predictions on outsourcing. The knowledge-based view also predicts that high asset specificity, be it in the form of firm specific knowledge and capabilities, leads to internalisation (Grant, 1996). However, the explanation of knowledge based scholars is that asset specificity is a consequence of routines and capability building inside the firm whereas TCE is only marginally interested in the origins of asset specificity, and sees asset specificity as the outcome of a previous economising choice.

The influence of the make-or-buy decision on a firm's effectiveness is still not quite clear although recent research has addressed this topic. A meta-analysis of 15 vertical integration studies that tested a total of 104 relations found no conclusive results for the effects of vertical integration on financial performance (Capon, Farley, & Hoenig, 1990). Recent research has come up with some interesting statements. If there is high asset specificity it pays off not to outsource (Poppo & Zenger, 1998). However, this research was done on IT outsourcing,

which is a rather untypical form of outsourcing since it is very young and unstable (Lacity & Hirschheim, 1993; Lacity & Hirschheim, 1995). The work by Kotabe and collaborators mentioned before also finds a positive relation between internal sourcing and profitability. Similarly a positive relation between vertical integration (internal sourcing) and profitability is reported by D'Aveni and Ravenscraft (1994). Gilley and Rasheed (2000) do not find any direct relation between outsourcing and firm performance. Most of the research relating the make-or-buy decision and effectiveness has been performed in the United States, with a small remainder coming from Japan and the United Kingdom. The research often presumes universal validity of the findings. How robust are these findings in different institutional contexts, such as China, continental Europe or India? Only by replicating earlier studies in those contexts, can this question be answered.

What the effects of outsourcing decisions are on the long run performance of the organisation, on its industry or on third parties is largely unknown, e.g.: is outsourcing good or bad for the economy as a whole? Some authors have argued that outsourcing may cause a spiral of industrial decline (e.g. Bettis, Bradley, & Hamel, 1992) but little empirical substantiation of this claim has been provided. The spiral is supposed to emerge when a firm sources out activities that carry a large knowledge content (Bettis et al, 1992). Suppliers, particularly ones in developing or newly industrialising countries, learn to perform a new activity through a buyer and then start competing with the buyer directly. Since the buyer often also loses internal manufacturing capability (Kotabe, 1998) it is unable to compete with these forwardly integrating suppliers. This important point should be addressed more thoroughly in future academic research.

An open question in the ownership and network dimensions, both conceptually and empirically, is whether inter-firm networks are an in-between mode of sourcing. That is, do they stand between markets and hierarchies as has been argued by some authors in the transaction cost economics tradition (Jarillo, 1988; Powell, 1990)? Networks are supposed to combine the positive traits of markets and hierarchies. This is a simplifying notion that is not empirically grounded. Hence we shall follow the line of some critics who have argued that:

a.   Sourcing networks do not occur solely in the middle between markets and hierarchies (Yeung, 1998). We find networks in a hierarchical setting, such as the Chinese family firm and in a market-like setting, such as the famous Italian garments district.

b.   Co-operation between firms does not occur along the same dimensions as hierarchies and markets. In inter-firm networks different processes occur, which are described by Dyer and Singh as 'relational rent mechanisms' (Dyer & Singh, 1998).

This leads to the conclusion that networks or inter-organisational relationships are really something different from markets and hierarchies and ought to be judged by different criteria. There is not one dimension between markets and hierarchies where networks occur somewhere in the middle. Since most empirical evidence can be found in the 'swollen middle' in between market and hierarchy (Hennart, 1993), it is better to judge relationships in terms of 'marketness' and 'hierarchyness'. These two terms are best seen as the degree to which a relationship is managed by price controls and the degree to which a relationship is managed by behavioural controls. Thus Hennart (1993) suggests it does not matter so much whether a supplier is internal or external. Instead he stresses the way the supplier is managed as key to understanding its effectiveness. This links closely to the next paragraph.

Chapter 2

2. Relation type
Many different categorisations of relation types have been introduced and tested. Particularly the role of 'trust' in interorganisational relations has been the topic of much conceptual and empirical work (Gambetta, 1988; Gulati, 1995; Lane and Bachmann, 1996; Sako, 1992). What is trust? What causes trust? What does trust cause? It is now obvious to most observers that dyadic relations can be described on a continuum. Whether that continuum runs from low to high trust, from low to high interaction or from exit to voice is partly a matter of semantics. High environmental uncertainty is a key factor in explaining why firms choose the high trust, voice type of relation (Gulati, 1998). Furthermore the degree to which trust is used varies with the product type (Sako, 1992).

A particularly worrisome characteristic of most research on relation types is its inherent vagueness when it comes to describing these tight relations. Many authors have cited a trend towards partnership relations between buyers and suppliers over the last ten years (for example Das & Teng, 1998; Hamel, 1991; Klepper, 1995; Martinsons, 1993; McIvor, Humphreys, & McAleer, 1997; Nooteboom, 1999), but few have been able to characterise such relations in details. Unlike 'hierarchies' and 'markets', inter-organisational relations seem to take many shapes. This may have hampered academic research, but not business consultants, who proclaimed partnerships as a key route to competitive advantage over much of the 1990s.

It has also been difficult to qualify and quantify the performance effects of partnership relations. Among the benefits that have been attributed to partnership relations are cost reductions through increased supply chain efficiency, lower transaction costs through trust, product and process innovation, learning, increases in firm competencies, improved product quality, reduced time to market and more generally competitiveness and cost positions (see amongst many others Burnes & New, 1997; Clark, 1989; Dyer, 1997; Hamel, 1991; Imrie & Morris, 1992; Smeltzer, 1997). A more formal relation between relation type and performance was not a topic of interest to the literature until fairly recently. In fact, much of the literature did not look at voice as causing both wanted effects (benefits) and unwanted effects (costs) and the balance between those two. Currently it seems that authors expect either a positive relationship between the voice type and performance (Helper & Sako, 1995) or a conditionally positive relationship (Sako, 1998). The measures of performance that Helper and Sako introduce, mainly 'commitment', are not very convincing. Which firm is judged on its mutual commitment with suppliers in the marketplace? This implies that better measures of relationship performance need to be found. Building upon Dyer and Singh (1998) it is interesting to describe what rent means in the context of inter-organisational relations. The next chapter will address that topic.

3. Network design
The third topic, supplier networks, is of more recent origin. Networks have been a topic of serious management studies since the late 1980s and this is obvious when looking at the results so far. They seem to have been influenced by the period of initiation of research. Much is known about how Japanese automobile companies structure their networks of suppliers

(Nishiguchi, 1994; Richardson, 1993), but how about other industries and supplier networks in other countries, including developing countries? There often is little or no work available in these areas. Measurement problems lie at the heart of this gap in the literature. It is very difficult to find the boundaries of a network, if there are any. If one does not know what parties to include and exclude, measurement becomes difficult. Furthermore research that compares different networks is particularly scarce. This is somehow logical given that the difficult question 'how do we compare two networks' has not been answered sufficiently theoretically. More comparative research is needed to improve our knowledge of sourcing networks. Presumably we are only at the beginning of a large stream of research on buyer-supplier networks.

Research that looks at supply networks in terms of how international they are and whether this matters is very uncommon. It is even being suggested by some observers that 'internationalisation' is a hollow term in a network perspective since any network is eventually bound to be international[23]. The European network literature in the IMP tradition[24] largely disregards issues of effectiveness of network strategy. How can effectiveness be measured in a network context? Of course it is also questionable to whom effectiveness belongs in a network context as it is a jointly created outcome. Uzzi (1997) nonetheless differentiates between firm-level effects and network-level effects of embedded ties. Table 1 provides an overview of these effects.

While embeddedness in relations brings advantages of the types mentioned above, relations can also be overembedded (Uzzi, 1997). In this case parties in the relation are no longer open to information outside the relation. A similar line of reasoning is employed by Ring (1999) who suggests that networks also incur costs upon the participants. This seems to suggest that firms need that firms that manage to find a balance between not being networked / embbedded and being too networked / overembedded are best off, which would imply there is an optimal point somewhere in between. Thus there may be a curvilinear relation, an inverted U-shape, between the degree of embeddedness and network performance. It is important to consider that the work of Uzzi and Ring is clearly of a theory-building nature and does not involve much testing of these hypotheses. Testing the embeddedness – performance relation mentioned above could be a major step forward for network thinking.

Generally speaking work that compares the effectiveness of networks vis-à-vis each other is quite rare. Most analysts would probably agree in that the complexity of most networks is too large to allow for a straightforward comparison of two distinctly different networks. There is a lot of anecdotal evidence based on single cases that points at either the successes or the failure of a network. Nike's supply network is a well-known example that comes to mind (see also Mol, 2001a). Yet the network structure of Nike versus that of its competitors is seldomly seen as a separate topic of study.

Table 2.1: adapted from (Uzzi, 1997). Expected positive firm-level and network-level consequences of embedded relations and negative consequences of 'overembedded' relations.

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[23] Personal communication with Professor David Ford of the University of Bath Management School. Bath, United Kingdom, February 2, 1999.
[24] The International Marketing and Purchasing group.

Components	Firm-level effects in integrated network structure	Accompanying network level effects in integrated network structure	Overembedded network structure firm & network-level effects
Trust	• Less haggling and monitoring costs • Privileged access to resources • Exchange of difficult to price resources	• Economies of time • Allocative efficiency • Investment • Complex adaptation • Pareto improvements	• Feuding • Relief organisation
Fine-grained information	• Information – processing speed and problem recognition • Knowledge of preferences and better forecasts	• Economies of time • Allocative efficiency • Complex adaptation • Investment • Pareto improvements	• Relief organisation • Less new & novel information from other networks
Joint problem-solving arrangements	• Learning and performance feedback • Invention of new solutions	• Economies of time • Allocative efficiency • Complex adaptation • Investment • Pareto improvements	• Extinction effects

4. Internationalisation

Research on the international dimension of sourcing has suffered from one conceptual and two empirical problems. Conceptually, there have not been any valid explanations as to why and in what cases international sourcing is superior to domestic sourcing. Although many ad hoc explanations have been given, we are therefore still stalled at the position of suspecting a positive impact of global sourcing on performance but being unable to explain it, unless with pragmatic arguments or the comparative costs argument. This latter argument, however, fails to account for the extra costs that are incurred through international sourcing due to physical distance, buyer-supplier distance and environmental distance (as discussed in chapter 1). Chapter 3 will address this topic of benefits of internationalisation in more detail.

The first empirical problem is a lack of measurement between international sourcing and performance. The only piece addressing this issue directly is Scully and Fawcett (1994), which is not supported by any theoretical underpinnings. They cite some perceived advantages of global sourcing (Scully & Fawcett, 1994). They also cite several challenges to successful global sourcing. Finally they measure the performance impact of global sourcing. The average performance impact they find for their different measures ranges from 3.11 to 4.46 on a 7-point scale. This implies that on average, respondents neither agree nor disagree with the statement that international sourcing has improved their firm's overall performance. What does this tell us? The way this impact is measured is essentially incorrect, since it carries bias. Consider the final question, the one delivering the highest averages: "Global sourcing has resulted in an above average improvement in your firm's overall competitive position". A respondent that answers no may feel that global sourcing has not impacted her or his firm, or alternatively that it has had a negative impact on the firm. No upward and downward margins of error are reported on the averages Scully and Fawcett calculate, which makes impossible an estimation of reliability of these findings. Furthermore the technique of calculating averages

based on direct questions and then to use them as evidence of a relationship is not accepted as a convincing method in top level academic research and journals.

The second empirical problem is a lack of reliable data sources to investigate internationalisation of sourcing (Swamidass & Kotabe, 1993). Firms do not report their sourcing activities in the same way they report their sales data. Sometimes they do not even keep track of the internationalisation of their supply bases. On the aggregate, national level there are only trade data, which are typically not telling of firm behaviour. This has tended to constrain researchers in need of data on the extent of internationalisation in sourcing.

Another aspect that is often not valued as it should be is the nationality of the supplier. Previously a lot of empirical work was discussed on the location of suppliers: domestic or international, developed or non-developed countries. However, only one article was discussed that explicitly recognised that supplier nationality matters (Kenney & Florida, 1995). For example, consider a multinational in a host country that uses a supplier from its home country that has also set up a local subsidiary in the host country. Is this a domestic, international or home-based supplier to the sourcing firm? Although the related issue of local content regulation has regularly been a topic of political debate, it has only rarely led to observations in the management literature.

Although some work on barriers to international sourcing exists, these barriers have neither been related to actual patterns of international sourcing nor to the performance outcomes of international sourcing. However, perhaps the outcomes of previous research can partly be interpreted in the light of these barriers. Most international sourcing has clearly been in countries within the Triad or a region within the Triad. Such an interpretation would confirm the notion that these countries suffer from an underdeveloped business system and infrastructure. This could very well imply that the barriers to international sourcing are largest to those countries that are located outside of the Triad.

Sourcing research in the third important economic area of the world, the European Union, has mainly been confined to descriptions of particular sourcing relations and networks (Dubois, 1998; Semlinger, 1993) and the structure and functioning of supplier networks (Ford, 1998). In Europe trust and co-operation have been worked out in most detail, e.g. in the comparison of U.K and German firms (Lane & Bachmann, 1996), the networks of the third Italy and Baden-Würtemberg (Grabher, 1993). However, the last two focus on single industries within single regions. Thus evidence on sourcing strategies of other European countries than the U.K. is fairly limited at the time. While it is pretty obvious what a 'sourcing profile' of the U.S., Japan or the U.K. would look like, it is much harder to discern a profile for industry-rich countries like France, Germany, Italy, Sweden, Switzerland or the Netherlands. Empirical evidence from these countries would add greatly to our understanding of the universality of certain sourcing concepts[25].

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[25] This argument is developed further in a paper recently presented at the inaugural European Academy of Management conference (Mol, 2001b).

5. International supply decisions

The evidence that has been collected on how firms achieve a balance between local responsiveness and global integration with regards to sourcing has not been well developed. We do not know much about where sourcing decisions are taken within a firm. We know far more about where investment or marketing decisions are taken. The link to performance is not very obvious in this area. Under what precise circumstances would it be good for a firm to have local decision-making and when should it have global decision-making?

A global decision making unit has final responsibility for all sourcing decisions world-wide. The classic example is the single country, single site, non-MNC. This firm always operates under a centralised regime. But this can also be a strategy of multinational corporations. As firms increase their number of operations and start internationalising they often stick to this centralised model of decision making, at least for some decisions. Major FDI decisions, for example, are always taken or approved by headquarters. Another form of global organisation is the division or business unit, which is delegated decision-making responsibility by headquarters. Finally, some firms use a global sourcing or global purchasing department to co-ordinate world-wide sourcing or advise local and regional units.

Following Prahalad and Doz (1987) the main reason to centralise decision-making is to obtain advantages from global integration. This can occur if large purchasing volumes exist, which allow buyers to drive down prices as fewer redundancies occur and the dependence of a supplier increases. Similar to the mechanism described by Prahalad and Doz large external supply volumes will most efficiently be handled globally. With economies of scale in production, firms tend to centralise production sites. However, international sourcing is unlike foreign production in the sense that multiple actors exist. With foreign production through FDI, firms choose single sites for production. In sourcing, suppliers are chosen that have specific location-bounded advantages. In other words international sourcing allows MNCs to consider a broader scope of suppliers. Only decision-making units with a global overview can fully exploit this scope as more decentralised units will run into information problems when searching outside their own geographical area. Obviously a condition that also stimulates global decision-making is the global presence of suppliers. Consider the numerous suppliers of carmakers that have internationalised in recent years. By being present in multiple markets they can offer carmakers a uniform product in all of these markets, reducing the need for costly design changes.

Two major disadvantages seem to be connected to such a global mode of operations. The first disadvantage is obviously that globally organised MNCs have to sacrifice some responsiveness[26]. Locally embedded organisations will always have an advantage over global organisations when it comes to dealing with inconveniences in the buyer-supplier relation, as face-to-face communication is a preferable mode over any indirect form of communication. Furthermore firms that see the globe as their sourcing domain, instead of a large number of

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[26] Bartlett and Ghoshal (1989) claim that this friction between integration and responsiveness may (partly) be overcome by adopting a 'transnational' model. However, little evidence exists that such a model has truly been implemented in many firms. None of the firms we spoke to (Tecson, 1998) explicitly admitted to a transnational model in sourcing. The effectiveness of the transnational model has also been cast in doubt in recent years after implementation failures at firms like Philips and ABB. It appears that both the complexity and the co-ordination costs of transnationals are high.

local or regional markets, are far more likely to run into search and deliberation costs (Rangan, 2000). Acquiring information and certifying the reliability of that information are costly activities when venturing into new and far away markets. The abilities of organisations and individuals to access and evaluate new sources is limited by their social networks (Rangan, 2000), which eventually leads to a limited search and incomplete evaluation. Once socially and physically nearby sources have been established, barriers are formed to look for unknown sources and buyers are somewhat locked-in to existing suppliers.

A regional decision-making unit builds upon a world divided into subsets, e.g. Asia Pacific, Europe and North America. Each subset takes its' own sourcing decisions. Many MNCs have given profit responsibilities to these regional organisations. A number of legitimate reasons exists to do so. First of all geographic proximity may cause firms to source regionally. Second, government regulation, such as EU directives, may force firms to source within the region as products need to be regionally adapted for the market. A third reason may be that a global organisation does not always provide the needed feeling for regional circumstances. Some MNCs, like Philips and Shell (Tecson, 1998), have in the past set up International Purchasing Offices (IPOs) to deal with this. IPOs are used to do all or part of the purchasing in the host country and often in a number of neighbouring countries. A regional sourcing department often fulfils the same role, the difference is that a regional sourcing department is a part of the regional headquarters. In some cases organising regionally is most appropriate. Especially when many of the relevant institutions and much of the regulation is at that level, as is the case for many products in Europe (Amin & Thrift, 1995). If there is a large economic and cultural similarity between the countries in the region, it seems particularly fitting to organise regionally. A regional organisation is mostly an attempt to combine the advantages of global and local organisation.

Among the problems related to a regional organisation of inter-firm relations is the possibility that a regional headquarter may start to operate as if it were a full headquarter in itself. In that case the distance to suppliers increases and the same problems of global organisation may erupt including communicating with and searching for suppliers. Conflicts of interest between regions on the other hand, may cause a sub-optimal result at the global level. The regional level may not be most appropriate given very high needs for integration or responsiveness. In such cases, firms sourcing regionally may be stuck in the middle.

A local decision-making unit is a national subsidiary or even a single plant that carries its' own responsibility for sourcing. Each locality takes independent sourcing decisions. Some products are still very costly to transport over larger distances. An example that immediately springs to mind is water, which is an important input to many production processes. Firms would not normally source water from the other end of the world. Local organisations will be better equipped to handle this type of sourcing than firm headquarters. Thus, a localised supplier base will often lead to a local organisation of sourcing. A second reason to organise sourcing locally is when strategic advantages can be obtained by deploying subsidiary level competencies, a phenomenon more commonly described as subsidiary initiative (Birkinshaw, Hood, & Jonsson, 1998). A subsidiary that engages in the development of new strategies, including those involving suppliers, may not only improve its own position within the corporation, but also induce product or process innovation (Birkinshaw et al, 1998).

However, for many sourced products, scale significantly alters cost patterns because scale economies get lost with small numbers. In a purely local transaction it is much harder to obtain significant scale than in a transaction involving multiple subsidiaries. Another problem related to local organisation is the limited scope of suppliers that a subsidiary will have. The range of international suppliers a subsidiary is likely to know is limited by its network size, which again is a result of its size and location (Gulati, 1998). With so few suppliers available to the subsidiary an optimal choice is less likely because other, global opportunities are foregone. Table 2 summarises points made in the previous section about the literature.

	Key contributions	Performance	Agenda
Ownership	• High asset specificity causes internalisation • High uncertainty causes internalisation • Low frequency causes internalisation	• Under high asset specificity internalisation is positively related to performance • Under high uncertainty internalisation is positively related to performance • Conflicting findings on outsourcing – performance relation	• Knowledge based and resource-based vs. transaction cost explanations? • Is there a critical point beyond which outsourcing is damaging? • Is there a continuum between 'marketness' and 'hierarchyness'?
Relation type	• Trust is necessary in building relations • Uncertainty causes need for trust and tight relations	• Under high uncertainty tight relations are positively related to performance • Voice relations help in obtaining intangible benefits like learning and innovation Claim: • Voice relations lead to higher performance	• Do voice relations improve performance? • How does trust develop? • Under what conditions are voice and trust not useful?
Internatio-nalisation	• Degree of internationalisation varies with size of home country • Barriers to international sourcing	Claim: • International sourcing leads to higher performance	• Does international sourcing lead to higher performance? • What patterns of internationalisation are most effective?
Network design	• Firms have a portfolio of relations • Networks can be measured in terms of embeddedness	• A balanced portfolio leads to higher performance • More embedded network nodes perform better under conditions of high uncertainty Claim: • Parallel sourcing leads to higher performance	• What is the most effective network structure? • How are relations beyond the first tier best managed? • Is there a curvilinear embeddedness - performance relation?
Internatio-nal supply decisions	• Home country influences the degree of local supplies • Local adaptation is needed to balance integration	• Better adaptation leads to higher performance	• Is a transnational model the best way of dealing with multiple demands?

Table 2.2: A summary of the literature (see text).

2.2 Research agenda

Although any generalisation of such a broad area of literature is doomed to be partly incorrect, some general remarks about the whole international sourcing literature hold true. These remarks define the agenda of sourcing research, a part of which will be unfolded in chapter 3. The remarks are based upon the discussions in chapters 1 and 2. They are listed below and their consequences for sourcing research are discussed. Broadly speaking these remarks can be divided into three topics. The first topic is the nature of the literature itself. The second topic concerns the research methods being applied. The third topic is related to the content of research questions.

A. Nature of the literature
1. Fragmented literature: the literature is fragmented;
2. Testing: some topics have been developed theoretically but have not been tested;
3. Anglo-Saxon models: most of the literature is based on Anglo-Saxon models of thinking;

B. Research methods
4. Statistical methods: among the statistical methods used, multiple regression is the most popular solution;
5. Comparative cases: among the case studies few are done on multinationals from different countries.
6. Continental Europe: there is little work that takes continental Europe as the empirical setting;

C. Research questions
7. Combination: the decision to internalise and the particular type of relation are largely treated separately;
8. Internationalisation of sourcing: the international dimension of sourcing is not fully understood or researched yet;
9. Relation and performance: the type of relation has not often been related to the performance outcome of the relation;
10. Network effectiveness: there is little understanding of what constitutes the effectiveness of a network;
11. Internal decision making: little is known about internal decision making on external relations, in particular how it is organised across borders.
12. Information technology: not much is known about how firms fit new IT into existing buyer-supplier relations.

1. Fragmented literature
Instead of seeing the various dimensions of sourcing as closely intertwined issues, most authors focus on one dimension and one theory[27]. From a practical point this is not very useful: a manager is interested in whether to outsource an item but at the same time requires information on how to source. It is unlikely that a single theory provide the desired level of

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[27] This is precisely the point Barringer and Harrison (2000) make when they discuss interorganisational relations, also see Mol (2001a).

understanding of such complicated issues. An integrated framework, describing various dimensions would be useful as a decision support tool.

2. *Testing*

There are a substantial number of interesting questions in the international sourcing literature, which await testing. With some issues we seem to have a clue but no evidence while others need some further theorising. For example it is surprising to notice what little evidence is available to support the notion that the internationalisation of the supply base has a positive influence on firm performance. This appears to be more of an assumption than a finding. And the fact that the literature on the effects of external sourcing or vertical integration is at best indecisive is not helpful either.

3. *Anglo-Saxon models*

Although the Anglo-Saxon model of business largely dominates today's international marketplace, it need not be our only theoretical lens to judge sourcing decision-making. In fact a more intricate understanding of the Dutch, Chinese or Brazilian business system, may serve to upgrade thinking about sourcing. The most important question to look at here is to what extent models and findings hold in other research settings.

4. *Statistical methods*

Multiple regression analysis is one of the more convenient and powerful statistical tools available to social science. Thus it is quite understandable that most researchers have so far relied on regression analysis. However, some of the issues to be solved could better be tackled by other methods like LISREL or panel data analysis. Since some of the theory in sourcing predicts indirect effects a path analysis method like LISREL could be helpful to reveal the various paths. For longitudinal research featuring relations over longer periods of time, panel data analysis is an appropriate technique.

5. *Comparative cases*

A substantial number of insightful case studies have been written on (international) sourcing strategy. An interesting addition from the perspective of discovering more about the influence of national systems on sourcing strategy would be cases comparing firms within the same industry but operating from different countries. This could generate new insights in the sourcing decision making process.

6. *Continental Europe*

Clearly Europe provides a challenging and useful testing ground for the ideas in the outline above. On the one hand firms in Europe operate under a single economic regime. On the other hand, grave differences between people and between organisations still persist. Elements of culture come into play too and these are often very different between European countries like Portugal and Sweden. If a greater understanding is achieved of the differences and similarities between countries in the EU, as far as international sourcing strategy is concerned, this would be useful.

7. *Combination*

It seems that different streams of literature exist, that largely disregards each other's findings. Particularly, one would expect to see empirical combinations of the effects of ownership and relation type because choosing what source to use and how to use it are strongly intertwined questions. These combinations are nowhere to be found. This is bothersome from a practical point of view, since practising managers regularly confront themselves with this question: "Is it more important to decide whether I am going to outsource this item or how I am going to source it"? To what issue should most attention be devoted? It is perhaps, however, even more disturbing for academics as a failure to properly integrate two alternative explanations for essentially the same phenomenon, the effectiveness outcome of the sourcing arrangement, equals a failure to bridge domains of knowledge. Important new knowledge might be created precisely at this crossing.

8. *Internationalisation of sourcing*

International sourcing is a very complex phenomenon because it can take on so many forms. The literature has as yet failed to deal with the entire complexity of the topic. Although some work in the area of international sourcing has been initiated it has so far been difficult to build explanations that go beyond extensions of domestic sourcing. Some mentioning of comparative advantage is made and Vernon's product cycle theory is applied. However, an overarching framework of what differentiates global sourcing from domestic sourcing is missing.

9. *Relation and performance*

Partnership relations can potentially increase benefits for the parties involved or improve outcomes. What is more interesting is in what particular situation this goal is really obtained. Sometimes, relations can be overembedded: too many complexities are introduced in the buyer-supplier relation when seemingly simple conditions exist. So what is more important to know is under what conditions partnership relations are beneficial and for what types of performance.

10. *Network effectiveness*

Network propensities that have been the centre of attention include potential benefits and advantages. However, little has been made of measuring benefits and costs. Furthermore there is a serious appropriation problem in that we do not know whom to assign costs and benefits to. Finally it has proven to be very difficult to compare various networks. This makes much of the current work on the effectiveness of networks somewhat speculative in nature.

11. *Internal decision making*

When it comes to the integration across borders, even less is known. The extension of previous research could take a number of directions. Which sourcing decisions are taken by headquarters (ethnocentric), by national subsidiaries (polycentric) or by business units and divisions (geocentric)? This is an interesting area for research that is currently undiscovered.

12.   Information technology

The focus of the original electronic markets literature was on how IT would change existing sourcing policies of firms. Since there no radical changes of sourcing strategies of large MNCs have occurred since the introduction of the Internet an equally if not more interesting question is how firms fit new IT into their set of existing supplier relations. Research on this topic would be helpful to increase the understanding of how sourcing strategies change over time.

2.3   Replication with extension

Obviously it is impossible to fill all these gaps in the literature within the limits of a single study. The discussion above was merely intended to highlight that multiple challenges are still unanswered. An important question is how these gaps can be filled through new research. The *next chapter will specify which of the gaps can and hopefully will be filled through the current study*.

Two ways exist to improve and empirically validate the existing body of knowledge in any field: replication and extension of previous research. Replication does not occur very often (Hubbard, Vetter, & Little, 1998). Especially replications with extension are rare in the field of strategic management: only 22 out of 419 empirical studies in three top management journals over the 1976-1995 period are of this nature (Hubbard et al, 1998). Most other work is an extension of previous work but not a literal extension. The alternative to replication and extension would be to redefine a field and come up with new concepts, but no pressing reasons seem apparent to do so in the case of international sourcing strategy. There is sufficient theory and it is quite clear what the important dimensions of international sourcing are. What is lacking is application of this theory in some empirical settings and a link between the various dimensions. This study explicitly tries to build upon existing work through replicating it, but also through extending it into as yet uncharted territories.

One reason to exactly replicate earlier research is to validate results that might statistically not be entirely reliable. For example, Murray et al (1995a) explicitly call for replication of their own work on global sourcing, since the alpha coefficients on some of their measures are low. Furthermore, it cannot ex ante be shown that sourcing patterns do not change over time or across places, on the contrary: they seem to change continuously (Helper & Sako, 1995). A universal generalisation of research findings poses some extra preconditions (Rosenzweig, 1994): A conceptually equivalent definition of variables between countries, an equivalent operationalisation of variables, the same theorised relationship among focal variables, a closed system and data that are not affected by observer bias or respondent bias. It seems doubtful that all of these conditions have been met in previous research (just consider the closed system condition).

Hence two forms of replication might be undertaken to test whether sourcing patterns change. First of all, the *same set of firms or at least a similar one as used in one of the earlier studies could be subject of replication*. Using longitudinal analysis the consistence of results through a period of time could be checked and time-based deviations could be filtered out. The *second form of replication could concern the same questions but in a different economic, cultural and social setting*. It appears that most of the data presented, and especially those at the firm level, are from MNCs located in the United States.

Replicating the studies in another region, for example Japan or the European Union, might generate other findings. The differences in environmental variables might then be used to explain these findings (Cheng, 1994). The pilot study mentioned earlier (Tecson, 1998), revealed that the European environment indeed influences the sourcing policies of firms. One recurring factor in these interviews was that the local market and the regulatory environment often partly determine the location of suppliers. The European Union is a major player in the global economy with its own social and economic structures. A replication of earlier U.S.-based research in the European context is thus desirable.

Chapter summary

Chapter 2 again discussed the literature on international sourcing, now with the explicit aim of finding omissions in this literature where further research is needed. Important strides have been made in the area of outsourcing and supplier relations where relatively solid theoretical models have been developed and tested. As a consequences much is known about why firms choose to outsource and good categorisations of different supplier relations exist. The literature on supplier networks is still in its formative stages but contributions have been made concerning the importance of networks in the modern economy. Concerning supplier internationalisation most research has focused on establishing patterns of internationalisation. In the area of international supply decisions not much work has been done.

In each of the five dimensions there are important triggers for a research agenda, especially in relation to performance. Much has been suggested about the positive contribution of outsourcing to performance but few tests have been undertaken. There is a hunch that the partnership (or voice) type of supplier relation contributes to supplier performance but tests are missing. The same applies for internationalisation of the supply base: global sourcing is said to be good for performance, but empirical evidence is lacking. Where networks are concerned an important step forward would be to find a way to start comparing various networks. The topic of international supply decisions would benefit most from conceptualisation and measurement of what possible ways firms have to make international supply decisions. One important general conclusion is that mainland Europe appears to largely have been forgotten in studies of sourcing. A good approach to study these topics would be to replicate existing work and extend it by introducing new concepts or testing grounds. Chapter 2 laid the groundwork for the construction of a conceptual framework.

Chapter 3: A framework for understanding global sourcing strategy

The aim of this chapter is to describe the exact theoretical relations this study will investigate. While the previous chapters sketched the literature and featured a broader scope, this chapter will explicitly narrow down towards a set of *hypotheses*. The study will focus on the relation between three interrelated dimensions of sourcing strategy and firm performance: *(1) internal vs. external sourcing, (2) exit vs. voice relations, and (3) domestic vs. international sourcing.* Obviously defining and explaining what sourcing performance is, precedes any attempt to explain the drivers of sourcing performance. So first the dependent variable of sourcing performance is discussed. After having clarified the concept of sourcing performance, as it is understood in this study, in section 3.1, its causes can be discussed. These causes of sourcing performance are the different international sourcing strategies that were discussed in chapters 1 and 2, which form the independent variables, and other explanations, which are used as moderating or control variables. In section 3.2 a basic model is presented in an attempt to explain the international sourcing performance of firms. Section 3.3 expands upon this model by introducing moderating variables. The fourth and final section of this chapter discusses some important control variables.

3.1   Sourcing performance

The essence of strategic management is to explain how organisations achieve sustainable competitive advantage (SCA). In other words, strategic management is all about performance differentials between firms. This study is an attempt to explain these differentials where the effects of sourcing strategy are concerned. Hence *this study looks at the performance effects of choices made by firms concerning their inputs.*

This raises the interesting and difficult question how the performance effects of sourcing strategy can be measured. Many attempts have been made in strategy and organisation research to capture performance with mixed results. This led Venkatraman and Ramanujam (1986: 801) to suggest that:

> "The treatment of performance in research settings is perhaps one of the thorniest issues confronting the academic community today".

Of course considerable progress has been made since, both through an increased conceptual understanding of performance and the wider range of analysis techniques and data currently available. The problem of dealing with performance is essentially two-headed. First of all it is difficult to define the very concept of performance. What is an effective outcome and what is not? The second problem is the difficulty of finding adequate measures in empirical settings to capture performance as it has been defined. While the latter problem will be a prime concern of the methodological chapter, an attempt will now be made to define the performance

outcome of the global sourcing strategy of a multinational firm. A first general definition of sourcing performance is:

> *The degree to which a firm succeeds in fulfilling the goals it has set out, by using the input side of the production process*

Earlier, sourcing was defined as an intermediate activity, which has a large impact on its effectiveness measures. The effectiveness of end-of-chain activities, such as marketing of a product, may easily be measured by the final success of a firm, like its market share or profitability. One of the problems in relating strategy to performance is that many factors can intervene in the process (Venkatraman & Ramanujam, 1986), causing the independent variable (strategy) to have a less significant or non-causal relation with the dependent variable (performance). The introduction of any step that increases the distance between the observed and the predicted cause is thus to be avoided in order to minimise these biases. This implies that the preferred mode of analysis is that which minimises the length of the causal chain, i.e. the mode that uses close-by measures of success. For intermediary activities it is therefore better to look for intermediary success measures. However, as it will turn out later, earlier work (e.g. Helper & Sako, 1995; Murray et al, 1995a) had major problems finding variables that fulfil the criterion of a short causal chain. The major limitation is that no generally agreed upon measure exists for intermediary performance at the firm or business unit level. There are of course some industry or firm specific measures for intermediary performance but these can not be generalised. Therefore measurement at the firm level has to occur at the end of the chain, on the firm's output side. Given that there is no intermediary measure available, this is the best measurement solution. So sustainable competitive advantage due to sourcing will be measured as an end-of-chain, organisational level construct.

Three ways of obtaining sustainable competitive advantage
It is now generally recognised that there are traditionally three streams of literature that help us to understand the attainment of sustainable competitive advantage (Dyer & Singh, 1998; Teece, Pisano, & Shuen, 1997):
1. *Positioning*: a better market position vis-à-vis competitors, expressed in terms of lower costs, a differentiated product or a combination thereof (Porter, 1985);
2. *Resource based*: a more valuable stock of internal resources and capabilities or a superior ability to combine resources and capabilities (Barney, 1991; Dierickx & Cool, 1989);
3. *Transaction costs*: a better governance, also framed as economising, leading to transaction cost advantages (Williamson, 1991).
If we combine the latter two the notion that emerges is that managing external relations in such a way as to maximise joint resources and capabilities leads to competitive advantage of itself. This is a recent fourth perspective called *relational rent*. This perspective is expressed as follows (Dyer & Singh, 1998: 661):

> "[F]irms who combine resources in unique ways may realize an advantage over competing firms who are unable or unwilling to do so. Thus, idiosyncratic interfirm linkages may be a source of relational rents and competitive advantage."

Thus, we have two modes in which these long-term advantages come about in sourcing, either internally or through an external relation. Internally, there is associational specialisation (Barnard, 1938) or a distinctive *competence* (Selznick, 1957) to perform certain tasks. One might think of a distinctive competence in sourcing strategy, when a firm is better at managing the input side than its competitors or has better manufacturing capability (Kotbe, 1992). Externally there is *relational rent* (Dyer & Singh, 1998). Dyer and Singh (1998: 662) define four determinants of relational rents:

1. investments in relation-specific assets;
2. substantial knowledge exchange, including the exchange of knowledge that results in joint learning;
3. the combining of complementary, but scarce, resources or capabilities (typically through multiple functional interfaces), which results in the joint creation of unique new products, services, or technologies;
4. lower transaction costs than competitor alliances, owing to more effective governance mechanisms.

Firms looking for relational rent need to be concerned with the four measures of investments, learning effects, unique new products, services or technologies and effective governance mechanisms. While investments, the first determinant, are essentially an input for the other three determinants, the second through fourth determinants Dyer and Singh mention are indirect effects of relations. The first indirect effect is *learning*. Learning is a dynamic and often path dependent process (Teece et al, 1997), which implies that a buyer and supplier can build sustainable advantage once they have gone through a specific learning process. Other firms can not imitate that process so easily. The second indirect effect is *innovation*. If new products are developed or new production process are introduced as a consequence of a sourcing relation, this can help a firm in improving its long-term performance (Nishiguchi, 1994). Thirdly, more effective governance mechanisms could be realised by performance measurement (monitoring) in specific areas in order to tackle bottlenecks in the relation. This is also employed as an outcome of strategic performance by Murray et al (1995a). Of course it can also be important to avoid too many idiosyncratic investments. Some flexibility of the sourcing configuration needed in the long run (Nishiguchi & Beaudet, 1998). A firm that can more easily switch suppliers or supplier locations has a flexibility advantage over competitors. This requires a balancing act between the benefits of idiosyncratic investments and the ability to redefine those investments. Under the continuous threat of exit by one of the partners it is difficult to engage in joint learning for example. Using a *flexible network* approach can guarantee such switching possibilities are constantly available.

Categorising performance effects of sourcing
Two categorisations of sourcing performance are necessary. First, *two types of performance will be distinguished, economic and strategic performance*. Any human activity has direct and indirect effects. In the strategy literature such effects are often referred to as economic and strategic performance (Murray et al, 1995a; Sharma and Vredenburg, 1998). Firms seek to obtain both types of performance. Economic performance refers to how well a firm is performing now while strategic performance refers to its ability to perform in the long run.

While direct, economic performance effects are often easy to distinguish at one particular moment in time, indirect, strategic performance effects can involve complex causal chains and longer periods of time. The source of these long term performance effects is in relational rent (Dyer & Singh, 1998) or associational specialisation (Barnard, 1938): these effects reside either within the firm or between the firm and its partners.

Economic performance effects are those performance effects of sourcing that occur in the short term and are directly related to transactions and relations. In sourcing the direct effects of a delivery are the attributes of that particular delivery, such as the price and quantity of goods, the perceived quality and the service attached to a delivery. These attributes are often referred to as the tangible elements of a delivery because they can easily be specified and recorded in a contract. A contract requires a supplier to deliver quantity A of component B with quality C at time D. Financial performance of a firm is the aggregate outcome of all of its deliveries: changed product attributes will directly influence financial performance. Thus a firm's financial performance is also a direct effect. When measuring economic performance of a firm the literature usually relies on financial measures.

In contrast, strategic effects are those performance effects of sourcing that occur in the long term and flow indirectly from transactions and relations. The indirect effects of a particular delivery include a much wider array of items. They may include the attributes of the next delivery, learning effects of one of the parties concerned and product innovation to mention only a few. These attributes are often referred to as intangible elements because it is difficult to specify them ex ante Murray et al (1995a) in their analysis similarly make a two-fold distinction between financial and strategic performance. Strategic performance may be seen as an indirect effect, occurring in the longer run. Performance effects can be said to be strategic when they deliver sustainable competitive advantage to the firm.

A second distinction that needs to be made pertains to the level of analysis of performance effects of sourcing. *Two levels of analysis are distinguished. The first level is performance of the firm (or business unit) as a whole*. This is what is normally implied by firm performance in theories of the firm or in stock markets and the form of performance measurement most commonly witnessed in strategic management studies. However, as we move towards a more detailed level of understanding sourcing strategy, namely a particular buyer-supplier relation, it is necessary to come up with a more detailed understanding of performance. For it is unlikely a buying firm judges the effectiveness of its relation with a single supplier by reference to its overall performance. *The second level is performance of a particular supplier*. For firms will attach different performance criteria to relations with suppliers. Buying firms will seek attributes that relate much more closely to a particular supplier's performance. So there are two levels of performance, namely firm performance and supplier performance. Supplier performance relates to all deliveries of a particular supplier to a buying firm, or more narrowly to all deliveries of a particular supplier to one product within a buying firm. This also conforms to existing literature (for instance compare Murray et al, 1995a, with Poppo and Zenger, 1998), although existing articles understandably focus solely on one level or the other.

An argument could be made for the network or dyadic level instead of the firm level. However, supplier performance concepts at the firm level have better measurability and obviously relate better to firm performance. Network level concepts, like embeddedness

(Granovetter, 1985), may be more appealing to some observers but they pose severe limitations on what questions can usefully be answered in the context of sourcing due to problems of delimitation and level of analysis problems. The performance of a network is very difficult to translate back into firm performance due to appropriation issues, inseparability etc. (Ring, 1999). This makes it difficult to relate network performance to the other dimensions in this research, internal vs. external sourcing and domestic vs. international sourcing. Such a comparison would in fact require an entirely separate empirical measurement. Furthermore the development of a theory of the performance of networks is still rather premature (Grandori, 1999; Ring, 1999).

Economic performance at the supplier level is dependent upon processes that determine the flow of goods in deliveries and related information between buyer and supplier. The extent to which suppliers perform satisfactorily is judged by measuring the outcomes of a transaction or a range of transactions. Oft-cited elements of economic performance in deliveries include[28]:

- Costs, overall costs or total costs of ownership;
- Quality of deliveries;
- Responsiveness of suppliers or extent of service;
- Reliability of deliveries;
- Speed of deliveries;

These are all measures that are included in supplier performance measurement systems or logistics performance measurement systems as they are often called (see Mol, 1999; Van Weele, 2000). There are no absolute standards as to what is a good delivery time or service level, since this will depend heavily on the type of product, the production system, the strategic focus of the company, geography and other factors.

A firm's operations are usually judged by financial ratios, more specifically profitability of the firm within a given time period. In order to obtain a comparable measure profits are divided by a size measure of the firm, like total assets, sales or investments. These are the kinds of indicators that lie at the heart of an investor's judgement of a firm. If a firm does not return enough money, investors and banks will be unwilling to provide it with funding. Many studies in strategic management also use such financial performance measures to assess the success of a firm (e.g. Capon, Farley & Hoenig, 1990). Therefore often-used measures of economic performance at the firm level include:

- Financial ratios such as return on sales or return on investment[29].

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[28] This list was generated through a literature search combined with some of the interviews with firms and discussions with academics. Key literature in this area includes (Murray et al, 1995a; Nooteboom, 1999: 116-117; Poppo & Zenger, 1998). Interviews with managers in the Netherlands were used to corroborate these understandings from the literature. Managers admitted to using these goals in their sourcing policies. Many of these interview results have been discussed by Tecson (1998) and Mol (1999).
[29] Obviously there are many other measures including shareholder value, EBITDA and such. Unfortunately most strategy research does not have such measures available for example because they are not collected within all firms or at all levels in a firm.

Sourcing firms may differ in their approaches to improving economic performance. However, an essential feature of economic performance is that it is relatively easy to replicate, making it not highly valuable as a firm resource (Mahoney & Pandian, 1992). The argument of easy replication is only partially true in practice. A good example is the quality control system of Japanese automobile firms. When they attempted to replicate these systems it took US and European competitors considerable time to come even close to Japanese quality levels. To successfully implement such a system there is much more involved than simply the decision to implement it. Path dependencies (David, 1993) are only one reason that firms find it difficult to implement systems that are alien to them.

Strategic performance is dependent upon processes that determine the interaction characteristics between buyer and supplier and the traits of their relation. In a sense it is the double loop (Argyris & Schon, 1978) of the buyer-supplier relation, which is not concerned with product deliveries but with processes that lie behind these deliveries such as inter-partner capabilities or inter-partner learning (Hamel, 1991). These are elements of the relational rent concept of Dyer and Singh (1998). Oft-cited measures of strategic performance at the buyer-supplier relation level include[30]:

- Joint learning to develop capabilities;
- Joint innovation;
- Network management;

These measures are usually not part of the performance measurement system of a supplier, although there is an increasing tendency among practitioners, at least in the Netherlands (Mol, 1999) to include them as important indicators of supplier performance. Similar to economic supplier performance measures there is no absolute standard as to what constitutes a satisfactory performance level. It is very hard to translate these measures into monetary value. In fact, it is highly likely that these performance standards are often defined 'on the fly'. Only as a relationship develops are partners able to see what kind of learning and innovation they are able to get out of that relationship. If the partners would precisely know in advance what they would learn, there is probably little reason to engage in a partnership type of relation. On the other hand there is usually a vague idea of the direction in which learning will take place. Buyers can assess the competence base of suppliers and feed on that competence base. Furthermore they can look at a supplier in terms of its competence growth.

At the firm level, the strategic performance of a firm is often judged against its long-term ability to obtain market positions and its potential to grow. Instead of only reaping profits in the short term, many firms are better off by gaining market share for the long term[31]. This seems to be true particularly in business-to-business markets where customer loyalty is more important than in consumer markets since switching costs are higher and reputation can easily

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[30] See previous note and Nishiguchi (1994) who discusses the strategic advantages of a flexible configuration of suppliers.

[31] Obviously there is a trade-off at some point: firms that sacrifice too much short-term profitability may no longer be able to sustain growth.

be destroyed given larger information availability and the higher relative importance of single buyers. Thus often-used measures of economic performance at the firm level include:

- Output ratios such as market share and sales growth rate.

Strategic performance effects of sourcing occur in the longer term and can be sustained over a longer period of time (Mahoney & Pandian, 1992). From a strategic management point of view it is most interesting to find the effects that affect the sustainable competitive advantage of the firm. Indirect effects occur as the consequence of a transaction or a series of transactions within a relationship. This implies some learning process has to occur to absorb information from the transaction or relationship. This type of performance is much harder to replicate since it can (Dyer & Singh, 1998: 662) "only be created through the joint idiosyncratic contributions of the specific alliance partners". In the case of a single firm a joint purpose (Barnard, 1938) is readily available through the organisation's goals. In the case of multiple firms a joint purpose needs to be created before these knowledge sharing routines can be attained (Dyer & Singh, 1998). Strategic performance through sourcing arrangements is a valuable resource for both the buyer and the supplier involved (Dyer & Singh, 1998; Mahoney & Pandian, 1992).

Table 1 summarises the various performance effects that are the focus of this study.

	Short term (economic)	Long term (strategic)
Firm performance	How well is the firm fulfilling demands posed on a daily basis: *Financial returns*	How well is the firm positioned for years to come: *Market position*
Supplier performance	How well are deliveries by the supplier meeting standards: *Delivery attributes*	How well does a relationship contribute to long run development: *Relationship attributes*

Table 3.1: Summary of performance effects under investigation in this study. The dimensions are explained above and stem from earlier research (for example Murray et al 1995a, Williamson, 1991b).

3.2   The basic model

This section focuses on the question how sourcing performance can best be explained. *Which model is most useful to explain sourcing performance?* This raises the question *what independent variables should be used to explain the dependent variable, sourcing performance[32]*. In order to clarify the reasons for choosing particular independent variables, a number of criterions are now put forward for choosing independent variables.

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[32] At this point it is important to notice that a) the previous two chapters have already discussed possible independent variables, b) a key conclusion of this discussion was that the literature has perhaps identified the proper dimensions but has not always been clear as to what the expected relations between these dimensions and performance are. While this study draws heavily on existing literature to compose a theoretical framework, it was also shown that existing literature is incomplete particularly with regards to international sourcing. In this sense this study is primarily of a theory-testing nature but also has to rely on an exploratory framework and exploratory analyses at times. As was suggested in chapter 2 the study is therefore of the type 'replication with extension'.

The next few paragraphs will undoubtedly be partly redundant in that they seek to re-establish what the literature has already found before, namely what dimensions of sourcing matter to explain firm

Chapter 3

Choosing independent variables
First of all and most obviously, a valid independent variable must bear some obvious theoretical relationship to the phenomenon one wishes to explain. In the case of sourcing it is unlikely that a clear relation can be established between say the number of trees in the home country and the performance of a particular firm. This seems an irrelevant independent variable. A theoretical relation has to exist *a priori*. Statically the question is whether the independent variable has any explanatory power for the phenomenon under scrutiny. If the independent variable does not add to the explanatory power, in statistical terms the R^2, then there is no reason for including it in the model (Gujarati, 1995).

Second, and related to the first point is the size of the effect of the independent variable. Can we expect this variable to be significant, both in the conceptual and the statistical sense? Preferably the variables that are included should be those that are expected to have the largest impact on the dependent variable. This will increase the explanatory value of the theoretical model and thus add to the explanation of the dependent variable sourcing performance. For instance, the educational background of a manager may impact sourcing performance to some extent, but does not seem to have the same magnitude as the choice between internal and external sourcing[33]. Thus when constructing a model it is advisable to include the most relevant variables to the research topic (Gujarati, 1995).

The third criterion for independent variables relates to the strategic management of firms. Is this variable something that may be changed by a decision-maker? This implies that only those variables that can be influenced by managerial decisions of a firm are independent variables. Take for example the Alps that could systematically lower the sourcing performance of firms based in Switzerland because of transport difficulties. This would probably qualify as an 'interesting to know' fact, but hardly seems to be under the control of the sourcing manager of a Switzerland-based firm. Therefore this is a point not worthy of inclusion as an independent variable. This does not imply that there is no room for such a variable in the model. Perhaps it can be useful as a moderating or control variable. This criterion explicitly adds an instrumental purpose to this study, finding the best way to do something. This is not problematic since improving existing systems is a key facet of science, natural or social. All empirical scientific studies can become instruments, depending on how decision-makers employ them.

Fourth, it is obvious that in an empirical study only those variables can be included that can be tested in the field. Is this variable open for empirical testing? Before setting up the empirical research an estimation has to be made of the viability of obtaining data on this variable. Including a variable that can not be tested, such as a tacit belief of a manager that can not be made explicit, seems a useless exercise.

Finally, the total number of independent variables must be as limited as possible in order to obtain a parsimonious model. For each possible variable it must be asked whether this is a logical variable to include in the model. Limiting the number of variables contributes

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performance. The next few paragraphs imply neither that entirely new independent variables have to be 'invented' nor that existing theories need to be replaced.

[33] Although of course the educational background of the manager may also influence the choice between internal and external sourcing and thereby indirectly affect performance in theory this is at most a minor effect.

to the conceptual clarity of the model. What sense can be made empirically of an extremely complicated model? A model with 25 independent variables that are all deemed relevant might lead to an outcome where everything matters a little bit. However, what really matters in research is not what matters a little bit, but what matters most.

Thus a number of criteria are attained to guide model construction:
1. Independent variables must have a theoretical relation to the dependent variable;
2. Independent variables chosen must be those that are likely to have a large explanatory power;
3. It must be possible for an actor, in this case a manager of a sourcing firm, to systematically influence the independent variables;
4. The independent variables must be open to empirical scrutiny;
5. The total number of independent variables must be as limited as possible to make the model parsimonious, conceptually clear and empirically manageable.

It is a basic assumption of this research that only a combination of economic exchange structures and social exchange processes can help us explain the outcomes of firm behaviour and sourcing strategies, following for example Oliver (1997) and Nooteboom (1999). We need not only an economic explanation of when markets and hierarchies are the preferred mode (Coase, 1937), but also an explanation of how different types of interaction affect social relationships, particularly through the intertwined mechanisms of trust (Luhmann, 1968) and power (Luhmann, 1975).

Thus we need to look beyond the economic object of study of governance decisions. And we need to look beyond the sociological object of study of social relations. The single most important reason for doing this is that managers do so too. They do not single out a decision on whether to outsource without taking into account potential suppliers that could deliver a product. Furthermore studies of organisation only stand to gain from incorporating multiple perspectives. Therefore it is appropriate to look at issues that are usually the subject of study of different fields of management and to incorporate theoretical angles from these different fields.

In combination with the five decision criteria outlined above this leads to the following fundamental choice. *This study attempts to look at international sourcing strategy in terms of what sources are used as well as how these sources are managed.* Thus a three-dimensional model is developed that incorporates a) the make or buy decision, b) the type of relation between buyer and supplier, and c) the effects of internationalisation[34]. With this essential choice in mind, construction of the theoretical model can commence. All three of these dimensions were discussed at length in chapters 1 and 2.

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[34] As stated in a previous note this choice does not imply anything fundamentally different from existing literature. It merely confirms that existing literature has, perhaps unconsciously, come to the same conclusions in terms of what dimensions of sourcing matter to assess firm performance.
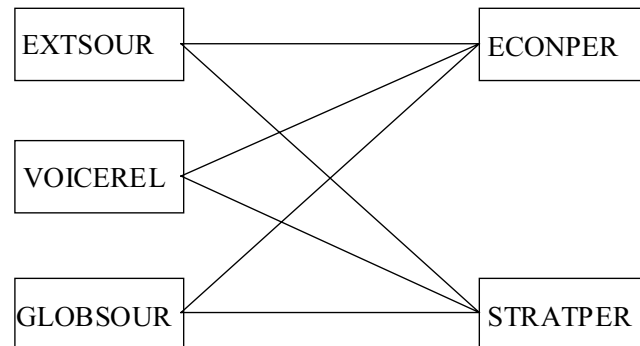
Figure 3.0: independent and dependent variables

Internal or external sourcing

According to Coase (Coase, 1937) the existence of organisations can be attributed to market failure or 'marketing costs'. Thus firms are constantly weighing the total costs, including transaction and production costs, of the market and hierarchy modes. Purely theoretically they are thought to do this in an optimal way (Williamson, 1991b) such that a firm always chooses the right degree of external sourcing because for every choice the right alternative is applied. There are multiple reasons to believe this is not true in practice though. First, the decision to outsource is surrounded by many uncertainties regarding eventual payoffs and the true costs and benefits of the make-or-buy decision are rarely known in advance. Second, firms are normally not able to specify learning and innovation effects connected to make or buy in advance. If a firm would be able to specify those effects, then they can simply be implemented now. Third, as the number of decisions to be made increases, the firm is less able to devote enough attention to each individual decision, causing less than perfect information to be available. Fourth, there are all kinds of path dependencies in a firm's internal sourcing and external relations that obviously limit the degree of strategic choice. Fifth, firms are limited by both their physical location as well as their positions in the market and inter-firm networks. Sixth, it is well-known that all kinds of psychological effects co-determine eventual decisions that managers make, for example so-called 'bandwagon effects' that cause firms to behave alike. Seventh, and this is a very important reason for deviations, other goals than purely economic goals may co-determine a firm's eventual choices. This applies at the firm level where interests of other stakeholders like employees or the environment may conflict with purely economic performance. It similarly applies at the managerial level where a manager may be driven by private interests like those described by agency models. In short: there is a variety of reasons why actual firm behaviour may differ from (economically) theorised firm behaviour.

Empirically the relation between internal or external sourcing and performance is not very well researched. Although there have been numerous studies of vertical integration (Capon, Farley, & Hoenig, 1990) they often focus on other dimensions of vertical integration than sourcing, for example on corporate diversification and scope issues. The literature on the effects of vertical integration on performance is not conclusive, although most of the literature seems to suggest vertical integration (internal sourcing) is positively related to financial performance (Capon et al, 1990). More recently at least part of the literature seems to suggest that given a

high level of asset specificity it is better to source internally (Poppo & Zenger, 1998) or even that it is altogether better to source internally (Murray et al, 1995a). Murray et al (1995a) found a positive but not significant relationship between internal sourcing and economic performance. This literature would generate the expectation that external sourcing and economic performance are negatively related.

Other research often does not distinguish between types of performance, but there is a lot of anecdotal evidence available that external sourcing is often used as a way of increasing short-term, measurable outcomes. Hendry (1995) suggests outsourcing improves such indicators as contracting costs and short-term flexibility[35]. Other research has linked outsourcing with improvement of cost levels, customer satisfaction or risk levels (e.g. Cross, 1995; Monczka & Trent, 1991; Quinn, 1992). Through focusing on its core competencies a firm can improve overall cost levels by outsourcing certain activities to best-in-world outside suppliers (Quinn, 1999). This generates the counter expectation that external sourcing and economic performance are positively related.

Strategic performance seems to improve when firms integrate activities. Murray et al (1995) found a positive relation between internal sourcing and strategic performance when controlling for several other factors. Hendry (1995) also warns of negative long-term effects of outsourcing in the form of a loss of internal knowledge and learning capability. The possibility of opportunism always exists (Williamson, 1985) meaning knowledge can leak to suppliers or suppliers make use of incomplete contracts in other ways. These empirical results seem to be in line with the predictions of transaction cost economics and the knowledge-based view of the firm. Regardless of whether a negative reason (market failure), or a positive reason (shared knowledge, routines and language) exists: if items are sourced internally, firms usually try to obtain some form of advantage over a longer period of time.

Thus, while external sourcing is usually associated with an attempt to optimise short-term, economic variables, internal sourcing is used to optimise the firm strategy in the long run. This coincides with the investments made and switching costs. Once a firm internalises a part of the value chain, it is making investments and running into switching costs that make it less likely to expect short-term changes. A firm that outsources, however, is better able to switch from one supplier to another and as a consequence is better in adapting its short-term performance. If this is true there is a trade-off between short term and long term performance. Alternatively we find hypothesis 1b.

> **Hypothesis 1a: External sourcing is positively related to economic performance.**
> **Hypothesis 1b: External sourcing is negatively related to economic performance.**
> **Hypothesis 2: External sourcing is negatively related to strategic performance.**

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[35] At the same time Hendry exposes scepticism concerning the long-term consequences of outsourcing on elements like firm capabilities.

Chapter 3

Exit or voice relations
The second dimension is not concerned with whether a source is located inside or outside a firm, but with how external sources are managed. Different types of relations with external suppliers exist. Most often a dichotomy or continuum is proposed between low social interaction and high social interaction within the relationship. A range of names has been put forward to portray these different ideal types of relations. The former type of low or no social interaction is a/o deemed arm's length relation (Williamson, 1985), market (Williamson, 1975), discrete market relation (Ring & Van de Ven, 1992) and exit relation (Helper, 1987). In the low social interaction type actors are described as atomistic, with no clear social network between them (Ring & Van de Ven, 1992). For the high social interaction type authors a/o mention alliances (Gulati, 1995), networks (Gulati, 1998), partnerships (Martinsons, 1993), voice relations (Helper, 1987) and relational contracts (Williamson, 1979) or relational contracting (Ring & Van de Ven, 1992).

In this study the emphasis is on the dichotomy between exit and voice (Helper, 1987). Firms are not seen as atomistic units but as parts of intertwined networks of firms (Richardson, 1972; Ring and Van de Ven, 1994). A theory of exit, voice and loyalty in dyadic relations has already been developed. This theory of exit, voice and loyalty resides with Hirschman (1970). In buyer-supplier relations it has been interpreted (Helper, 1987; Helper, 1991) as providing firms with two ways to manage qualitative and quantitative changes in output. Exit (Hirschman, 1970: 33) is when a change occurs and 'the customer goes over to the competition'. Hirschman states that (1970: 21):

> "by inflicting revenue losses on delinquent management, exit is expected to make that 'wonderful concentration of the mind' akin to the one Samuel Johnson attributed to the prospect of being hanged'.

Voice he defines as (Hirschman, 1970: 33):
> "any attempt at all to change, rather than to escape from, an objectionable state of affairs, whether through individual or collective petition to the management directly in charge, through appeal to a higher authority with the intention of forcing a change in management, or through various types of action and protests, including those that are meant to mobilize public opinion".

Hirschman (1970: 36) interprets voice as an alternative to exit, where the decision to exit will *"often be taken in the light of the prospects for the effective use of voice"* (1970: 37, emphasis in original). Buyers will first try the voice option or at least contemplate its merits, before deciding to exit. Exit occurs in case voice is thought to be ineffective or has proven to be ineffective. According to Hirschman (1970: 41) voice is most likely to occur in markets with few buyers or where a few buyers account for an important proportion of sales. Few buyers, or an oligopsony, is a normal characteristic of business-to-business markets, which explains the merits of the exit-voice-loyalty theory for explaining buyer-supplier relations[36].

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[36] Unlike in business-to-consumer markets, where single consumers are generally unable to communicate directly with the management of the firm, voice appears a more plausible alternative in industrial markets.

A framework for understanding global sourcing strategy

Much research in recent years has aimed not at voice but at trust. This brings to mind what the role of trust is in the exit-voice-loyalty framework. Entities are continuously being faced with uncertainty, which they try to reduce (Luhmann, 1968). The trust mechanism provides an opportunity to do so as it reduces the perceived complexity of the outside world because actions of others become more predictable. Trust is best viewed as a necessary but not sufficient condition for voice to occur. If there is no trust there is no voice but if there is trust there is not necessarily voice. Voice requires another condition, namely value (Nooteboom, 1999). Only if both parties see an exchange as value generating it will be executed. Trust is a characteristic of the relationship between two or more parties unlike power, which is a mediating variable on that relationship (Luhmann, 1975). In Luhmann's terms power is a catalyst which changes the probability of events (Luhmann, 1975). Improbable events can become more probable through power, whereas probable events can become less probable. Power can occur in both low and high-trust relations as it is not connected to the type of relation, even though it may influence that particular relation.

What are the performance effects of one type of relation (exit) vis-à-vis another (voice)? Hirschman (1970) does not devote much attention to this question. His preoccupation seems to be with the question in which cases voice and exit are effective. He notes (1970: 80) that in order for voice to be effective there has to be at least an option of exit. But this option of exit should not be too easy to attain. This statement is perhaps more telling of the role of switching costs in the framework than of the influence of voice on performance. Others have filled some of the blanks in Hirschman's work, although this may not have been their primary concern. Gulati (1998) suggests embedded ties often lead to higher results, particularly in cases of high uncertainty. Uncertainty rises with the length of the time frame. The longer the time period over which a decision has to be made, the more likely it is that sources of uncertainty will boil up. Thus, when the time frame is more limited, voice may not be the preferable option. In Luhmann's (1968) conception of trust the extent to which the uncertainty reducing mechanism of trust has to be employed is generally smaller if the time period concerned is shorter.

This is a plausible argument: in order to regain the investments that a voice strategy requires, a longer time horizon is needed to judge the results. Thus only over the longer term can we really distinguish the positive outcomes of a voice strategy. In case of voice joint innovation and learning is much easier to attain than with exit. Under the constant threat of exit by the other partner, no organisation or person is willing to invest much in a relation. Without mutual investments innovation and learning can not be achieved. Thus following a voice strategy will be positively related to long-term performance.

Exit is in essence a strategy of divestiture. Exit is applied immediately and it is exercised for the sake of immediate returns. The new supplier has to offer some direct benefits. Thus exit aims at improving the short-term performance of the firm. Threatening to exit can be an effective bargaining tool for a customer to help reduce prices or to improve the priority assigned to shipments of that customer. If this is the case, then exit is a useful option to increase performance. On the other hand, a firm's economic goals may also need some form of co-ordination that an exit regime does not offer. For example, reducing delivery times or improving product quality often require joint initiatives of customer and supplier. Even cost reduction can require such co-operation because very detailed information from a

supplier is often necessary to achieve insights in the cost structure of the supply chain. In such cases, voice may still be the preferred option, even for short-term economic goals.

> **Hypothesis 3a: Voice relations are negatively related to economic performance.**
> **Hypothesis 3b: Voice relations are positively related to economic performance.**
> **Hypothesis 4: Voice relations are positively related to strategic performance.**

Domestic or international sourcing

In most of the writings on global sourcing and indeed on internationalisation in general there is a notion that internationalisation of activities is beneficial to a firm. To overstate the point: the more international an activity is, the better the performance of that activity. This idea seems to be behind much of the literature on globalisation and the multinational firm. In fact, starting with Ricardo's (1978) theory of comparative advantages, international trade is expected to reap positive welfare effects. Hymer (1976) suggested that internationalisation through FDI by a firm is an attempt to increase profitability by benefiting from structural imperfections in different markets. In Dunning's (1988) eclectic paradigm internationalisation is the outcome of a firm's attempt to optimally utilise advantages from different locations given certain internalisation and ownership advantages. In the revised product cycle model of Vernon (1979) countries differ in their scarcity pattern: in some countries labour may be scare, in others raw materials or space. A firm internationalises in order to combine these different types of scarcity in a beneficial manner. In sourcing a similar point has been made by Kotabe (1998). Kotabe (1998) suggests that global sourcing is a means to increase a firm's competitiveness. Thus, Kotabe expects a high degree of internationalisation in sourcing to be positively related to sourcing performance at least if international sourcing has been a strategic choice by the firm and not an imperative dictated by the industry or headquarters.

The impact of internationalisation of sourcing on performance is usually not estimated separately for economic and strategic performance. However, Dunning (1993), following Behrman (1972), assigns four different motives to foreign production activities, which is a step towards such a separation. These four kinds of MNC types are resource seekers, market seekers, efficiency seekers and strategic asset or capability seekers (Dunning, 1993). Dunning further mentions three other motives that are applicable only under specific circumstances: escape investments, support investments, and passive investments. These motives can be extended from internal sourcing of final goods to internal or external sourcing of components, because of the general nature of this typology.

Resource seekers internationalise to obtain (Dunning, 1993: 57):

> "particular and specific resources at a lower real cost than could be obtained in their home country (if, indeed, they could be obtained at all)".

A framework for understanding global sourcing strategy

Resource seeking is an economic process, from which no long-run advantage can be obtained. Resource seeking by operating foreign supplies can lead to lower real costs. But others can replicate this process at a limited cost.

Market seekers, the second type, are characterised by Dunning (1993: 58) as:

"enterprises that invest in a particular country or region to supply goods or services to markets in these or in adjacent countries".

It is sometimes of great importance to choose a supplier in the country of production and sales, particularly if transportation costs are high and if the industry is characterised by a high degree of government involvement or by national sentiments. Unless prevented by institutional barriers others can replicate such a sourcing pattern.

The third type of international activity is efficiency seeking with the following primary goal (Dunning, 1993: 59):

"to rationalize the structure of established resource based or market-seeking investment in such a way that the investing company can gain from the common governance of geographically dispersed activities".

Many MNCs have been or are currently involved in rationalisation of the supply base by reducing the number of suppliers. Since it is essentially a process of restructuring, others are a priori able to do the same.

The fourth and final type of activity are the strategic asset seekers, which are: (Dunning, 1993: 60):

"those which engage in FDI, usually by acquiring the assets of foreign corporations, to promote their long-term strategic objectives – especially that of sustaining or advancing their international competitiveness".

A modified version of this in sourcing would be a relationship with an international supplier aimed at developing a unique joint resource base. This latter type seems to be the only of the four types of international activity that explicitly seeks to obtain strategic advantage and builds on idiosyncratic advantages. The first three types appear to concentrate mainly on obtaining short-term economic advantage.

Of the other three only the first two apply to sourcing. Passive investments occur only in case of FDI, when a firm holds stock in a foreign firm. The escape motive is also of a strategic nature since it seeks not to improve economic performance but to establish new sourcing positions. Firms using the escape motive intend to (Dunning, 1993: 61):

"….escape restrictive legislation or macro-organizational policies by home governments".

In the case of international sourcing this can amount to *sourcing items from abroad that can not be produced or perhaps only be produced at excessive costs in the home country due to legislation*. Another way of escaping from potential government pressure

would be to set up a parallel source in case something occurs with the reliability of deliveries or as a bargaining tool with suppliers or even governments. Obviously such safeguards in the form of multiple sources induce additional transaction costs and are only useful when critical inputs are concerned. Support investments equally apply to sourcing, although they are perhaps better called sourcing support activities. Their purpose is to (Dunning, 1993: 61):

"support the activities of the rest of the enterprise of which they are a part."

These are activities like a call centre connected to the sales of the product or after-sales maintenance. This is nothing to do with strategic performance but is simply a way to economically operate some necessary but not essential activities of a firm.

The overall idea is clearly that international sourcing is used as a means to improve firm performance, both in the short and the long haul. One final argument in favour of this line of reasoning is the self-selection bias of firms that internationalise their sourcing. Why would a firm take the trouble of internationalising its supply base if it feels it has nothing to gain from doing that? Hence firms that are found to source internationally must have perceived there were valid reasons to do so (higher performance). There is not much literature available to support a notion to the contrary. There is fragmented evidence that elements of sourcing may be more difficult internationally. One work that comes to mind is that of Levy (1995) who argues that international sourcing complicates supply chains. Another area of work involves the difficulties associated with operating in other cultures (Barkema, Bell, & Pennings, 1996). But no clear statements have been made that internationalisation of the supply base will decrease genereal firm performance. Thus, the following hypotheses are obtained.

Hypothesis 5: The degree of international sourcing is positively related to economic performance.
Hypothesis 6: The degree of international sourcing is positively related to strategic performance.

Figure 1 combines these 6 hypotheses and displays the basic research model. This model will be the focus of attention in chapter 8.
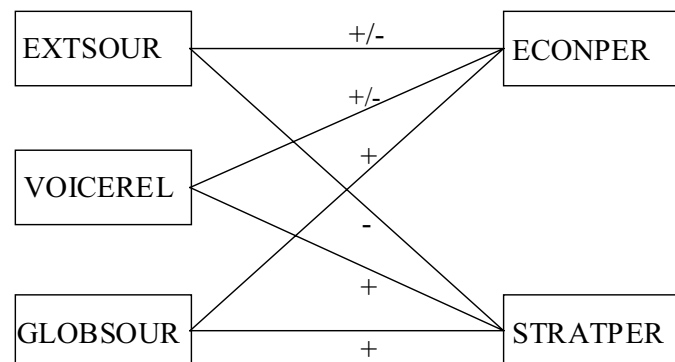
Figure 3.1: basic research model (chapter 8).

3.3   Moderating variables

There are several important moderators on the theoretical relations described above. What a moderator is, is best described by Baron and Kenny (1986: 174) who define it as a

> "variable that affects the direction and / or strength of the relation between an independent or predictor variable and a dependent or criterion variable".

In a moderator model there are three different variables that help predict the dependent variable. First, there is the main effect or predictor. The hypotheses described earlier are all examples of such main effects. Second, there is a direct effect of the moderator. Similar to the main effect a moderator can help predict the dependent variable in its own right. Third, and this is the most complex variable, there is an interaction effect between the predictor variable and the moderator variable. This interaction effect is simply calculated by multiplying the value of the predictor by the value of the moderator. As Baron and Kenny (1986: 174) state

> "a basic moderator effect can be represented as an interaction between a focal independent variable and a factor that specifies the appropriate conditions for its operation".

Thus the reason for specifying moderating variables is a belief that they not only help explain the dependent variable directly but also through an interaction with the main or predictor variable. But how should the outcomes of this interaction effect be interpreted? If a moderator is said to be positive, this means that the interaction between the predictor and moderator is positively related to the dependent variable (see also Hair, Anderson, Tatham & Black, 1998). This implies that the value of this relation will be higher for high values of the moderator. For a negative interaction effect, this line of reasoning is simply mirrored, high values of the variable lower the value of the main effect. Table 3.2 captures this discussion and provides an illustration.

	Interaction effect positive	Interaction effect negative
Meaning	Main effect more positive / less negative for high values of moderating variable	Main effect less positive / more negative for high values of moderating variable
Illustration	X * Z is a positive moderator on the relation between X and Y: The higher the value of Z, the higher the value (β) of the relation between X and Y	X * Z is a negative moderator on the relation between X and Y: The higher the value of Z, the lower the value (β) of the relation between X and Y

Table 3.2: Summary of various possible effects of the interaction variable.

In this study all specified interaction effects will be of the linear type (the most common and most simple type, see Baron and Kenny, 1986). In order to discuss these moderators in an ordered manner, they will now be presented in blocks per dimension of sourcing strategy. At the end of each of these blocks the discussion will be recaptured in a graphic model. These three graphic models serve as the basis for discussion in the chapters 5, 6, and 7.

Chapter 3

Internal vs. external sourcing

Asset specificity

Transaction cost economics (Williamson, 1979) suggests that three characteristics of a transaction dictate whether an input is sourced internally or externally: asset specificity, uncertainty and frequency. Later the influence of frequency was put into question by Williamson (1995). Empirical research confirms that a lot of the statistical variance in make-or-buy decisions can indeed be explained by this model and particularly by asset specificity (Walker & Weber, 1984; Williamson, 1991a). Williamson (Williamson, 1991b) concluded that the specificity of the product exchanged to a large extent predicted whether the product would be exchanged with an external supplier or not. The higher the asset specificity, the more likely a firm is to source internally, since it can not rely on opportunistic parties in the market to behave as it wishes them to. Empirical evidence not only suggests that the choice between make or buy is influenced by asset specificity, but also that the effectiveness of that choice is determined by the asset specificity (Murray et al, 1995; Poppo & Zenger, 1998).

However, it is questionable whether asset specificity is the ultimate cause of the make-or-buy relation and the resulting performance or a by-product of a firm's activities and strategy (Nishiguchi, 1994). This raises the question of the logical adequacy of the relation. Is the *raison-d'être* of an organisation really a failure of the market? There is a counter view (Grant, 1996; Kogut & Zander, 1992) that suggests organisations possess unique features of themselves that make organisations a more efficient form of governance for particular economic exchanges. Thus there is another reason to use the organisation, besides market failure. Barnard (1938: 137) puts it in the following way:

> shared purpose is "the unifying element of formal organization"
> and (1938: 86) "[t]he necessity of having a purpose is axiomatic, implicit in the
> words 'system', 'coordination,' [and] 'cooperation'".

This counter view, often referred to as knowledge-based view of the firm, differs from transaction cost economics in a number of other respects too (Poppo & Zenger, 1998). First, and perhaps most importantly, the knowledge-based view presupposes that the shared history of exchange partners matters for the present state of the relationship. Through repeated exchanges within a firm, routines can be developed that increase the efficiency of governance (Nelson & Winter, 1982). Furthermore a common language and pool of knowledge are developed within the firm. This leads knowledge-based scholars to a different interpretation of the relationship between asset specificity and internal sourcing. It is not market failure that causes internal sourcing but the competitive advantage that can be derived from internal routines, knowledge and a firm language. Thus, the knowledge-based view makes similar predictions, but with a different explanation than transaction cost economics. If shared knowledge, routines and language are important, a firm will source internally. This implies that external sourcing is negatively related to performance if shared knowledge, routines and language are important.

However, empirically asset specificity and intra-organisational capabilities can imply more or less the same measure. Both are usually measured by the degree of unique human, location and physical inputs that are needed to produce a product (Poppo & Zenger, 1998;

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Walker & Weber, 1984). Thus as far as predictions related to asset specificity, external sourcing and performance are concerned there are no substantial differences between the two approaches although the two approaches obviously apply different arguments to make their case. This leads to the following hypothesis[37]:

Hypothesis 7: Asset specificity negatively moderates the relation between external sourcing and performance

Uncertainty

The economic uncertainty a firm faces is an important variable to consider in outsourcing decisions. It has been argued that firms facing *high uncertainty in terms of volume fluctuations will tend to outsource risks* (Quinn & Hilmer, 1994). Through carrying over production responsibilities and volume risks to suppliers, firms are thought to become more competitive. However, a supplier would normally be expected to add a risk margin to its cost price if there is much uncertainty so such gains may be negligible. Gilley and Rasheed (2000) find that uncertainty is actually a negative moderator for the outsourcing-performance relation. That is, if there is much uncertainty in their environment, firms are better off by not outsourcing so many activities. These findings are in line with the predictions put forward by Williamson (1985), who suggests that under conditions of uncertainty it will not be economic to source externally since transaction costs will rise exponentially given the presence of incomplete contracting in case of high uncertainty. Suppliers will not be willing to take on unnecessary risks unless they can charge a premium on prices, which would make external sourcing more expensive and less attractive.

Hypothesis 8: Uncertainty negatively moderates the relation between external sourcing and performance

Innovation

In industries where innovation plays a particularly large role, it may be beneficial to internalise production activities (Murray et al, 1995). It is generally easier to develop product and process innovations internally. Furthermore if highly innovative products are being outsourced, this may lead to leaking of knowledge to competitors or to the supplier, encouraging potential entry in the industry by the supplier. Innovations can not be specified in advance, which causes any contract involving innovation to be incomplete and raises the transaction costs of dealing with external parties. Thus outsourcing is not a good solution for firms in highly R & D intensive environments. Outsourcing will be a better solution for low-tech products that are nearing the end of their product life cycles since the effects of knowledge spillovers to competitors or suppliers will be negligible, as technology is not a key competitive factor anymore. Even if some R & D activities are sourced externally, key R & D inputs will usually be sourced from within the industry and not vertically, from suppliers.

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[37] Recall the discussion above: this specification implies that if the relation between external sourcing and performance is negative, it will be more negative under conditions of high asset specificity. If, on the other hand, the main relation is positive, it will become more positive under conditions of low asset specificity.

Hypothesis 9: Innovation negatively moderates the relation between external sourcing and performance

Foreignness

It has often been argued that MNCs obtain a higher performance than local firms because they have particular inherent advantages over local competitors (Hymer, 1976; Dunning, 1993). Producing and selling in multiple countries allows MNCs to reap scale benefits. Global brand names help to introduce products in foreign markets more easily. Furthermore MNCs are able to develop production capabilities in one country and transfer those to other countries. However, when it comes to their local networks, MNCs are faced with a disadvantage (Kostova & Zaheer, 1999). Because they do not have a local supply base in a host country, they need to either use foreign sources or build up a new supply network. If they build a new supply network in the host country they will have to overcome problems relating to language, culture and other institutions. One example is the necessity to explore contract law in the host country. Local firms have been around much longer and have more experience in constructing and improving their supply network. Governments will under normal conditions also be more supportive of local firms than of their foreign competitors. MNCs face a 'liability of foreignness' problem (Kostova & Zaheer, 1999) in their sourcing network. It is expected that while the overall performance of subsidiaries of multinational firms is higher, the ability of foreign MNCs to leverage their network of outside suppliers to obtain higher performance is limited in comparison to local firms.

Hypothesis 10: Being a foreign firm negatively moderates the relation between external sourcing and performance
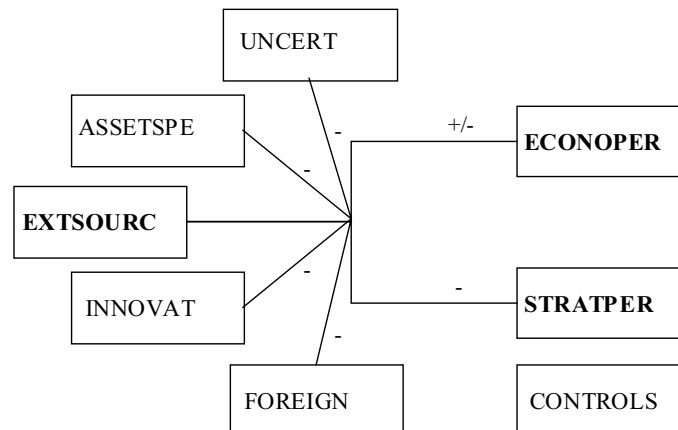
Figure 3.2: overview of the external sourcing model, four moderators and control variables (chapter 5). The control variables are discussed in section 3.4.

Exit vs. voice relation

Loyalty

The discussion of Hirschman's 'Exit, Voice and Loyalty' above was limited to the first two elements. Loyalty, the third element of Hirschman's theory, is a mediating variable. The most useful interpretation of loyalty seems to be one where we start by explaining how the level of loyalty co-determines voice or exit. If a buyer is loyal to the selling organisation, it is less likely to depart that supplier and thus more likely to opt for voice. Loyalty causes such attachment directly but also indirectly through the increased influence loyal members will have on the selling organisation's policies. As Hirschman (1970: 78) frames it: "loyalty holds exit at bay and activates voice". For exit to be applied there is no necessity of voice. In fact, this can be reversed: when there is loyalty, exit is less likely. Thus voice becomes more likely as the level of loyalty rises.

Moving on to an explanation of how loyalty helps to achieve effectiveness when applying voice it appears one should not search for direct performance effects of loyalty. Loyalty is not meaningful unless it can be exploited within the confines of a particular relation. Undoubtedly most instances of loyalty (e.g. personal loyalty to a country) are hardly ever truly put to the test. Instead the performance effects of loyalty will run through the exit and voice mechanisms. Loyalty best fulfils its role as a mediating variable when (Hirschman, 1970: 80) 'the effective use of voice requires a great deal of social inventiveness' and when substitutes are readily available. But in such cases loyalty indeed helps to increase the effectiveness of the voice option meaning its indirect effect is to improve the performance outcome of voice relations. If there is more loyalty the investments made in voice relations will have a longer payoff period and be more effective. Without such loyalty there may be a voice relation but whether this relation holds over time is unclear. If a voice relation is terminated the attached investments will be lost.

Hypothesis 11: Loyalty positively moderates the relation between voice relations and performance

Buyer dependence

Like any other organisation supplier firms are dependent on their customers. Obviously this buyer dependence will vary greatly among relationships. Some suppliers completely depend on one buyer, while others have a well-balanced portfolio of customers. The extent to which a supplier is willing to commit resources to a particular buyer will be a function of its dependence on that buyer and the likelihood of a continued relationship (Pfeffer & Salancik, 1978). Ruigrok and Van Tulder (1995) elaborate on this by introducing scales of dependence: buyers and suppliers are dependent upon each other to some extent. They furthermore suggest that a high dependence of suppliers upon buyers, would lead the buying firm to obtain superior performance results, as the supplier has only limited options at its avail (Ruigrok & Van Tulder, 1995: 83). A supplier with a large buyer dependence will often be in a situation of lock-in. It is unable to dispose of the buyer, unless at excessive costs. Therefore it is often best off by also trying to lock the customer in through developing valuable joint routines. This will allow the supplier some room for manoeuvring within the relationship. The effectiveness of the voice mechanism will be strengthened when a supplier commits more resources to a relation because it is more dependent on that relation.

Hypothesis 12: Buyer dependence negatively moderates the relation between voice relations and performance

Supplier dependence

Conversely a buying firm will also be more willing to put resources into a relationship if the relative importance of that relationship is larger (Pfeffer & Salancik, 1978). If a product's costs or value are to a large extent determined by the performance of a single supplier, it will be worthwhile to invest more in the relationship with this supplier since the supplier is of key importance to the production process. Since the actual performance outcome of a buyer-supplier relationship depends upon mutual commitments, larger supplier dependence will be helpful to increase the effectiveness of voice relations. Particularly if buyer and supplier are mutually dependent, there may be lock-in in the relation. In such cases a long-term relation geared towards value creation, quasi-integration of the supplier, may be the most effective solution.

Hypothesis 13: Supplier dependence positively moderates the relation between voice relations and performance

Power

Power is a variable that potentially moderates relations: a catalyst according to Luhmann (1975). Conceptually power in dyadic relations is often seen as a means to improve the effectiveness of the more powerful party at the expense of the less powerful party. Applied game theory (Schelling, 1969) suggests that the outcome of a bargaining process can be uneven if power differences exist between actors. A buying firm with high power can obtain superior performance results from a relation with a supplier. This is also in line with Porter's (1980) five forces model. Here a low bargaining power of suppliers directly enhances industry profits, as it is one of the five forces that predict inter-firm rivalry in an industry and the competitiveness of firms. According to Porter (1980) power causes a game of appropriation: those with most power are best able to appropriate the profits from a buyer-supplier relation. Power may also differ per buying firm. Power can be excerpted indirectly via other players in the network that the dyadic buyer-supplier relation is a part of. Therefore a broader conception of power is necessary that incorporates the sourcing firm's power with respect to other actors in the network. Power is manifested in market and institutionalised power of the buyer.

Murray et al (1995a) do not find the hypothesised negative moderating effect of supplier bargaining power on the relation between internal sourcing and market performance. Thus, if suppliers had a lot of bargaining power this did not have the expected catalytic effect. However, the authors themselves question this particular outcome, as the Cronbach alpha associated with this question was rather low. Furthermore they did not incorporate the other side of the bargaining relation, the power of the buyer itself. Instead they focused on the power of suppliers only. So a second look at the influence of power is appropriate.

Hypothesis 14: Power negatively moderates the relation between voice relations and performance.
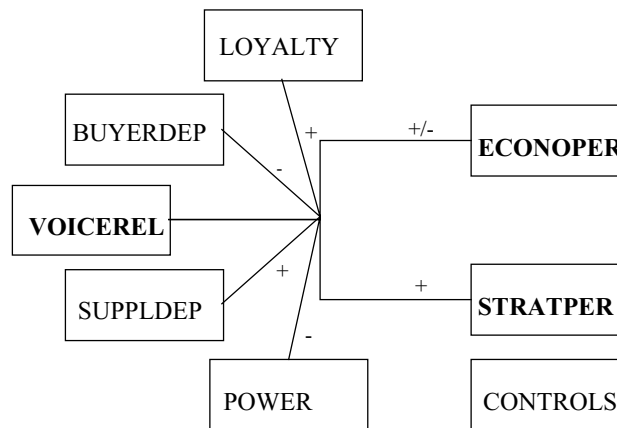
Figure 3.3: Overview of the voice relation model,
four moderators and control variables (chapter 6).

Domestic vs. international sourcing

International experience

A firm that is exposed to international situations, for example through FDI, exports or being a multinational firm in general, will gain valuable experience in managing the internationalisation process. This previous experience can help a firm make proper international sourcing decisions, for example because the firm will know what pitfalls to avoid when it decides to source from a foreign country. Furthermore the firm's awareness and knowledge of foreign sources will be higher since it will have encountered foreign suppliers when it internationalised. In that sense, a network of weak ties has been formed (Granovetter, 1973) that is activated when new supply decisions are made. There are many indications in the literature that previous foreign experience is helpful when embarking upon initiatives in new countries (Barkema, Shenkar, Vermeulen & Bell, 1997). Similarly international experience in other areas of management will be helpful in international sourcing. Firms that can build upon international experience will be better able to exploit international sourcing as a means of increasing competitiveness.

> **Hypothesis 15: International experience positively moderates the relation between international sourcing and performance.**

Foreignness

In hypothesis 10 it was contemplated that foreign firms are at a disadvantage when sourcing externally because they are less familiar with the local supply network. However, once it has been decided that an external source will be used and the choice emerges as to whether to use a local or an international supplier, this will turn into an advantage for foreign firms. Since they already have a home-based sourcing network their knowledge of and experience with sourcing from multiple countries is larger. In fact, their international sourcing network will be stronger than their local sourcing network. In the case of international sourcing foreign firms

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can apply their foreignness because as a foreign firm they inherently have more international ties. Thus foreign firms can be expected to be better at leveraging international sourcing to increase performance.

Hypothesis 16: Being a foreign firm positively moderates the relation between international sourcing and performance.
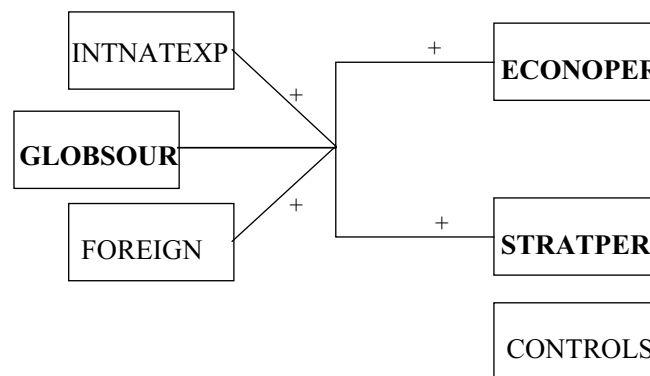
Figure 3.4: overview of the international sourcing
model, two moderators and control variables (chapter 7).

3.4 Control variables

Some variables do not moderate the key relations but are of importance as an explanation of firm performance. These variables are now listed. They are control variables in various analyses in this study. Control variables are found at three levels in this study: the environment (the market), the firm and the buyer-supplier relation.

Industry

Most of organisation theory and particularly the part of OT concerned with effectiveness outcomes (strategic management) has drawn upon the notion of inter-industry differences[38]. Among industries relations between variables may be stronger or weaker or they may actually take on an opposite sign. What is a good sourcing strategy in food processing may be disastrous in the production of electronic components. Between industries we find differences in performance indicators like Return On Sales (ROS). The average ROS in an industry depends on the number of times a firm is able to deploy its assets productively. In the retail business profit margins are much lower than in manufacturing industries. Some industries have lower ROS because of intense competition. For these and a range of other reasons industry is included as a control variable.

In this research model industry is likely to have an effect on all key variables: the performance levels, the level of outsourcing, the relation type, and the level of

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[38] There is a longstanding debate on industry level vs. firm level explanations. It is not necessary to include that in the current discussions, but see for example Rumelt (1991).

internationalisation. Lane and Bachmann (1996) found very different inter-firm relations in two industries across the UK and Germany. De Wit, Mol and van Drunen (1998) compared 34 buyers and suppliers in the Rotterdam area. They found that the level of outsourcing differed strongly among industries. Furthermore there were substantial differences in the relations between buyers and suppliers. Some industries showed more of an arm's length pattern while others were engaged in partnerships. Some industries had a very local pattern of sourcing while others operated across border to some extent. Through including industry as a dummy variable part of the explained variance in performance will be attributed to industry effects.

Firm size
Firm size matters and is habitually included in the analysis of performance. Size of the firm matters in international sourcing. For example: De Wit, Mol & van Drunen (1998) noticed in their limited sample in the Netherlands that larger firms were better able to form networks of suppliers and seemed more inclined to internationalise their supply bases. Furthermore size of the firm is known to positively influence performance outcomes (see Baine and the SCP group as well as the PIMS studies). Most other studies confirm these results (Capon et al, 1990). Including size of the firm in the analyses will help to increase the explanatory power of the analyses and correctly attribute effects to other variables.

Productivity
Some firms are better at employing their labour force than other firms. Because of better human resource management, higher productivity through information systems or simply because they are lucky enough to have people with more skills. Firms that are able to produce the same output as their competitors with fewer employees, stand to save money and to improve profitability. This is in line with the general trend in knowledge management to recognise people as a key driver of a firm's competitiveness. If this is true then higher turnover per employee, which is a measure of firm productivity, should lead to higher profitability.

General firm strategy
Obviously sourcing strategy is only a part of a firm's overall strategy, though not a small part. Some of the other aspects of a firm's strategy would include its human resources policy, its IT strategy and its market positioning. The competitive position in the market is generally seen as the single most important strategic choice a firm makes (Miles & Snow, 1978; Porter, 1985). Does a firm want to bring to market an innovative and differentiated product? Or does it focus on being cost efficient by following competitors' technological leadership? A third option still is to do a bit of both, what Porter (1985) refers to as being stuck in the middle. This fundamental choice will be of importance to explain a firm's performance and therefore it is useful to include general firm strategy as a control variable.

Several different approaches for measuring this distinction have been proposed, of which Porter's (1985) generic strategies and Miles and Snow's strategic types are the most important ones. Porter (1985) distinguishes between cost leadership, differentiation, cost focus and focused differentiation strategies. Miles and Snow (1978) propose four types: prospector, analyser, defender and reactor. These two approaches have been shown to be

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largely consistent and an empirical tool has been developed on the basis of the Miles and Snow category that is thought to be an effective representation of Porter's types as well (Shortell & Zajac, 1990).

Trust

Much has been written about trust in recent years (e.g. Lane & Bachmann, 1998; Mayer, Davis & Schoorman, 1995; Nooteboom, Berger & Noorderhaven, 1997), also in relation to performance (Nooteboom, 1999; Ring, 1999; Uzzi, 1997). In this study trust between buyer and supplier is not seen as a moderator on the relation between voice and performance but instead as a prerequisite. In order to have voice both trust and value to the partner are needed (Nooteboom, 1999). Trust will have an impact on voice and may have an independent impact on performance, but the level of trust will not co-determine the effectiveness of voice in obtaining performance. Trust is unlike loyalty, which is seen as a positive moderator or power, which is seen as a negative moderator. While trust is likely to have an impact on performance, certainly when it is measured in terms of supplier satisfaction, this impact is not the focus of the study. Fundamentally, trust differs from loyalty in that being loyal to a partner goes beyond trust. Trust is a necessary but not sufficient condition for loyalty.

Longevity

The length of a relation between a buyer and supplier may co-determine the extent to which a buying firm is satisfied with a relation. If two firms have been engaging in economic exchanges for a very long time, performance in the form of supplier satisfaction may be an artefact of the length of the relation. Personal ties may have developed that cause the sourcing manager to judge the supplier positively regardless of other factors. Thus it is necessary to control for longevity.

Respondent characteristics

In survey research there is always a chance to obtain outcomes that are an artefact of the respondent's background. Therefore it is necessary to control for some key characteristics of the respondent. This research aims at sourcing managers. Both the seniority and tenure of respondents will differ and this can have severe consequences for research outcomes. Managers with longer tenure may be more knowledgeable in a number of areas, for example the degree of process innovation. Similarly a higher management function can imply more knowledge of particular figures or it could mean a lack of detailed knowledge, which could in turn influenced the measured performance where performance is a perception variable. Hence respondent characteristics cause effects that need to be controlled for.

Export intensity

Firms that export a large percentage of their sales may have above average performance (Goedegebuure, 2000). There are several reasons for this. Exporting firms may spread their risks among several markets, thereby decreasing their sensitivity to a single market and allowing management focus to shift among markets when necessary. Furthermore there will also be a large self-selection bias attached to exporting firms: only those firms with somehow superior products will be able to export these products. Such firms may be expected to have an above average performance. Another argument is that it will mostly be firms with a large

market share locally that start to export their products because they are more likely to achieve saturation in the local market. In all there are various reasons to expect a superior performance of firms with a high export intensity and therefore this effect should be controlled for.

Chapter summary

Chapter 3 discussed the conceptual framework of this study. First the concept of sourcing performance, the dependent variable of this study, was discussed. Sourcing performance was categorised along two dimensions, the type of performance and the level of analysis. Two types of sourcing performance were distinguished, economic and strategic performance. Economic performance occurs in the short term and is directly related to transactions and relations. Strategic performance of sourcing occurs in the long term and flows indirectly from transactions and relations. Two levels of analysis were distinguished, the firm and supplier level. At the firm level sourcing has an impact on a firm's overall performance. At the supplier level single suppliers achieve a certain performance level.

Based on the previous chapters three independent variables were identified and hypotheses were presented as to how they relate to sourcing performance. Outsourcing is hypothesised to be either positively or negatively related to economic performance and to be negatively related to strategic performance. Voice relations are believed to be either positively or negatively related to economic performance and to be positively related to strategic performance. Internationalisation is thought to be positively related to both economic and strategic performance. These hypotheses are the basis of later empirical chapters.

Two other types of variables were identified, moderating and control variables. The moderating variables that are hypothesised to influence the outsourcing – performance relation are asset specificity, uncertainty, innovation and foreignness. The moderators related to the voice – performance relation, are loyalty, power, buyer dependence and supplier dependence. The moderating variables associated with the internationalisation – performance relation, are foreign experience and foreignness. A set of control variables was listed that helps to explain performance but is not at the centre of attention in this study. These include variables at the environmental level, the firm level, the supplier relation level, and the respondent level.

Chapter 4: Grasping sourcing – research method

The empirical research carried out in this study relies on multiple methods and sources. The methods include both quantitative and qualitative research. The sources include both primary data and secondary data. In this study different methods are seen as complements and no method is seen as fundamentally superior over another method. Scientific research occurs in recurring circles of theory development and theory testing. Different research methods are useful for different purposes (Yin, 1994). Qualitative research is most useful in developing theory further by providing new insights from the field. But its use is not entirely limited to the theory development stage. Quantitative research is most useful in testing theories. Similarly, its use is not entirely limited to theory testing.

The research framework presented in the previous chapter is mostly based on existing conceptual work but also draws on earlier empirical tests. As the bridge between the research framework and empirical research is constructed it is important to be informed by practice and the empirical setting. How do managers in the field deal with the issues described earlier? What do they see as appropriate means to improve performance? Studying people implies there is a possibility to discover their internal logic even without studying their actual behaviour in detail by looking at how managers express this logic. For this research phase this study draws on both interview techniques and case studies. Interviews and case studies were applied to support theory development.

To test the research framework, quantitative, statistical techniques are used. These techniques are used with a large database obtained from a third party and with survey data that were collected as a part of this study. The statistical techniques used here range from very basic techniques, like calculating descriptives and frequencies to somewhat more advanced techniques like factor analysis and regression analysis. The actual tests of theory are all based on multiple regression analysis, a technique well equipped to simultaneously test the effects of multiple variables on one dependent variable. Regression provides an answer to the question: to what extent can we explain the outcome of a dependent variable given the values of a set of independent variables? All of these methods will now be discussed in more detail. By far the most attention is devoted to the survey as it occupies the largest role in later chapters.

4.1   Interviews

A number of interviews were held with managers knowledgeable on the sourcing strategy of their firms. A majority of these interviews were conducted as part of a research project during the first year of the study. The results of this study were published in Tecson (1998). The purpose of these interviews was to obtain insights into different elements of international sourcing strategy and how this strategy effects performance. Obviously this could only be done using unstructured and semi-structured interviews. Most interviews were semi-structured in nature, including a range of topics and questions to be addressed, but the interviews also left room for open discussion. At a later stage interviews were used to help prepare the survey

and to test the survey. Managers working in the purchasing field were asked to fill out the survey to help identify its weaknesses and possible pitfalls. The aim of the interviews was to support theory formation or survey development. This study will only report interview findings as additional or anecdotal evidence. The nature of the interviews is not adequate to use them in any theory-testing format.

4.2   Case studies

This dissertation contains two qualitative studies, which are best called mini-cases. One of these mini-cases deals with the influence of IT in the sourcing process. This study is based on multiple interviews supplemented by company sources and public data. It reflects the experiences of Philips Medical Systems and Stork Industrial Systems. The second mini-case, on the Ford Mondeo, deals with global sourcing and is entirely based on secondary data. Like with the interviews the primary purpose of the case studies is to support qunatitative analysis and not to explicitly test any theory. These cases are mostly illustrative. However, the case study of Stork and Philips will also serve to generate insights into the influence of IT in sourcing because the role of IT in sourcing is a topic that has not been studied very extensively yet in the literature. This is particularly true for Internet-based applications. Therefore there is little theory that can be tested and it is much more important to develop such theory further than to test what little theory we have. New theory should guide later research on the topic.

4.3   Database

An important technique in this dissertation is the exploration of a large database. Access to this database has kindly been provided by the CBS (Centraal Bureau voor de Statistiek – Statistics Netherlands). This database is particularly suited for statistical techniques, most prominently regression analysis, which will be applied in *theory testing*. Given the nature of the data these tests have to be restricted to one core hypothesis, namely the one concerning the influence of outsourcing on firm performance.

CBS collects data from all manufacturing firms the Netherlands, both Dutch firms and foreign subsidiaries, with more than 20 employees on a yearly basis. These data are collected at the level of individual business units (BUs), which may or may not be part of a larger firm. Firms are legally obliged to provide correct information to CBS. The data that are collected are quantitative in nature including items like turnover, industrial purchasing, profitability, markets share and exports. For this study access was granted to firm level data on a set of just over 8,000 BUs of manufacturing firms. Some 4,800 BUs were selected from these 8,000 based on whether they are involved in manufacturing and whether they had 5 or 6 years of data available for the 1993-1998 period. The latter criterion indicates these firms consistently exist and provide data over a longer time period, effectively ruling out new firms, for which different patterns would apply. Using these data a number of additional firm level measures were calculated. The firm level data were then complemented by publicly available data at the 3-digit industry level, including detailed data on investment and industry concentration. Finally a number of country-specific measures were added. The 4,800 firms are divided over 85 separate 3-digit level industries that are coded according to the NACE system,

which is the European equivalent to the SIC in the United States. Manufacturing as it is defined here includes the NACE codes 15 through 37. In this study the analysis is mostly limited to 1998, which is appropriate given the fact that the structures under investigation hold over time (Mol and Gedajlovic, 2001). Multiple measures were used, which are now described in detail.

FIRM PERFORMANCE MEASURES

Following earlier studies (Murray et al, 1995a) two separate measures were created for the year 1998. The first measure is return on sales (ROS), calculated as 1998 net profits over total 1998 sales of the BU ('ROS98'). This measure reflects the financial performance of a BU. The second measure is market share, calculated as 1998 sales of the business unit over total 1998 sales in the 3-digit industry ('MARSHA98'). This measure reflects the market performance of a BU.

INDEPENDENT VARIABLES

The degree of external sourcing ('EXTSOU') was calculated as *industrial purchasing over total sales*. This measure indicates to what extent a firm relies on external suppliers to produce its products. The nationality of the firm ('FOREIGN') is a dummy variable that can take on the value of 0 for a Dutch firm and 1 for a subsidiary of a foreign firm. Out of the 1,650 firms in the sample 530 are foreign subsidiaries. For asset specificity no firm level data are available in this database. However, there is a 3-digit industry level measure ('ASSPEC') that divides *total investments by the industry over total turnover of the industry*. This provides a consistent and theoretically appropriate measure for the level of asset specific investments in a given year. Asset specificity is a strategic choice of firms but only to a limited extent (Nishiguchi, 1994). By far the larger part of the variance in asset specificity is not found at the firm level but at the industry level. The kinds of specific investments firms in a particular industry need to make are fairly similar. Once one starts to compare between industries there will be much bigger differences. The product a firm manufactures is a fairly reasonable predictor for the level of specific assets it needs. The uncertainty a firm faces was calculated as the variance of the firm's respective ROS figures for all the years ('FIRMUNCE'). This is a fairly standardised measure for uncertainty. To measure innovation a 3-digit industry level measure was employed that was calculated as total research and development costs in a given year over total turnover ('RNDINT'). Here a similar argument applies in that the variance of R & D spending within industries will be much smaller than the variance between industries.

CONTROL VARIABLES

To control for possible industry level effects, industry dummies were added. Since the sample consists of firms from 82 different industries, 82 dummies were added. Obviously industry effects play a substantial role in explaining firm performance (Porter, 1980; Rumelt, 1991). ROS measures can vary widely between industries, depending on how many investments are needed to produce a given turnover. ROI measures, which are not available in these data, are generally more stable across industries because shareholders and banks pose return levels on their investments that are equal across industries. The size of the firm is another obvious variable to control for in any study of firm performance as large larger firms have often been

shown to be more profitable. To control for size of the firm the log of the sales of the firm in a given year was used ('LOGSALES').

4.4   Survey

The main research tool of this study is a mail survey among sourcing managers. The mail survey technique usually relies on a substantial group of respondents, typically at least hundreds of respondents (Fowler, 1993). That allows for a range of statistical techniques to be applied. Furthermore surveys in social sciences often draw upon people's perceptions rather than collect 'hard' data (Dillman, 1978). There are several reasons for this. First, respondents may not always be able or willing to provide such hard data. It is for example doubtful that many firms measure exactly the number of times they have been in touch with their largest supplier over the last month. Likewise some figures are not even provided for scientific purposes like profitability. Second, many of the variables that social scientists are interested in hardly exist outside of people's perceptions. Is it possible to come up with an exact measure of 'trust' that is valid across all respondents? Third, perception based questions can be answered much quicker. They do not require the time to gather or process information that hard data do.

The mail survey in this study combines a range of perception questions with hard data but hard data are only used when this was seen as most appropriate. Even so, there are issues of exactness attached to these questions. We can not take the values as they are but can trust that if any errors have occurred in filling out questions these will be levelled by the statistical methods applied. Perception questions usually combine to form multiple-item or summated scales. Summated scales are means of using multiple questions to measure one construct. The construct of trust exposes itself in several ways but these ways are strongly intertwined. The answers to multiple questions are added to form one summated scale. These summated scales are much more reliable than the items they are composed of because they make the measurement error attached to a single item less influential.

Sample selection

Before being able to select a sample, four important questions needed to be answered on the location of the research, the industries to be covered, the level within the firm to choose, and the respondents within firms. Early on a decision was made to concentrate the survey on Western Europe. The two main reasons for this were the gaps in the literature defined in earlier chapters and the physical location of the researcher. Furthermore it was decided to focus this research entirely on the manufacturing sector. Earlier literature has put forward a rather clear idea of what sourcing strategy is for manufacturing firms and how supply chains are constructed. For services firms this is far less clear. This coincided with the general research focus of the larger research group, which was in manufacturing rather than in services. In this group core firms were identified, which are central to supply chains (Van Tulder, Van den Berghe and Muller, 2001). These firms are researched in terms of their internationalisation in a number of areas and the impact of internationalisation on nations. A third choice was what level within the firm to address. This depends largely on the research questions being asked. The theoretical model identified a relation with a supplier as an important predictor of performance. And previous literature has suggested that sourcing

strategy is best measured at the level of specific products (Kotabe, 1992). This ruled out the option of using corporate measures since corporate measures are aggregates of multiple products and multiple locations for most firms. Thus the sample had to be limited to the *business unit level*, where a key product would be easily identifiable. The final question was whom to address within those business units. While top management would be able to answer a wide range of questions, there were two drawbacks connected to contacting top management. First, top management might not be very knowledgeable on certain aspects of sourcing strategy, such as details on the relation with particular suppliers. Second, top management was less likely to answer given both time pressures and the large amounts of similar requests from researchers. Thus specialised managers appeared more suitable, particularly since there appeared to be few questions in the questionnaire that might go beyond their knowledge.

The specialised managers would have to come from the sourcing and purchasing area. Thus a sample of purchasing or sourcing managers at the business unit level of manufacturing firms located in Europe was needed. Note that the firms themselves did not necessarily have to be European. In fact, a lot of global sourcing research draws on foreign subsidiaries (e.g. Murray et al, 1995a).

In finding a sample various options were evaluated. Constructing an entirely new database of respondents appeared too complicated, given both the unwillingness of some firms and the problem of where to start. Therefore an existing database of sourcing managers had to be traced. There was the option to limit the sample to only one or a few industries. Given the needed sample size, this implied that a cross-European data source had to be found. Some efforts were undertaken to discover how realistic such an option would be through European industry associations, like the European plastics producers association. It appeared that these associations did not have separate files of sourcing managers. Furthermore the sample size and breadth were unclear. Thus the option of using specialised purchasing organisations was seen as more useful.

There is no European organisation of purchasing managers like the NAPM, the National Association for Purchasing Management in the United States. However, there is a global federation of national organisations called IFPMM, the International Federation of Purchasing and Materials Management. The members of this organisation are not firms but the various national associations. The web site of IFPMM and two separate meetings with an academic expert and the Dutch purchasing organisation NEVI (Nederlandse Vereniging voor Inkoop – Dutch Association for Purchasing) revealed that setting up a sample through IFPMM might not be possible at all or could take a number of years. Thus it appeared wiser to contact the member organisations directly. However the various purchasing organisations in Europe have a different degree of organisation and different goals. There is little unity and contacts are often limited. Thus the same two sources (an academic expert and NEVI) suggested contacting a leading country first. CIPS, the Charted Institute of Purchasing and Supply in the United Kingdom was chosen. CIPS was unable to co-operate because it had previously sent out other surveys to its members. At that point it became clear that conducting an international survey would be very difficult if not impossible. Domestic researchers would be preferred over foreigners. Furthermore there were other obstacles

including language and administrative barriers that limited the possibilities of a cross-European survey. Overcoming these would take too much time, perhaps years.

However, such problems did not emerge in contacts with NEVI because it was Dutch and in fact located in Zoetermeer, within a 20-kilometer radius from Rotterdam. NEVI was willing to co-operate by supplying its list of members in the manufacturing sector. One problem with this list was that some firms would not be appropriate to send a survey to. The list was somewhat contaminated by non-manufacturing firms and other inappropriate firms. Thus a filter was needed to establish which firms would be useful. At that time existing contacts with CBS were reinforced. CBS registers almost all Dutch economic activity and has a huge database of firms for which certain data are available. Furthermore it has developed computer programmes to match its own database with other databases. Thus all firms from the NEVI membership database registered as industrial were forwarded to CBS. Appendix describes what sectors from the NEVI database were selected. CBS then ran the programme to match the NEVI database with its own database. Those firms that were matched by this programme were included in the sample. Furthermore a number of business units of large, legally complex, firms were added to the sample.

Given the means of selecting respondents a bias may be expected in terms of the sample composition. What kinds of firms become members of a purchasing organisation? One may expect that, generally speaking, members of a purchasing organisation tend to be larger firms and firms that purchase more. Furthermore a bias towards particular industries can occur that is due to the importance given to purchasing within the industry. How representative is the sample that was chosen for the Dutch manufacturing sector at large? Table 1 displays the number of firms within a particular industry in a major part of the Dutch manufacturing sector and in the sample. Unfortunately it is not possible to conduct an analysis of variance (ANOVA) here because that would require bundling the two files, which would introduce bias since many firms in the sample also appear in the larger database. Thus the analysis has to be limited to comparing the descriptives. It is obvious that some industries are underrepresented in the sample while others are overrepresented. Of the underrepresented industries, numbers 17 (textiles), 18 (clothing), 20 (wood and wood products) mostly consist of smaller firms. Other industries like number 22 (printing) are perhaps less fit for an analysis of sourcing strategy.

Table 4.1: Industry-by-industry composition of the sample and the Dutch manufacturing sector at large. Sources: CBS database and survey[39].

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[39] SBI 2-digit level industry number 74 is not a part of manufacturing. Inspection after the survey revealed these were firms active in engineering. See also the remarks about non-respondents later in this chapter.

	Frequency in Dutch industry	Percentage of Dutch industry	Frequency in sample	Percentage of sample
15	1137	13.9	82	10.4
16	13	.2	5	.6
17	233	2.8	7	.9
18	127	1.5	3	.4
19	66	.8	2	.3
20	244	3.0	7	.9
21	228	2.8	27	3.4
22	868	10.6	15	1.9
23	23	.3	9	1.1
24	404	4.9	92	11.7
25	430	5.2	53	6.7
26	359	4.4	22	2.8
27	100	1.2	24	3.0
28	1369	16.7	88	11.2
29	1144	13.9	184	23.4
30	50	.6	10	1.3
31	211	2.6	35	4.4
32	73	.9	17	2.2
33	231	2.8	30	3.8
34	187	2.3	20	2.5
35	221	2.7	18	2.3
36	460	5.6	32	4.1
37	31	.4		
74			5	.6
Total	8209	100.0	787	100.0

Going beyond these industry patterns, there is also a comparison to be made at the firm level. Again, averages have been calculated for the Dutch manufacturing sector at large as well as for the sample. Table 2 displays those calculations. The firms in the sample, the NEVI members, are generally a) much larger, b) more purchasing intensive and c) more profitable. It is quite difficult to compare the two groups statistically, because one (the sample) is a part of the other (Dutch industry). However, t-tests can be run on Dutch industry as a whole to see whether values for Dutch industry differ significantly from values for the sample. The outcomes of these t-tests are not correct in the sense that they are biased by the presence of firms from the sample. However, significance levels on these t-tests present a conservative test. If there are differences with the sample firms included, these differences will become larger upon excluding the sample firms. Thus if a significant difference is found, this will certainly persist. Testing for a conservative 99% confidence interval, significant differences (.000 significant) were indeed found for all variables except the last one, return on sales, where the significance level was .199. None of these differences are particularly surprising. In fact, they confirm the self-selection bias that might be expected: only the larger and more purchasing intensive firms join a purchasing organisation. Thus the sample is probably not a good representation of Dutch manufacturing at large. However, it does appear to be an appropriate sample to look at sourcing activities manufacturing firms of above average size in the Netherlands.

	Dutch industry mean	Dutch industry standard deviation	Sample mean	Sample standard deviation
Industrial sales	49356	255216	153406	554391
Employees	104	493	323	1399
Industrial purchasing	29382	168779	83098	301448
Gross profits	6205	41191	23236	107514
Purchasing as % of sales	.4927	.3818	.5349	.1919
Return on sales	.1014	.6921	.1127	.3248

Table 4.2: differences between the sample and the Dutch manufacturing sector at large in 1998. For Dutch industry at large N = 6,433[40]. For the sample N = 704. Amounts are in millions of Dutch guilders. Sources: CBS database and survey.

Survey design

A crucial stage in survey-based research is the design of the survey (Fowler, 1993). This involves multiple steps, including translating the research model into questions, finding an appropriate structure, formulating the questions in the appropriate language, testing the questions and coming up with an effective design.

The structure that was chosen was to narrow down the questions in three stages. The first part of the survey focused on general questions, including the respondent's place within the organisation, the role of purchasing in the organisation, the extent of international linkages within the firm and the firm's general strategy. The second part of the survey started by asking the respondent to pick one particular product, which was referred to as 'product X' in the remainder of the survey. This product was chosen by respondents on the basis of producing most turnover for the firm. Thus product X can be said to be the firm's most important product. Respondents were also asked to write down the name of the product, for possible crosschecking. In the second part the questions focused on the sourcing strategy of the firm, the degree of asset specificity of the product, technological and volume uncertainty, the marketing and financial results of the product, the geographical distribution of the supply base, process and product innovation and the extent of E-commerce usage. The third part of the survey dealt with supplier relations. It would be inappropriate to ask for the 'mean' relations with all suppliers for both cognitive and content reasons. For instance what is the average trust in suppliers? Respondents will be troubled to answer this question in various ways. So the choice was made to address only relations with the largest supplier. Under circumstances the largest supplier can be used as an approximation for the entire supply base. This of course depends on the importance of the largest supplier to the focal firm. Alternatively the relation with the largest supplier can be thought of as a reflection of the firm's ability to build relations with suppliers. Respondents were asked to identify the largest supplier for product X. They were then asked a range of questions about this supplier including the longevity of the relationship, its development over time, the importance of the supplier for product X, the importance of the firm for the supplier, the extent of co-operation, the degree of trust, the possibilities for switching or substitution, the negotiation power of the supplier vis-à-vis the firm, the impact of the supplier on the product, the

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[40] The large difference between the previous table and this table is due to missing firm level data for 1998. Some firms did not yet provide data to CBS while others did not provide data for any years. In later analyses a subset was created to avoid this problem.

location of the supplier, the monitoring mechanisms employed by the firm, the commitment to the supplier and product-related as well as relation-related satisfaction measures.

It is generally advisable to use as many proven measures from previous empirical research as possible when formulating questions. If these are not available, new questions should be tested more rigorously. Luckily, it was possible to find measures for many items from earlier research on sourcing strategy, most prominently from Mohr and Spekman (1994) and Murray et al (1995a). These measures were adapted to the situation of the survey. Some other items were rather straightforward intellectually such as questions regarding a respondent's experience within the current job. These questions were simply inserted. And there was a small third category of questions that really needed to be built from scratch. These questions were designed rather carefully and stressed during the test phase. Appendix A includes all the different questions in English, including the original items used by other authors. Appendix B contains the text of the entire survey as it was sent out in Dutch.

Testing and improving the survey was a process that took several months and consisted of three distinct phases. In the first phase the initial design was discussed with a number of academic peers. In this first phase the emphasis was placed on finding measures that appropriately represented the theoretical concerns of the study. Several improvements were made during this phase. Something that also became clear during this phase was that the initial translation of some items was somewhat mechanical: the text did not really work well in Dutch. This was changed in later versions to improve readability. In the second phase the survey was tested by a group of non-academics not related to this research and outsiders to the sourcing field. These people have a good general feel of the economy and business in general as well as a solid grip of Dutch. Several other improvements were made. In the third phase the survey was tested using (former) sourcing managers that were asked to relate the questions to their own experiences. This revealed that several questions were not posed in the appropriate manner. Again corrections were made to overcome this problem.

Sample development

The data collection stage followed many of the guidelines provided by the survey literature (Dillman, 1978; Dillman, 1991; Fowler, 1993; Yammarino, Skinner & Childers, 1991). Chronologically the different stages were undertaken as in table 3.

Week	Activity	Results
0 (December 15)	• First round of surveys sent out by regular mail	79 valid surveys returned by regular mail
4 (January 11)	• Second round of surveys sent out by regular mail	84 valid surveys returned by regular mail
8 & 9 (February 14–27)	• Phone calls to remaining respondents • Some 140 surveys sent out on request by regular mail, e-mail and fax	494 respondents provided a reason for not returning the survey
11 (March 15)	• Mail box closed	41 valid surveys returned by regular mail, e-mail and fax

Table 4.3: chronological overview of survey activities.

Obviously one of the most important yet difficult aspects of survey research is to obtain decent response rates. Given the length of this survey, which included a maximum of 84

boxes and 16 A5 size pages in total, this appeared a pressing problem. The literature on responses to surveys has suggested a wide variety of means to stimulate individuals to fill in surveys (Yammarino et al, 1991) not all of which are applicable to organisational research.

Mailings to respondents included a survey, a return envelope with a Freepost address written on it, a card on which an address could be entered for receiving the results of the research and an overview of previous research results. The return envelope made it easier for respondents to mail back their responses. The Freepost address was used to minimise costs on behalf of the respondent. Respondents were given the possibility to receive the results of the survey in order to stimulate their interest in the research and to create a give-and-take situation. Previous research results were provided to show that this was serious scientific work that nonetheless appealed to sourcing managers in the field. Much attention was devoted to making the survey and the other components look attractive and serious to the respondent.

Since the size of the sample and the number of operations to be performed were too much to handle for a single person, several people were involved in the data collection stage. When the two big loads of postal surveys were sent out, people were instructed how to code the surveys, where to sign letters and what envelops to send out in what manner. The phone calls were conducted using a two-page protocol that described how to introduce the research and what to say in what particular circumstance. Furthermore people were given feedback concerning particular cases leading to routinisation of the process. Similarly, a protocol was developed to guide data entry. This protocol described exactly what number to enter at what question. Furthermore the guideline was provided to always contact the main researcher if unexpected or unclear results were found. This ensured that all data were entered in exactly the same fashion. After data entry there were several checks on whether or not data were entered correctly, including looking for values outside the predefined range, extremely high or low values and impossible ratios or combinations of data. Obviously, a number of respondents did not fill out all questions. Sometimes they could not fill out the question because it did not apply or the answer was unknown to them but at other times they appeared to have forgotten to answer a particular question or two pages of the survey. The main researcher decided on a case-by-case basis whether or not the respondent should be contacted to obtain the missing answers. In almost all cases contacting the respondent indeed led to a positive result. Some firms were not willing to provide certain data, particularly data on firm turnover and financial and market performance.

Response breakdown

The total valid response of the survey is 204, of which 200 were in time to be used for analysis. Whether or not a response is deemed valid depends on the extent to which the survey was completed. Some potential respondents started to fill out the survey to only then discover they could not complete it. If at least 80% of the survey was completed, a response was seen as valid. The original sample consisted of 787 firms. Thus the gross response rate is 204 / 787 * 100% = 25.9%. Because up to 2,000 telephone calls were executed, it was possible to analyse in some detail the reasons for non-response among a great majority of firms in the sample. Table 4 provides an overview of different categories in the sample. From the 787 surveys 19 were returned by the mail service because the firm no longer resided at that address. Based on the telephone interviews as well as written response by a small group of people a substantial group of potential respondents, 175, cited a lack of time as the reason for

not responding. During the first round many people were busy with end-of-year activities. Furthermore a substantial number of people were working on implementing projects, taking much of their time. And a small group of firms working closely with the agricultural sector was occupied by the foot-and-mouth disease and BSE. Another 11 people were not interested while 24 admitted that their firm never co-operates with surveys like these. A very small group of 4 people found the survey to be too complicated or too long and 5 people had other reasons not to answer. Then 7 people cited a combination of reasons, like no time and not interested with another 9 people who mostly returned the survey by regular mail, cited no reason at all. Even though many phone calls were made, 122 people were actually not reached by telephone at all. The reasons for this varied. Some people were on a longer holiday or absent due to illness. Others were on foreign trips, engaged in local festivities or were simply very busy. And there was a quite substantial group of firms whose telephone numbers we were unable to track. One firm in the database even carried a phone number that was over 6 years old. This clearly indicated a need on the side of NEVI to update the database. Of the firms that we spoke to and that did not react negatively, 25 promised to try to send in the survey at a later stage while 85 requested a new survey. This latter action was closely connected to a problem in the database that we discovered while making the phone calls. It appeared that at least 100 to 150 people that were sent a survey were no longer working in the company or were now working in an entirely different department of the company. Some people had left the company three to four years ago. Thus the survey had to be resent to another person. Obviously this did not influence the number of responses in a positive manner. Also it appeared during the phone calls that a substantial number of firms, 63, did in their own opinion not deal with sourcing strategy ('uitbestedingsstrategie') as it was investigated here. Another four firms were added to this category at a later stage when further inspection revealed that these firms were really engineering firms and not manufacturing firms[41]. These 67 firms were in their own opinions simply not able to return the survey. Similarly, 30 respondents were unable to return the survey, because they were not knowledgeable in this area. These people had only taken up their job weeks ago or did not have a good overview otherwise. Thus it appears fair to conclude that a group of 19 (never delivered) + 67 (firm can not respond) + 30 (individual can not respond) = 116 firms can be dropped from the sample when calculating the effective response rate.

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[41] No data were available from the CBS for these non-responding firms. They are all business units of a Dutch industrial manufacturing firm. Later inspection was based on publicly available reports from this firm.

	Frequency	Percentage of the sample
Returned by mail (wrong address)	19	2.4
No reason cited	9	1.1
Lack of time	175	22.2
Not interested	11	1.4
Firm profile does not fit survey	67	8.5
Respondent unable to answer	30	3.8
By principle	24	3.0
Combination of reasons	7	.9
Survey too complicated	4	.5
Other reasons	5	.6
To be sent	25	3.2
Sent a third survey	85	11.3
Respondent never reached	122	15.5
Valid surveys received	204	25.9 (30.4 effective rate)
Total	**787**	**100.0**

Table 4.4: An overview of responses and reasons for not responding.

This implies the effective response rate for the survey was 204 / 671 * 100%, or 30.4%. Given the length of the survey, 16 pages of A5 paper containing 89 different questions, this is a good response rate. The response rate stands out positively when compared to other research in sourcing strategy. Gilley and Rasheed (2000) sent out their survey to two different respondents within a firm to receive responses from only 17% of the firms. Murray, Kotabe and Wildt (1995a) achieved an effective response rate of 22%. For large, randomly selected samples responses can fall even lower, as is the case in Poppo and Zenger (1998) who barely achieve a 5% response rate. In general, surveys in Western Europe tend to amount to somewhat higher responses than in the US, but even correcting for that effect more than 30% is a good response rate.

The high response rate of over 30% is a first indication that non-response may not be a significant problem with this survey. However, more evidence is needed to substantiate this statement. The question is how representative the response group is for the original sample? An often-encountered problem with survey research is that the respondents may not represent an appropriate reflection of the sample from which they were drawn (Fowler, 1993). The basic problem is that no survey data are available from non-respondents because they have not returned the survey. Thus it is difficult to find out how non-responding persons would have responded. Multiple techniques have been invented to check whether non-response is a problem. One of the more common techniques is to compare the results of early and late respondents and see whether this generates any differences. This method has often been criticised for being inaccurate and not telling anything about the non-respondents themselves. Another method is to call a limited number of non-respondents and interview them to gather some basic data, often the control variables. These are subsequently compared to the data of respondents. A new problem introduced here is whether or not the telephone interview generates a new form of bias not present in the mail survey. If non-perception data are gathered this is obviously not a problem. In this research, however, none of these methods had to be applied. Since CBS data were available to carry out these checks a direct test could be applied to check for differences between respondents and non-respondents. Table 5

summarises the differences between respondents and non-respondents on a number of key dimensions. Industrial purchasing and purchasing as a percentage of sales are key independent variables. Employees and industrial sales are control variables. Gross profits and return on sales are dependent variables. The ANOVA analysis reveals that none of the observed differences between respondents and non-respondents are significant. Thus, we have established that no response bias has occurred in the sense of excluding or including particular types of firms in terms of turnover, number of employees, purchasing intensity or profitability.

	Mean respon-dents	Mean non-respon-dents	Mean square between groups	Mean square within groups	F-Test	Signifi-cance of F-test
Industrial sales	131830	160818	112579598848	307626958235	.366	.545
Employees	256	346	1078654	1958601	.551	.458
Industrial purchasing	61924	90372	108419998063	90845955478	1.193	.275
Gross profits	24884	22670	657142405	11574803309	.057	.812
Purchasing as % of sales	.5157	.5415	.089	.037	2.421	.120
Return on sales	.1139	.1123	.000	.106	.003	.954

Table 4.5: Analysis of variance between responding and non-responding firms for 1998 data. N = 704, which includes 524 non-responding firms (from 587) and 180 responding firms (from 200). Amounts are in millions of Dutch guilders. The data for this comparison are taken from the CBS database.

Although these firm level data confirm that non-response is not a problem with this survey it is also important to establish whether the respondents provide a picture of the various Dutch manufacturing industries similar to the sample at large. To make this comparison, the frequencies of various industries in the sample were measured. They are displayed in table 6. As before it is not very useful to use a statistical test given the small numbers appearing in the cells. Thus the discussion is limited to visual inspection. What is apparent is that the so-called OEM companies (original equipment manufacturers), in Dutch usually referred to as 'maakindustrie', are very well represented, particularly industries 28, metal-based products and 29, machinery. These are firms with serial production of complicated multi-component products. The industries that are not so well represented are the so-called process or batch industries like industries 15, food and beverages and 24, chemicals. The more traditional industries like leather products and furniture appear to be represented normally. This could be an indication that this survey was perhaps more difficult to answer for parts of the process industries. Some of the phone calls that were made afterwards seemed to confirm this. This is not necessarily a problem, although it does seem to indicate that the findings are perhaps not representative for industry at large, a conclusion drawn before. The inclusion of industry dummies in later analyses should help to track the influence of various industries on the outcomes.

	Frequency among respondents	Percentage of respondents	Frequency in sample	Percentage of sample
15	13	6.5	82	10.4
16	4	2.0	5	.6
17	3	1.5	7	.9
18	1	0.5	3	.4
19			2	.3
20	1	0.5	7	.9
21	6	3.0	27	3.4
22	4	2.0	15	1.9
23	1	0.5	9	1.1
24	16	8.0	92	11.7
25	14	7.0	53	6.7
26	6	3.0	22	2.8
27	5	2.5	24	3.0
28	31	15.5	88	11.2
29	56	28.0	184	23.4
30	3	1.5	10	1.3
31	5	2.5	35	4.4
32	3	1.5	17	2.2
33	8	4.0	30	3.8
34	7	3.5	20	2.5
35	4	2.0	18	2.3
36	9	4.5	32	4.1
74			5	.6
Total	200	100.0	787	100.0

Table 4.6: Industry-by-industry composition of the respondent group and the sample. Sources: CBS database and survey.

Another important characteristic is the home base of the responding firms. This will be used as a potential explanation for international sourcing patterns in later chapters. Some 21% of the respondents are non-Dutch firm as depicted in table 7. Although many foreign firms are present in the Dutch economy with European or regional headquarters, it is well known that the number of manufacturing firms established in the Netherlands by foreign firms is rather limited. Although it attracts substantial inward FDI, the Netherlands is generally not seen as an extremely attractive place for FDI in manufacturing activity. Most of the investments flowing into the country are directed towards services and distribution. Dutch firms were slightly more likely to complete the survey than were foreign firms. This difference is quite marginal though.

	Frequency among respondents	Percentage among respondents	Frequency in sample	Percentage in sample
Australia			1	.1
Belgium	2	1	12	1.5
Denmark			3	.4
Finland	2	1	6	.8
France	2	1	10	1.3
Germany	9	4.5	29	3.7
Ireland	2	1	4	.5
Israel	1	.5	2	.3
Italy			1	.1
Japan	2	1	6	.8
Luxembourg	1	.5	3	.4
Netherlands	157	78.5	591	75.1
Neth. Antilles	1	.5	11	1.4
Norway			1	.1
Sweden	5	2.5	9	1.1
Switzerland	3	1.5	13	1.7
United Kingdom	4	2	26	3.3
United States	10	5	59	7.5
Total	200	100.0	787	100.0

Table 4.7: Country-by-country composition of the respondent group and the sample. Sources: CBS database and survey[42].

This provides an accurate picture of the responding firms. However, what are the characteristics of the responding individuals? There are two measures in the survey that can help answer that question. The first is the job composition of the respondents. Respondents were asked to identify their job from within 6 choices. Out of 200 respondents 6 were CEOs, 11 were vice-president of purchasing and 1 was a purchasing advisor. A further 34 people were purchasers and 35 occupied another job. By far the largest group of people, 113 or 56.5% of the respondents identified themselves as purchasing managers. The fact that so few respondents belonged to top management was not surprising. Purchasing is usually not an activity performed at the top level and the outcomes correspond well with the membership base of NEVI.

The second question that was asked to assess the nature of the responding individuals was "when did you take up your current job"? Figure 1 below shows the distribution of the responses to this question. It is clear most of the respondents have taken up their jobs in the course of the 1990s, however there is some deviation as one respondent has been in this job from as far back as 1965. On average the respondents started in late 1993. Perhaps the tenure of the respondents will be of use in later explanations of results.

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[42] The firm from the Netherlands Antilles will be treated as a Dutch firm in later analyses. Not only are the Netherlands Antilles a part of the Netherlands legally, but is it also quite reasonable to assume this firm is registered as Netherlands Antilles for tax purposes only.
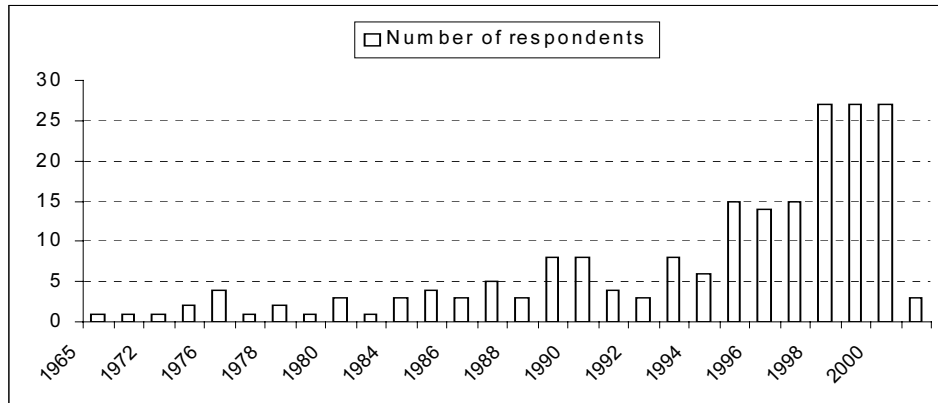
Figure 4.1: Number of respondents that started their jobs in a given year. Total number of respondents is 200.

Measurement: reliability and validity

Empirical scientific studies face the difficult task of finding the proper empirical constructs to represent often complicated theoretical scientific models. As Carmines and Zeller (1994: 2) put it 'measurement is most usefully viewed as the process of linking abstract concepts to empirical indicants'. Thus any measurement needs to take into account both theoretical and empirical concerns. The theoretical concerns mostly relate to whether a measurement is valid, that is whether an indicator measures what it purports to measure (Carmines & Zeller, 1994: 4). Validity is judged against the background of a theoretical variable. Thus validity is a matter of degree (Carmines & Zeller, 1994) in the sense that a measure is not either valid or not valid. The empirical concerns are mostly related to reliability of the measure. Reliability is best seen as 'the extent to which an experiment, test or any measuring procedure yields the same results on repeated trials (Carmines & Zeller, 1994: 3). Reliability is, by necessity, a matter of degree.

How should the reliability and validity of the measures used in this survey be assessed? Validity has multiple dimensions including criterion-related validity, content validity and construct validity. Here, the latter is of most importance because as Cronbach and Meehl noted (1955: 282):

> "Construct validity must be investigated whenever no criterion or universe of content is accepted as entirely adequate to define the quality to be measured".

The way construct validity is most usefully assessed when multiple items are used to form a scale is through factor analysis. It is important to stress that factor analysis itself is not a theory-free tool. Theoretical convictions must exist that predict that several items will load onto factors. With this in mind the SPSS Factor programme (data reduction – factor) was ran to assess validity. In order to measure reliability, the classical test theory was followed (Nunally, 1978) using the internal consistency method. This method relies on Cronbach's alpha (Cronbach, 1951), or simply alpha, as an indicator of reliability. This is the standard

procedure for reliability in surveys like these. Alpha was calculated using the SPSS reliability programme (scales – reliability).

How are the construct validity and reliability determined in practice? The factor analysis is run in such a way that a number of components will show up equal to the number of columns or items. Thus if 3 items have been tested, 3 components will appear. If the correlation table is the basis for the factor analysis then the combined eigenvalues of the components will be equal to the number of components. Eigenvalue is defined by Hair et al (1998: 89) as the amount a variance accounted for by a particular factor. In the said example the combined eigenvalues will be 3. To test whether a component is unidimensional, which is necessary for a scale to be formed, the eigenvalues of components are examined. The eigenvalue of the first component is by definition equal to or larger than 1. What is important is that the eigenvalues of all other components are smaller than 1 because that implies a construct is unidimensional. Once it has been established that a construct is unidimensional the next step is to assess the reliability through Cronbach's alpha. What a good value of Cronbach's alpha is depends on the research aim. For truly tested scales a value of over .8 or even over .9 must be attained (Carmines & Zeller, 1994). Otherwise .7 is seen as good enough or even .6 in more exploratory research (Hair et al, 1998). In general it is true that the more widely a scale has been applied in previous literature, the stricter demands are upon alpha.

The formula for Cronbach's alpha is[43]:

$$\alpha = N/(N-1) \left[1 - \sum \sigma^2(Y_i) / \sigma_\chi^2 \right]$$

Now the reliability and validity of all variables in the survey that consist of multiple items will be assessed. Both the eigenvalues and the Cronbach Alpha values will be shown and a short discussion accompanies these outcomes. As noted before *Appendix A* contains all the scales, while *Appendix B* contains the survey itself. Most scales were taken from previous research and only very few were constructed for this survey. The test procedure was described above.

Uncertainty

The uncertainty measure used in the survey relates to the volume and technological uncertainty surrounding the product. Respondents were asked to provide perceptions of how uncertain volumes are (VOLUNCERT), to what extent the volume uncertainty can be predicted (INVREL), how often product specifications are changed (SPECFREQ) and how likely future specification changes are (FUTSPEC). The correlation matrix of these four measures is shown below with the means of the measures.

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[43] The formula shows that alpha can be increased either by increasing the average correlations among variables or by increasing the number of items in the scale. The latter is often difficult in management research given the very limited time respondents can spend on completing surveys. In this research the basic strategy was to not cut down the number of variables and use limited numbers of items per scale. In the sourcing field this seems to be the most widely applied approach.

	MEAN	VOLUNCERT	SPECFREQ	FUTSPEC	INVREL
VOLUNCERT	2.8636	1.000	.299	.261	.417
SPECFREQ	2.3485	.299	1.000	.392	.161
FUTSPEC	2.7980	.261	.392	1.000	.151
INVREL	2.9697	.417	.161	.151	1.000

Table 4.8: Descriptives and correlations of uncertainty measures. N = 198.

From the next table, table 9 it can be concluded that the first factor has an eigenvalue of more than 1 while the second factor has an eigenvalue of less than 1. Thus the construct validity of the scale is barely good enough. If the second factor would have an eigenvalue of more than 1, this implies that there is no unidimensionality, which again means that not one single scale can be formed[44]. The reliability of the scale is highest if all four items are included, but Cronbach's alpha is only .61, which is rather low and somewhat worrisome. The final row in the table shows the range of potential alphas that would emerge, were one of the items to be deleted. If this uncertainty scale was split into two separate scales for technological uncertainty and volume uncertainty the outcomes of the analyses did not improve. Thus it is best to consider this as one scale for uncertainty in general.

Eigenvalue 1	1.847
% of variance 1	46.17
Eigenvalue 2	.989
% of variance 2	24.71
Eigenvalue 3	.612
% of variance 3	15.30
Eigenvalue 4	.553
% of variance 4	13.82
Alpha	.6084
Deleted item alpha	.4869 - .5840

Table 4.9: factor eigenvalues, alpha and range of alphas with one item deleted.

Asset specificity

Four possible items were identified for the asset specificity scale. One was a general item that could cover asset specificity as a whole. The other three were specific items for human asset specificity in the sense of unique technical capabilities of employees (UNITECH), physical asset specificity in the sense of unique production equipment (PRODEQ) and site specificity in the sense of unique production locations (PRODLOC). It appeared that including the general item did not include either the reliability or the validity of the scale. In fact, alpha decreased by 0.02. The reason could be differences between the questions: the general question asked for what the replacement value of assets would be while the three specific questions concentrated on uniqueness of skills. Adding items without improving the reliability of the scale is not advisable unless there is a compelling theoretical argument to do so. In this case the general item is believe to be nothing more than a combination of the specific items

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[44] Also note that while a larger number of items will generally increase Cronbach's alpha (given the nature of the formula), it will also increase the likelihood of a second factor of more than 1. If this would occur, factor rotation or other measures should be implemented.

and there is no specific reason to include it. Therefore only the three specific components were retained.

	MEAN	UNITECH	PRODEQ	PRODLOC
UNITECH	4.0914	1.000	.430	.490
PRODEQ	4.1117	.430	1.000	.399
PRODLOC	3.0508	.490	.399	1.000

Table 4.12: Descriptives and correlations of asset specificity measures. N = 197.

From the next table it can be concluded that the first component of the three components explains by far the most variance. Also Cronbach's alpha is .70, which is satisfactory for a 3-item scale. Leaving out one of the three items results in a decrease of the scale, implying that the three items above provide the match.

Eigenvalue 1	1.881
% of variance 1	62.684
Eigenvalue 2	.613
% of variance 2	20.431
Eigenvalue 3	.507
% of variance 3	16.884
Alpha	.6983
Deleted item alpha	.5695 - .6566

Table 4.13: factor eigenvalues, alpha and range of alphas with one item deleted.

Process innovation

Three possible items were used to form the process innovation scale. These were the level of process innovations of the product compared with other products in the firm (PROCPROD), the level of process innovations of the product compared with competing products (PROCCOMP), and the applicability of process innovations elsewhere in the firm (PROCINFI).

	MEAN	PROCPROD	PROCCOMP	PROCINFI
PROCPROD	2.9263	1.000	.721	.351
PROCCOMP	3.0263	.721	1.000	.365
PROCINFI	2.5579	.351	.365	1.000

Table 4.14: Descriptives and correlations of process innovation measures. N = 190.

From the next table it can be concluded that the first component of the three components explains by far the most variance. Also Cronbach's alpha for the three items is .73, which is satisfactory for a 3-item scale. However, leaving out the third item increases the alpha by .11, which is very substantial. Given this large difference, there is ground to believe it is better to exclude item 3, applicability of process innovations elsewhere in the firm. Theoretically this also makes some sense, as the third item does not ask for how much process innovation there actually is, but asks for the applicability of the process innovations elsewhere. Although this is a measure of the value of the process innovations to the firm, it may indeed be quite different

from the level of innovations as such. Thus the scale was formed on the basis of the first two items only and has a .84 Cronbach's alpha.

Eigenvalue 1	1.982
% of variance 1	66.068
Eigenvalue 2	.739
% of variance 2	24.644
Eigenvalue 3	.279
% of variance 3	9.289
Alpha	.7263
Deleted item alpha	.5177 - .8379

Table 4.15: factor eigenvalues and alpha.

Product innovation

Three possible items were used to form the product innovation scale. These were the level of product innovations of the product compared with other products in the firm (PRODPROD), the level of product innovations of the product compared with competing products (PRODCOMP), and the applicability of product innovations elsewhere in the firm (PRODINFI).

	MEAN	PRODPROD	PRODCOMP	PRODINFI
PRODPROD	2.9263	1.000	.667	.297
PRODCOMP	3.0263	.667	1.000	.442
PRODINFI	2.5579	.297	.442	1.000

Table 4.16: Descriptives and correlations of product innovation measures. N = 193.

From the next table it can be concluded that the first component of the three components explains by far the most variance. Also Cronbach's alpha for the three items is .71, which is satisfactory for a 3-item scale. However, leaving out the third item increases the alpha by .09, which is substantial. As with the previous item this large difference indicates it is better to leave out the third item. Doing this also makes sense theoretically as discussed above. Thus the scale was formed on the basis of the first two items only and has a .80 Cronbach's alpha.

Eigenvalue 1	1.955
% of variance 1	65.177
Eigenvalue 2	.734
% of variance 2	24.461
Eigenvalue 3	.311
% of variance 3	10.362
Alpha	.7119
Deleted item alpha	.4543 - .7997

Table 4.17: factor eigenvalues, alpha and range of alphas with one item deleted.

Strategic performance

Two possible items were used to form the strategic performance scale. These were market share of the product compared with the largest three competitors (MARKSHAR) and sales

growth of the product compared with the largest three competitors (SALEGROW). These measures stem from earlier sourcing research (Murray et al, 1995a).

	MEAN	MARKSHAR	SALEGROW
MARKSHAR	3.4213	1.000	.430
SALEGROW	3.3293	.430	1.000

Table 4.18: Descriptives and correlations of market performance measures. N = 197.

From the next table it can be concluded that the first component of the two components explains by far the most variance. What is problematic is that Cronbach's alpha for the two items is only .58, which is low, even for a 2-item scale. This causes concern over the reliability of this measure. In chapters 5 through 7 there will be additional discussion on the consequences of these low values. Perhaps it would in retrospect have been better to add more items to this question like questions on the firm's market positioning.

Eigenvalue 1	1.430
% of variance 1	71.500
Eigenvalue 2	.570
% of variance 2	28.500
Alpha	.5865

Table 4.19: factor eigenvalues and alpha.

Economic performance

Two possible items were used to form the economic performance scale. These were return on sales of the product compared with the largest three competitors (RETSALES) and return on investment of the product compared with the largest three competitors (RETINV). These measures stem from earlier sourcing research (Murray et al, 1995a).

	MEAN	RETSALES	RETINV
RETSALES	3.2011	1.000	.460
RETINV	3.1958	.460	1.000

Table 4.20: Descriptives and correlations of financial performance measures. N = 189.

From the next table we see that the first component of the two components explains by far the most variance. What is somewhat problematic is that Cronbach's alpha for the two items is .63, which is not really high, even for a 2-item scale. This causes slight concern over the reliability. Similar to the previous item there will be more discussion in chapters 5 through 7. Perhaps it would have been better to add items to this question concerning return on assets or profit margins per item. Another option is to empirically combine strategic and economic performance. This produces a more reliable performance measure with an alpha of 0.67.

Eigenvalue 1	1.460
% of variance 1	72.989
Eigenvalue 2	.540
% of variance 2	27.011
Alpha	.6299

Table 4.21: factor eigenvalues and alpha.

Stability

Two possible items were used to form the stability scale. These were relationship development with the largest supplier (RELDEV) and purchasing volume growth with the largest supplier (PURVOL).

	MEAN	RELDEV	PURVOL
RELDEV	3.5879	1.000	.432
PURVOL	3.5829	.432	1.000

Table 4.22: Descriptives and correlations of stability measures. N = 199.

From the next table it can be concluded that the first component of the two components explains by far the most variance. What is problematic is that Cronbach's alpha for the two items is only .60, which is low, even for a 2-item scale. This causes concern over the reliability of this measure. However, in the original article an Alpha of 0,68 was reported (Nooteboom et al, 1997). This indicates that the measures have been shown to be more reliable in other studies, which provides some secondary support for applying the measures in this study.

Eigenvalue 1	1.432
% of variance 1	71.590
Eigenvalue 2	.568
% of variance 2	28.410
Alpha	.5980

Table 4.23: factor eigenvalues and alpha.

Voice relation

Three possible items were used to form the voice relation scale. These were co-operation in problem solving (COOPPROB), flexible responses to questions by the supplier (FLEXRESP), and receiving help from the supplier in case of an emergency (EMERHELP).

	MEAN	COOPPROB	FLEXRESP	EMERHELP
COOPPROB	3.9000	1.000	.679	.532
FLEXRESP	3.7300	.679	1.000	.627
EMERHELP	4.0750	.532	.627	1.000

Table 4.24: Descriptives and correlations of voice relation measures. N = 200.

From the next table it can be concluded that the first component of the three components explains by far the most variance. Also Cronbach's alpha for the three items is .83, which is high for a 3-item scale. No improvement can be made by deleting any of the items, so the summated scale was formed by using these three items.

Eigenvalue 1	2.227
% of variance 1	74.248
Eigenvalue 2	.473
% of variance 2	15.772
Eigenvalue 3	.299
% of variance 3	9.981
Alpha	.8250
Deleted item alpha	.6942 - .8084

Table 4.25: factor eigenvalues, alpha and range of alphas with one item deleted.

Trust

Four possible items were used to form the longevity scale. These were trusting the supplier to live up to all conditions of a contract (CONTTRUS), trusting the supplier to take beneficial decisions (DECITRUS), trusting that the supplier will provide a good deal (DEALTRUS), and harmony in the relationship (RELAHARM).

	MEAN	CONTTRUS	DECITRUS	DEALTRUS	RELAHARM
CONTTRUS	3.7538	1.000	.524	.347	.479
DECITRUS	3.5377	.524	1.000	.660	.556
DEALTRUS	3.5477	.347	.660	1.000	.652
RELAHARM	3.6734	.479	.556	.652	1.000

Table 4.26: Descriptives and correlations of uncertainty measures. N = 199.

From the next table it can be concluded that the first component of the four components explains by far the most variance. Also Cronbach's alpha for the four items is .82, which is satisfactory for a 4-item scale. Dropping the first item leads to an increase in alpha of 0.01. The three remaining items would have an alpha of 0.83. However, dropping this item implies that a theoretically important aspect of trust, the extent to which contracts prove to be binding, would have to be deleted. Thus several tests will be undertaken in later chapters, mostly in chapter 6, to assess whether statistical problems would arise from using all four items. On the basis of these empirical tests it will be decided whether the four-item scale can be applied.

Eigenvalue 1	2.620
% of variance 1	65.508
Eigenvalue 2	.677
% of variance 2	16.935
Eigenvalue 3	.443
% of variance 3	11.063
Eigenvalue 4	.260
% of variance 4	6.495
Alpha	.8241
Deleted item alpha	.7475 - .8317

Table 4.27: factor eigenvalues, alpha and range of alphas with one item deleted.

Loyalty

Three possible items were used to form the loyalty scale. These were stopping to buy the largest supplier's products (STOPBUY), not being committed to buying the largest supplier's products (NONCOMMI), and minimal involvement with the largest supplier (MININVOL).

	MEAN	STOPBUY	NONCOMMI	MININVOL
STOPBUY	4.1256	1.000	.246	.437
NONCOMMI	3.5628	.246	1.000	.314
MININVOL	4.0151	.437	.314	1.000

Table 4.28: Descriptives and correlations of loyalty measures. N = 199.

From the next table it can be concluded that the first component of the three components explains the most variance. However, Cronbach's alpha for the three items is only .59, which is low for a 3-item scale. Dropping the second item helps to increase the reliability of this scale to .61. Without the second item the scale would be less complete theoretically and therefore tests in later chapters, in particular chapter 6, will have to reveal whether it is appropriate to include all three items in the scale. Again, there is indirect evidence to conclude that the scale may be reliable, as in the original article (Mohr and Spekman, 1994: 142) a Cronbach Alpha of 0.81 was reported. Thus the reliability in another setting was quite good.

Eigenvalue 1	1.671
% of variance 1	55.707
Eigenvalue 2	.774
% of variance 2	25.804
Eigenvalue 3	.555
% of variance 3	18.489
Alpha	.5914
Deleted item alpha	.3929 - .6077

Table 4.29: factor eigenvalues, alpha and range of alphas with one item deleted.

Power

Four items were used to form the power scale[45]. These were the supplier's negotiating power (NEGOPOW), the onetime costs involved with switching suppliers (SWITCHCOS), the inverse value of the number of alternative suppliers (ALTERSUP), and the inverse value of the number of alternative products (ALTERPROD).

	MEAN	NEGOPOW	SWITCHCOS	ALTERSUP	ALTERPROD
NEGOPOW	3.1818	1.000	.238	.442	.248
SWITCHCOS	3.6869	.238	1.000	.326	.282
ALTERSUP	2.3535	.442	.326	1.000	.568
ALTERPROD	3.1768	.248	.282	.568	1.000

Table 4.30: Descriptives and correlations of power measures. N = 200.

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[45] A total of 9 different items were used to distinguish power. However, only 1 reliable component could be found. The best match is achieved with these 4 items. It is possible to add the supplier's negotiating power and the onetime costs involved with switching suppliers but this decreases alpha to 0.66. Other options show lower alphas and are not reported here due to space constraints.

From the next table it can be concluded that the first component of the two components explains the most variance. Cronbach's alpha for the four items is .67, which is a bit low for a 4-item scale. Alpha can be improved slightly by leaving out the second item and in fact even more by leaving out both the first and the second item (to .73). Therefore further tests in subsequent chapters will have to reveal whether a 4-item or a 2-item scale provided the best solution. It appears this scale is not the best of all scales, but can be used.

Eigenvalue 1	2.076
% of variance 1	51.892
Eigenvalue 2	.779
% of variance 2	19.465
Eigenvalue 3	.759
% of variance 3	18.972
Eigenvalue 4	.387
% of variance 4	9.671
Alpha	.6670
Deleted item alpha	.4782 - .6713

Table 4.31: factor eigenvalues and alpha.

Short term supplier performance

Five possible items were used to form the short-term supplier performance scale. These items were satisfaction with delivery quality (DELQUAL), satisfaction with responsiveness to problems (PRORESP), satisfaction with the cost of deliveries (DELCOST), satisfaction with the reliability of deliveries (DELREL) and satisfaction with the speed of deliveries (DELSPEE).

	MEAN	DELQUAL	PRORESP	DELCOST	DELREL	DELSPEE
DELQUAL	5.3550	1.000	.515	.454	.600	.503
PRORESP	5.1800	.515	1.000	.311	.548	.596
DELCOST	4.6950	.454	.311	1.000	.408	.337
DELREL	5.2900	.600	.548	.408	1.000	.703
DELSPEE	5.1200	.503	.596	.337	.703	1.000

Table 4.34: Descriptives and correlations of
short-term supplier performance measures. N = 200.

From the next table it can be concluded that the first component of the three components explains by far the most variance. Cronbach's alpha for the five items is .83, which is satisfactory for a 5-item scale. However, dropping the third item, cost, helps to increase the reliability of this scale to .85, which is high for a 4-item scale. On the other hand excluding the costs of delivery is quite a significant backward step theoretically since the cost of deliveries is usually thought of as the key aspect of judging supplier performance at least by theoreticians and suppliers. Buyers sometimes claim that other elements such as quality and reliability are more important (Nooteboom, 1999: 140). Therefore this is in particular a case where the best solution is to retain all five measures unless analyses in subsequent chapters prove differently.

Eigenvalue 1	3.018
% of variance 1	60.360
Eigenvalue 2	.771
% of variance 2	15.422
Eigenvalue 3	.476
% of variance 3	9.517
Eigenvalue 4	.464
% of variance 4	9.271
Eigenvalue 5	.272
% of variance 5	5.430
Alpha	.8314
Deleted item alpha	.7647 - .8450

Table 4.33: factor eigenvalues, alpha and range of alphas with one item deleted.

Long term supplier performance

Three possible items were used to form the long-term supplier performance scale. These were satisfaction with learning new capabilities from the largest supplier (NEWCAPA), satisfaction with joint innovation with the largest supplier (JOININNO) and satisfaction with the largest supplier's ability to manage his network of subcontractors (SUBCONET).

	MEAN	NEWCAPA	JOININNO	SUBCONET
NEWCAPA	4.3979	1.000	.626	.461
JOININNO	4.5550	.626	1.000	.459
SUBCONET	4.4869	.461	.459	1.000

Table 4.34: Descriptives and correlations of long-term
supplier performance measures. N = 191.

From the next table it can be concluded that the first component of the three components explains the most variance. Cronbach's alpha for the three items is.75, which is satisfactory for a 3-item scale. Dropping the third item helps to increase the reliability of this scale to .76. This is yet another example of a marginal increase that is costly theoretically: it would imply that long term goals do not revolve around the supply network but only around the one-on-one relation between the buyer and supplier. This seems unrealistic. In chapter 6 various analyses will be undertaken to assess the empirical effects of using either two items or three items.

Eigenvalue 1	2.035
% of variance 1	67.828
Eigenvalue 2	.591
% of variance 2	19.710
Eigenvalue 3	.374
% of variance 3	12.462
Alpha	.7532
Deleted item alpha	.6209 - .7634

Table 4.36: factor eigenvalues, alpha and range of alphas with one item deleted.

Conclusions: reliability and validity

All of the above scales had correct construct validity in the sense that all the components were *unidimensional*. In all the scales the first component had an eigenvalue of more than one while all of the other components had eigenvalues smaller than one. Furthermore most of the scales also had the desired pattern of the first component explaining the bulk of the variance and the other components having more or less similar (small) sizes.

Several of the scales that were used in the survey did not meet the Cronbach alpha criterion of .7 posed on non-exploratory research. This is particularly true for the scales that were concerned with sourcing strategy in general. Two scales, for market performance and stability, did not even reach the .6 level of alpha. This implies any results obtained in later stages that related these variables to other variables have to be judged with all possible caution. However, such low alpha values also make it unlikely strong results will be found using these variables. Given the nature of the survey method, there is not really any possibility to go back into the field and gather additional data. On the other hand there were also a substantial number of scales that performed very well and this is particularly true for the supplier satisfaction measures. This provides confidence for subsequent analyses involving these measures.

In the survey there is a range of questions that do not fall under the header of multiple item scales. These items measure a percentage or state and do not measure perception. Obviously these questions can and should not be tested using either factor analysis or reliability analysis. All that can be done with these questions is to assess whether respondents appear to have completed the questions correctly. From the responses and the phone calls some questions came out as potentially unreliable. A substantial number of respondents were unable to answer the question what percentage of their largest supplier's turnover was taken up by their purchases. This raises questions about the accuracy of the remaining answers and about the profile of the non-respondents to this question. The question 'what is your total turnover' was not always answered correctly. Respondents were supposed to answer in terms of total turnover at the corporate level. However, some respondents answered in terms of business unit or division turnover. In later chapters a remedy for this problem will be put forward. A further suspicion arose over the *Internet EDI* questions: it appears likely a substantial number of respondents that answered this question positively do use EDI but this is not Internet based EDI.

Table 37 below summarises the empirical measures in both the database and the survey. Reference to this table will be made at various points in the study and therefore the reader will want to refer to it again.

Variable (chapter 3)	Abbreviation	Database measure (chapters 5 & 8)	Survey measure(s) (chapters 5, 6, 7 and 8)
Economic performance	ECONPERF	ROS98 (profits over sales)	Relative ROS & ROI (2 items) Supplier satisfaction (5 items)
Strategic performance	STRATPERF	(Logged) market share	Relative market share & sales growth (2 items) Supplier satisfaction (3 items)
Firm performance	FIRMPERF	--	Economic & strategic performance (2 & 2 items)
Internal vs. external sourcing	EXTSOUR	Purrat98 (external purchasing over sales)	Totproco (% of production costs by external suppliers) Purratsu (external purchasing over firm turnover)
Exit vs. voice relations	VOICEREL	--	Voicerel (3 items)
Domestic vs. international sourcing	FORSOUR	--	Forsour (% of supplies from abroad) Foreisup (foreign supplier)
Asset specificity	ASSETSPE	Asspec (industry investments over sales)	Assetspe (3 items)
Uncertainty	UNCERT	Firmunce (variance in '93-'98 ROS)	Volume uncertainty (2 items) & technological uncertainty (2 items)
Innovation	INNOVAT	Rndint98 (industry R & D over sales)	Prodinno (2 items) Procinno (2 items)
Foreignness	FOREIGN	Foreign (dummy)	Foreign (dummy)
Loyalty	LOYALTY	--	Loyalty (3 items)
Buyer dependence	BUYERDEP	--	Buyerdep (% of largest supplier's turnover with this buyer)
Supplier dependence	SUPPPLDEP	--	Suppldep (% of purchasing with largest supplier)
Power	POWER	--	Power (4 items)
International experience	INTNATEXP	--	Being a multinational firm (dummy)
Industry	INDUSTRY	3-digit level dummy	3-way industry dummy
Firm size	FIRMSIZE	Log sales Employees	Purchasing budget
Productivity	PRODUCT	Loglabin (logged sales per employee)	--
Firm strategy	FIRMSTRAT	--	4-way dummy (Miles & Snow)
Trust	TRUST	--	Trust (4 items)
Longevity	RELLENGTH	--	Number of years with supplier
Respondent characteristic	RESPCHAR	--	Experience (years in position) Position (4-way dummy)
Industry concentration	INDCON	Indcon98 (Herfindahl index)	--
Export intensity	EXPINT	Firm exports over sales	--
Product stan-dardisation	PERCSTAN	--	% of standardised inputs in product
Relational growth	RELGROW	--	Improvement of relation over time (2 items)

Table 4.37: Overview of empirical measures in the survey and database and their relation to variables.

Chapter summary

In chapter 4 the methods of the study are described. The study draws on four methods, interviews, case studies, a database and a survey. Interviews with sourcing managers and other experts were used to derive a feeling of the field. This information was incorporated when constructing the theoretical framework. Two case studies are used in the study, which draw upon multiple interviews and secondary data. These case studies are mainly used as illustrations. The database consists of measures collected by Statistics Netherlands (CBS). CBS collects data on external purchasing, various firm performance measures and additional variables. In this study the 1998 data are used. The database used here consists of almost 5,000 firms in a large variety of industries.

The survey is the most important tool of empirical research. A survey was developed based on the theoretical model described in chapter 3. This chapter describes how the survey was conducted. The survey was mailed twice to almost 800 members of NEVI, the Dutch purchasing organisation. The sample contains many of the larger and more purchasing intensive manufacturing firms in the Netherlands. Since 204 firms responded in time and many others were ineligible for a variety of reasons, an effective response rate of over 30% was obtained. The respondents were representative of the sample. The reliability and validity of the survey measures was assessed and most measures produced good to very good values. Two important measures provided some measuring difficulties: the degree of external sourcing and firm performance perceptions.

Chapter 5: The outsourcing dilemma

Decision-makers in firms are faced with the dilemma of how much to outsource and under what conditions to outsource. This chapter will provide results to help answer these questions by addressing the question whether outsourcing is a useful explanation of firm performance. The leading question of this chapter was formulated in the prologue: *Does outsourcing lead to improved firm performance?* The chapter then continues by testing under what conditions outsourcing helps to improve the performance of firms and under what conditions outsourcing deteriorates a firm's performance. Briefly recalling what was discussed earlier, this chapter will test the model developed in chapter 3, particularly figure 3.2. This model is repeated below in figure 1. All empirical chapters will follow the same pattern: first the model and results are presented in a very 'bare' form. Then these results are summarised and at the end of every chapter the results are discussed in much more detail. Thus section 5.1 contains an analysis of the database. Here the effects of external sourcing on both ROS and market share are discussed. Section 5.2 briefly summarises the findings and how they relate to the hypotheses. Section 5.3 analyses the effects of external sourcing on economic and strategic performance based on the survey. Section 5.4 summarises the findings from the latter analysis. In the analyses of both data sources the same model (figure 1) is tested but in slightly different ways. Section 5.5 contains the discussion of the findings where links are made to the conceptual framework and where findings are explained.
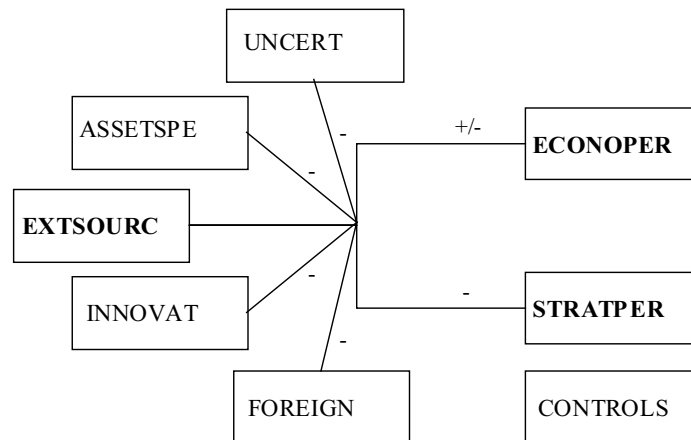
Figure 5.1: overview of the external sourcing model and its moderators.

5.1   Analysis of the database

The main trend in the Netherlands over the course of the 1990s was to source more from external suppliers. This trend was also documented in a recent management article (Mol, Schreuder and Goedegebuure, 2001). What is interesting to note is that while process-based industries and traditional industries increase external sourcing only slightly if at all, the OEM

industries ('maakindustrie'), including industries like electronics, vehicles and machinery, strongly increased their dependence on external sources. Examples include manufacturing of bicycles where the purchasing rate increased by 15.5% of turnover and electronic components where it rose by 14.1% between 1993 and 1998 (Mol, Schreuder and Goedegebuure, 2001). This trend towards increased outsourcing has been occurring for much longer in the Netherlands, in some industries even as far back as the 1977-1992 period (De Wit & Mol, 1999; De Wit, Mol & Van Drunen, 1998). As a whole this database shows an increase of the average use of industrial purchasing from 45.2% in 1993, through 46.9% (1994), 48.1% (1995), 47.8% (1996), and 48.5% (1997) to 49.1% in 1998.

The CBS database provides a first opportunity to look into the effects of external sourcing on performance[46]. An analysis was run to determine the effects of external sourcing on competitive performance for the year 1998. Several possible interaction effects were tested. Table 1 presents an overview of the variables that will be used in the regression analyses. Some of these variables were already discussed in chapter 4. Chapter 4 also provided an overview of all measures. Recall that *the key variables in this section are external sourcing (PURRAT98), return on sales (NETRO98), market share (MARSHA98), innovation / R & D expenditures (RNDINT98), asset specificity (ASSPEC98), uncertainty (FIRMUNCE) and foreignness (FOREIGN)*. It is noteworthy that the number of firms for which certain variables are available differs between variables.

Variable name	Measure for	N	Minimum	Maximum	Mean	Stand. Dev.
RNDINT98	Innovation expenditures	3,486	0	3.132	.352	.439
MARSHA98	Firm market share	4,640	.0054	83.75	1.445	4.119
INDCON98	Concentration ratio of industry	4,787	.592	70.59	4.925	6.898
ASSPEC98	Firm asset specificity	4,342	.8050	13.29	5.314	2.146
NETROS98	Firm return on sales	4,640	-76.43	84.78	10.05	11.82
INETRO98	Industry return on sales	4,787	-.394	33.28	10.06	3.920
EXPRAT98	Firm export intensity	4,640	0	136.1[47]	28.18	32.89
FIRMUNCE	Uncertainty firm faces	4,787	.00	1208	39.76	77.07
PURRAT96	1996 external sourcing rate	4,779	.2088	145.2	47.83	18.13
PURRAT97	1997 external sourcing rate	4,777	0	160.6	48.53	18.45

Continued on next page

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[46] The materials used in this section show many similarities to Mol and Gedajlovic (2001) but also differ slightly. In Mol and Gedajlovic (2001) less firms are used, only 1,650, but multiple years of data (1993-1998) in a panel data analysis. Since most of the effects we found there are constant over time there is little reason to use all years of data here. Furthermore it is better to use the entire set of 4,787 firms here since they are more representative of the whole range of industrial firms in the Netherlands and therefore more similar to the firms analysed in the survey. Obviously 1998 data are also closer to the moment the survey was sent out, late 2000. This again improves the extent to which comparisons can be made in this chapter and chapter 8 between the two data sources.

[47] For several firms ratios may appear unlikely, because these firms export more than they sell or purchase more than they sell. However, this is acceptable for a single year of data because of possible time lags in reporting. Firms that consistently showed this pattern were removed from the database at an earlier stage. Cases where data appeared particularly unlikely (e.g. where profits were 80% of sales) were also removed.

Variable name	Measure for	N	Minimum	Maximum	Mean	Stand. Dev.
PURRAT98	1998 external sourcing rate	4,640	.1131	179.2	49.07	18.68
INDPUR98	1996 industry external sourcing rate	4,787	18.22	78.10	49.12	9.254
EMPLOY98	1998 number of employees	4,640	2	5,559	109.34	237.0
LABINT98	1998 turnover per employee	4,640	22.03	21,113	355.8	506.7
LOGLAB98	Log of 1998 turnover per employee	4,640	3.09	9.96	5.6165	.6353
FOREIGN	Foreign or Dutch firm	1,650	0	1	.3212	.4671
EXP98	1998 firm exports	4,640	0	4,966,985	26,949	152,116
PURCH98	1998 firm industrial purchasing	4,640	18	5,437,194	31,111	164,910
SALES98	1998 firm sales	4,640	878	6,707,354	53,041	239,432
LOGSAL98[48]	Log of 1998 firm sales	4,640	6.78	15.72	9.756	1.210

Table 5.1: descriptives for the database variables used in the analysis (key variables are in bold). For an overview of variables see table 4.37. Most data are presented as percentages. Exp98, ini98 and, sales98, are in thousands of Dutch guilders and indcon98 is a Herfindahl index[49]. Employees (wkn98) is simply the number of employees and labint98 is the turnover per employee in thousands of guilders. Loglab98 and logsal98 are logarithmic functions of labint98 and sales98. Foreign is a dummy variable, with 0 being a Dutch firm and 1 a foreign firm. The listwise valid N (firms with all data available) is 1,004. Without the country variable ('foreign') it is 3,109.

Table 1, in appendix C, presents the correlations between the key variables in the analysis. Several control variables have been omitted because of space constraints as well as the low relevance of information. Given the large number of observations it comes as no surprise that almost all correlations are significant at the .05 level and that many are in fact significant at the .01 level. However, some correlations are particularly strong, giving a first indication of possible relations. Asset specificity relates negatively to external sourcing as predicted by transaction cost logic. Furthermore larger firms and export dependent firms use more external sourcing. Industries with larger firms and more export dependent firms invest more in R&D activities. External sourcing is correlated negatively with return on sales while asset specific investments, size of the firm, being a foreign firm and R&D expenditures are correlated positively with ROS. Finally there might be some multicollinearity problems when using both the firm level and industry level measures of industrial sourcing since they have a strong correlation. With this in mind the regression analyses of these data can commence.

Return on sales (ECONPERF)
This chapter and the next three chapters will rely on statistical modelling techniques. Models will be presented mathematically representing the dependent variable (performance) on the left-hand side of the equation and the independent (explanatory) variables as on the right-

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[48] A logarithmic function is applied to sales before analysis. This is a standard procedure to overcome large size differences that disrupt the analysis since sales is exponentially distributed. If a logarithmic calculation is not applied, a few very large firms will obliviate the effects of size differences between all other firms. A similar operation would have to be applied to include purchasing or exports in the analysis, but they are not used directly.

[49] A Herfindahl index is used to describe the extent of concentration of firms within an industry. It is calculated as the sum of the squared individual market shares of all firms.

hand side. After this mathematical formulation, the outcomes of the statistical analyses will be provided. These statistical analyses show the measures ('proxies') that are used to represent the theoretical variables of the mathematical formulations. Therefore two steps are taken. First, the theoretical relations identified in chapter 3 are translated into a formal model. Second, the formal model is tested by means of regressing the measures described in chapter 4 and summarised in table 4.37 on performance.

The first model that was employed was a basic model incorporating only control variables. The reason for testing such a model is that the test can indicate whether the control variables are a useful explanation of the dependent variable. The question that is asked is essentially 'is this model better than no model'? This would be expected since control variables are added to a model with the explicit purpose of explaining part of the variance. The first model can be formulated as[50]:

$$(1) \ ROS98 = \beta_0 + \beta_1 * \log sales98 + \beta_2 * \log labint98 + \beta_3 * export \ ratio + \beta_4 * industry + \varepsilon$$

Table 2 displays the results of this model[51]. Industry dummies are not reported here nor in any of the following analyses because of space constraints and to obtain a clearer presentation. Since over 80 different industries are involved, the reports would become somewhat lengthy. As expected various industry dummies are significant in all of the analyses. Detailed industry data are available upon request. The table reveals several interesting things. First of all the model itself is strongly significant with an F-value of 8.54, suggesting *this model is better than no model at all*. This is not unexpected, as control variables are included in the model because it is believed they explain part of the variance in the dependent variable. Second, the basic model has moderate explanatory value, with an *adjusted R2 of .12*. This implies it is a good model to start with but not a great model for explaining a firm's return on sales in 1998. Third, all firm level variables come out as significant. Size of the firm is positively related to ROS98. Turnover per employee is strongly positively related to ROS98. And the export level is negatively related to ROS98 in this model.

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[50] For those who are not very familiar with regression models Gujarati (1995) will form a good introduction. The simple model presented here consists of an intercept or constant β_0, several coefficients $\beta_{1......n}$ that related to explanatory variables $X_{1......n}$ and an error term ε that covers unexplained variance.

[51] In the analyses on ROS98 several firms were removed from the sample because a look at the data revealed that their reported ROS figures, such as +85% or −70% appeared incorrect due to typing errors, one time charges or other reasons.

	Stand. β	t-value	Sig.
Constant		-7.100	.000
LOGSAL98	.062	3.061	.002
EXPRAT98	-.051	-2.796	.005
LOGLABIN	.157	7.296	.000
	F-test: 8.54		.000
	R^2: .141		
	Adj. R^2: .124		

Table 5.2: basic model for explaining ROS98[52]. N = 4,625. Included variables are size of the firm, export intensity and productivity.

After reviewing these results the key independent variable of this analysis, external sourcing, can be added to the model. This leads to the following formula:

(2) $ROS98 = \beta_0 + \beta_1 * \log sales98 + \beta_2 * \log labint98 + \beta_3 * export ratio + \beta_4 * industry + \beta_5 * purrat98 + \varepsilon$

Table 3 reports the results of this next analysis. The model as a whole, which was already significant, has now become stronger with an F value of just over 21. Also, the explanatory value of the model, the adjusted R^2, has risen to *.28*, more than double the basic model. There is strong evidence for a negative relation between external sourcing and ROS in this analysis. *External sourcing comes out as the single most important explanation for ROS in the model*, with a t-value of close to 30, and the model as a whole improves with the inclusion of external sourcing. Also noteworthy is that the effect of size of the firm becomes stronger, while the effect of exports becomes insignificant. Thus in this more advanced model export intensity is not an explanation for performance of the firm anymore.

	Stand. β	t-value	Sig.
Constant		-14.374	.000
LOGSAL98	.082	4.184	.000
EXPRAT98	-.025	-1.554	.120
LOGLABIN	.429	20.247	.000
PURRAT98	-.526	-30.862	.000
	F-test: 21.03		.000
	R^2: .290		
	Adj. R^2: .276		

Table 5.3: model for explaining ROS98 incorporating external sourcing. N = 4,625.

Knowing that external sourcing appears to be an important variable in explaining ROS, it then becomes interesting to add further moderating variables. The general model that is tested has the following shape:

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[52] Again for space constraints and to simplify the tables, the unstandardised Betas and standard errors are not reported here. They are available upon request.

(3) $ROS98 = \beta_0 + \beta_1 * \log sales98 + \beta_2 * \log labint98 + \beta_3 * export\ ratio + \beta_4 * industry + \beta_5 * purrat98 + \beta_6 * moderator + \beta_7 * purrat98 * moderator + \varepsilon$

where 'moderator' is one of the moderating variables discussed in chapter 3. At this point a slight econometric problem is faced. Some of the moderating variables are based on industry level data, for instance asset specificity. Introducing these variables into the previous statistical models will cause a perfect correlation with the industry dummies. This implies that SPSS is unable to process them in the analysis and will throw out these moderating variables. There are three simple solutions to this problem. The first solution would be to leave out the industry dummies and only use the moderating variables. This is not an ideal solution because a large part of the explanatory value currently attached to the model will be lost. So far the industry dummies have included any industry level effects on performance, including industry level asset specificity, industry level R & D and others. If the dummies are replaced by the moderating variables only a part of the industry level effects will remain. Theoretically there are reasons to believe that average firm performance will differ between industries, depending on the industry's characteristics (see for example the five forces model of Porter, 1980). A second solution would be to not use the moderating variables themselves and just use the interaction between the moderators and external sourcing. This is econometrically viable but it is somewhat unusual in empirical research to only test the interaction effect without including any possible direct effects of the moderator. The reason it is unusual is that is impossible to tell whether the interaction effect between the moderator and the independent variable is in fact larger than the effect of the moderating variable itself. A third solution is to standardise the dependent variable through its industry value and then leave out the industry dummies. This simply implies that the average industry ROS is subtracted from a firm's ROS. This standardised ROS value then becomes the dependent variable. Once this has been done moderating variables can be entered without causing any econometric problem. Obviously after standardisation it is necessary to look at the model from equation 2 again before running models from equation 3. This, however, showed that the model became much weaker with the explanatory value being halved, implying the model is statistically less useful and can not be compared to any of the other models presented here. The reason this occurs is because inter-firm variances in performance are artificially suppressed by standardisation.

All three of these solutions were attempted to find a correct model. In fact, a combination of solutions appeared to provide the best results. It is unfortunate that industry level effects and variables based on industry can not be tested simultaneously. The model that was tested in equation 2 holds up strongly without including industry dummies. This does not imply that industry effects are not important or that the best model is obtained without using industry variables, but simply that even without accounting for industry the model is helpful to explain firm performance. Again as in previous models, *the external sourcing and productivity variables are the best performing variables* in the model.

Furthermore it appeared impossible to include both the industry level variables of asset specificity or R & D and the interactions between these variables and external sourcing. If this was attempted severe multicollinearity problems were introduced. Multicollinearity problems occur when variables are strongly correlated or more generally when an independent variable can to a large extent be explained by other independent variables in the model. The problem they cause is that the Betas predicted by the analysis become less reliable, implying

that the value that is found could be any other value. Thus the outcomes can not be trusted. Multicollinearity is detected by looking at the one-by-one correlations among dependent variables and by looking at variance inflation factor (VIF) scores. VIF values for independent variables are calculated by regressing all other independent variables on this independent variable. The VIF value is the 1 minus the R^2 of this regression analysis.

Two basic strategies exist for such a problem. First, it is possible to combine variables in a single factor. In this study, this is *theoretically undesirable*. Second, one or more variables can be omitted from the analyses. Multicollinearity is a problem with the industry level interaction variables. Since the variance in external sourcing within industries was limited relative to the variance in the industry level indicators, the interaction variables tended to correlate strongly with the industry level variables, including correlations of over .90. These correlations can be found in table 3 of appendix C. Thus *separate analyses were made including only the industry level variables or only the interaction variables with industry dummies*. These analyses are shown in two separate tables.

The first table, table 4, shows three models, one that includes the base variables without industry dummies, one that includes base variables and the moderating variables without industries and finally an optimised version of this second model. This version excludes insignificant variables from the analysis. These were dropped one by one based on their contribution to the model in terms of their significance level. As in previous analyses, the external sourcing and labour intensity variables are found to be important explanations of ROS. The sales variable is also positively related to ROS, as are R & D expenditures. The R & D expenditures variable is only moderately significant. This, however, may be caused by the fact that industry level measures are used here and not firm level measures.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
Constant		-13.964	.000		-1.500	.134		-12.685	.000
LOGSAL98	.078	4.030	.000	.047	1.298	.195	.063	2.964	.003
EXPRAT98	-.008	-.539	.590	.034	1.055	.292			
LOGLABIN	.395	19.671	.000	.287	7.770	.000	.403	17.606	.000
PURRAT98	-.544	-35.294	.000	-.576	-17.706	.000	-.572	-32.004	.000
UNCERTA				-.037	-1.333	.183			
FOREIGN				.007	.225	.822			
RNDINTEN				.026	.881	.378	.029	1.909	.056
ASSSPEC				-.016	-.549	.583			
	F-test: 349.091		.000	F-test: 46.975		.000	F-test: 282.557		.000
	R^2: 232			R^2: 275			R^2: 251		
	Adj. R^2: .231			Adj. R^2: .269			Adj. R^2: .250		
Notes	No industry dummies			No industry dummies			No industry dummies		

Table 5.4: hierarchical regression models for explaining ROS98 incorporating external sourcing and various moderating variables. N = 4,625 / 1,001 / 3,372[53].

[53] Obviously the exclusion of over 80 industry dummy variables will raise the value of adjusted R^2 compared to R^2 significantly since the adjustment is made based on the number of variables. It also raises the value of the F-test since the explained sum of squares is divided over the number of variables used minus 1. Also take note that the sample size changes radically once foreignness is included and also when R & D expenditures are included. Several tests were ran to establish whether this altered the relation between variables, which it did not. It does, however, limit the statistical power of the tests,

The next table, table 5, does not include the moderating variables but instead includes the interactions between the moderating variables and external sourcing[54]. In these models the interaction effects are run one at a time. Unfortunately problems of multicollinearity prevented running the third and the fourth model with both external sourcing and the interaction effect between external sourcing and R & D expenditures and asset specificity respectively. Tolerance values dropped as low as .08 and 10 in these equations. Therefore the model was run without external sourcing[55]. The expected negative values are found for both the uncertainty and asset specificity interactions. For the R & D interaction a positive but not significant effect was found, while an unexpected moderately positive effect was found for the foreignness interaction.

	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.
Constant		-13.837	.000		-2.162	.031		-7.482	.000		-13.311	.000
LOGSAL98	.078	3.972	.000	.075	2.566	.010	.059	2.441	.015	.083	3.914	.000
EXPRAT98	-.022	-1.368	.171	.022	.798	.425	-.037	-1.903	.057	-.039	-2.291	.022
LOGLABIN	.425	19.963	.000	.264	8.181	.000	.228	9.422	.000	.365	16.280	.000
PURRAT98	-.517	-29.373	.000	-.513	-18.921	.000						
PURRAT98 X UNCERTA	-.029	-2.212	.027									
PURRAT98 X FOREIGN				.044	1.850	.065						
PURRAT98 X RNDINTEN							-.565	-14.316	.000			
PURRAT98 X ASSSPEC										-.560	-26.455	.000
	F-test: 20.871		.000	F-test: 9.506		.000	F-test:14.018		.000	F-test: 21.981		.000
	R^2: .291			R^2: .353			R^2: .194			R^2: .254		
	Adj. R^2: .277			Adj. R^2: .316			Adj. R^2: .180			Adj. R^2: .243		
Notes	Industry dummies			Industry dummies			Industry dummies			Industry dummies		

Table 5.5: hierarchical regression models for explaining ROS98 incorporating external sourcing and various interaction effects[56]. N = 4,625 / 1,583 / 3,372 / 4,193.

which explains some of the drops in significance in the second model. In particular the logsales variables lose significance.

[54] As discussed above one alternative method of running these regressions with interactions that is sometimes suggested is to include all variables and simply accept the multicollinearity. This, however, makes interpretations of βs impossible, forcing interpretations of changes in adjusted R^2. Throughout this study this method was executed as well, leading to similar results in terms of the signs of interaction variables, although significance levels may have varied in either direction. Thus the current method is supported by these analyses (available upon request).

[55] When running the fourth model with both variables there was also a negative sign associated with the interaction but it did not come out significantly, which appears to be due to the aforementioned multicollinearity problems. In the third model there was a positive but not significant sign associated with the interaction effect. The probable cause of the multicollinearity is not just the correlation between external sourcing and these two interaction variables but also the industry effects that were used in the models.

[56] As pointed out by Masaaki Kotabe in a comment on an earlier version, one other intervening variable that could explain the negative relation between external sourcing and financial performance is industry,

Chapter 5

Possible problems with the regression analyses
There are several important assumptions underlying regression analysis. If one, a few or all of these assumptions are violated this can considerably lower the reliability of outcomes or make regression analysis impossible to use altogether. Thus it is necessary to conduct various procedures to prove that results are reliable.

The following support was gathered for viewing the regression assumptions as unproblematic in the analyses:

- The dependent variable, ROS98 is more or less normally distributed, though somewhat skewed.
- Inspection of residuals from the analysis did not reveal major departures from normality.
- Visual inspection of partial plots of the dependent variable and the key independent variables did not reveal heteroskedasticity.
- Durbin-Watson tests produced figures close to 2, meaning no serial correlation (autocorrelation) is found among the residuals.
- None of the variables in the models presented here have tolerances that approach 0 (values range from 0.3 upwards), implying multicollinearity is not a problem in the models presented here.

Market share (STRATPERF)
As the analysis on market share is performed, an immediate problem emerges in that market share is not a normally distributed variable. Not only is it truncated on the left and right side (it is not possible to have a market share of less than 0 or more than 1) but more importantly most firms have a market share close to 0 and only very few have a large market share. Thus the distribution of the market share variable is exponential. A variable that is clearly exponentially distributed can not be used in a normal regression procedure. This implies that the variable had to be normalised, for which it is necessary to calculate the logarithm of the market share. After this was done the variable 'logmarsh' that was obtained indeed showed a close to normal pattern. However, more restrictions appear. Since market share is calculated as size over industry sales the dependent variable is perfectly explained ($R^2 = 1$) when both size of the firm and industry dummies are included. Furthermore it is inappropriate to control for size of the firm when explaining the relative size of the firm (market share). Thus the size measure was excluded from further analysis. Even without the size variable the models with industry dummies would score very high in terms of R^2 (.73 and higher). This is obvious: once a dummy is included that represents a linearly correlated measure of average market share,

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given the product life cycle considerations (Vernon, 1979) discussed earlier. A test that included the interaction between external sourcing and industry was conducted. This test revealed that the interaction effect itself is not really substantial, although including the industry level of sourcing in combination with the firm level of sourcing does add to the R^2 of the equation. See also Mol and Gedajlovic (2001) for a confirmation of these findings and the end of this chapter for a more detailed discussion.

most of the variance in market share between firms is already explained. Furthermore this also tends to dilute the effects of variables other than industry. The problem that arises is twofold. First we explain what we already know, that in an industry where average market shares are low, most firms' market shares will be low. And second that all other effects, which are the effects we actually seek to explain, will disappear because they your marginal compared to the industry effects. A final consideration is that this study does not seek to blindly increase R^2 of the analyses.

However, it would also be inappropriate not to include any industry level control in the analyses. Therefore a moderate version of industry was included, the industry concentration ratio. This ratio is calculated as the sum of the squared market shares of all firms in an industry, also known as a Herfindahl index. This does represent the industry well in the sense that it will keep check of the distribution of market shares in the industry. Since this is also an exponential function with most industries being densely concentrated and a few not, a logarithmic function is again applied to obtain 'logindco'. The following model results, which runs parallel to equation 1 but is slightly different given the modifications that were needed:

$$(4)\ Logmarsh = \beta_0 + \beta_1 * logindco + \beta_2 * log\ labint98 + \beta_3 * export\ ratio + \varepsilon$$

Now the analysis can begin. Please note that all the analyses are still limited to the year 1998. Table 6 reports the analyses for the basic model. The table shows that as expected industry concentration relates positively to a firm's market share. Furthermore, more productive and more export intensive firms also have a larger market share. This is also to be expected.

	Stand. β	t-value	Sig.
Constant		-43.943	.000
LOGINDCO	.170	14.250	.000
LOGLABINT	.413	36.207	.000
EXPRAT98	.368	31.925	.000
	F-test: 1210.1[57]		.000
	R^2: .439		
	Adj. R^2: .439		

Table 5.6: basic model for explaining logged market share. N = 4,640.

As before, the model is now extended to include external sourcing, obtaining an equation that combines equations 2 and 4. The results of this analysis are shown in table 7. Unlike in the regression analyses that were used to estimate ROS, external sourcing does not have a strong influence in analyses to estimate market share of the firm. In fact, its t-value is far lower than that of any of the other predictors in the model. Also, including external sourcing does not add much to the model in terms of explanatory value.

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[57] Please note that F-tests of these models are much higher than for ROS models, primarily because another way of controlling for industry has been chosen. With industry dummies, the number of variables included in the analyses was close to 100, here it is only 4.

	Stand. β	t-value	Sig.
Constant		-41.495	.000
LOGINDCO	.416	36.408	.000
LOGLABINT	.343	25.431	.000
EXPRAT98	.168	14.067	.000
PURRAT98	.048	3.645	.000
	F-test: 913.3		.000
	R^2: .441		
	Adj. R^2: .440		

Table 5.7: basic model for explaining logged market
share including external sourcing. N = 4,640.

Now the moderators and interaction effects will again be included in the analyses, combining equations 3 and 4, in table 8. Here similar problems arise with multicollinearity as in the ROS analyses and the same solution was chosen to first present the moderating variables separately and to then present the interaction variables. The first table incorporates the results with the moderator variables only. The first model includes all variables while the second model results after optimisation efforts. As can be witnessed from the first model, outsourcing remains positively related to market share but this relation loses its significance. This confirms that the relation is rather weak. Another finding from both models is that foreign firms have larger market shares (as expected) and that firms coping with uncertainty have smaller market shares. This is as expected as large firms usually produce a more consistent turnover over time. Finally, being in an in industry with large specific investments and many R & D activities is also a negative predictor for market share.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		-9.604	.000		-9.661	.000
LOGINDCO	.507	17.669	.000	.504	17.680	.000
LOGLABIN	.193	6.778	.000	.206	8.079	.000
EXPRAT98	.224	7.978	.000	.227	8.133	.000
PURRAT98	.028	.961	.337			
FIRMUNCE	-.057	-2.334	.020	-.057	-2.333	.020
ASSPEC98	-.069	-2.609	.009	-.077	-3.077	.002
RNDINT98	-.339	-11.636	.000	-.341	-11.747	.000
FOREIGN	.066	2.492	.013	.064	2.417	.016
	F-test: 84.345		.000	F-test: 96.270		.000
	R^2: .403			R^2: .403		
	Adj. R^2: .398			Adj. R^2: .398		

Table 5.8: extended model for explaining logged market share including
external sourcing and moderator variables. N = 1,008 / 1,008[58].

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[58] Again note that including foreignness decreases the sample size by a factor 4. Similar results emerged from an analysis that did not include foreignness. All the signs are the same in that model. External sourcing is barely slightly significant (7.1%) with a positive sign, implying that it is mostly sample size that induces significance and confirming the weakly positive relation between external sourcing and market share reported earlier.

In the next table, table 9, the results of the models incorporating the interaction effects are shown. The interactions with both R & D expenditures and uncertainty have the expected negative sign and are significant. As in the ROS regressions, foreignness shows a positive and given the sample size moderately significant sign. The interaction with asset specificity does not come out as significant. In fact, in both the second and fourth models the external sourcing variable again loses its significance, confirming the previous conclusion of a weak relation[59].

	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.
Constant		-40.145	.000		-12.842	.000		-33.268	.000		-43.191	.000
LOGSAL98	.416	36.515	.000	.389	17.650	.000	.556	42.131	.000	.357	29.218	.000
EXPRAT98	.330	24.159	.000	.193	8.131	.000	.275	18.660	.000	.389	27.118	.000
LOGLABIN	.173	14.516	.000	.164	7.174	.000	.203	15.292	.000	.173	13.693	.000
PURRAT98	.064	4.743	.000	.036	1.558	.119	.126	8.603	.000	.018	1.172	.241
PURRAT98 X UNCERTA	-.058	-5.103	.000									
PURRAT98 X FOREIGN				.049	2.219	.027						
PURRAT98 X RNDINTEN							-.230	-16.655	.000			
PURRAT98 X ASSSPEC										.016	1.170	.242
	F-test: 739.786		.000	F-test: 144.6		.000	F-test: 705.2		.000	F-test: 648.6		.000
	R^2: .444			R^2: .313			R^2: .511			R^2: .436		
	Adj. R^2: .443			Adj. R^2: .311			Adj. R^2: .510			Adj. R^2: .435		

Table 5.9: hierarchical regression models for explaining logged market share incorporating external sourcing and various interaction effects. N = 4,640 / 1,591 / 3,383 / 4,208[60].

Possible problems with the regression analyses
There are several important assumptions underlying regression analysis. If one, a few or all of these assumptions are violated this can considerably lower the reliability of outcomes or make regression analysis impossible to use altogether. Thus it is necessary to conduct various procedures to prove that results are reliable.

The following support was gathered for viewing the regression assumptions as unproblematic in the analyses:

- The dependent variable, logmarsha, is more or less normally distributed.

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[59] As with economic performance the possibility of an industry level interaction was tested to look at product life cycle and alternative industry level explanations. Including the industry level sourcing as an intervening variable did not yield a substantially different result: the moderately positive relation between external sourcing and logged market share remained. So perhaps this variable alters the size of the main effect but there is no evidence it alters its direction.

[60] Note that in this analysis it was possible to include external sourcing when measuring the effects of a asset specificity and R & D expenditures because the industry dummies are missing that together with external sourcing caused multicollinearity.

- Inspection of residuals from the analysis did not reveal major departures from normality.
- Visual inspection of partial plots of the dependent variable and the key independent variables did not reveal heteroskedasticity.
- Durbin-Watson tests produced figures close to 2, meaning no serial correlation (autocorrelation) is found among the residuals.
- None of the variables in the models presented here have tolerances that approach 0 (values range from 0.3 upwards), implying multicollinearity is not a problem in the models presented here.

Evidence for time lags

All of the above analyses are based on the assumption that external sourcing will have an immediate impact on a firm's performance. That is, on the assumption that there is no time lag between behaviour and the related outcome. This may be a questionable assumption. At least it is an assumption that can be questioned with these same data since the external sourcing measure is available for multiple years (1993 through 1998). Table 2 in appendix C reports the correlations between the various years for this measure. As expected these correlations are high. Also noteworthy is that the correlations are highest between neighbouring years throughout the table. This implies that external sourcing strategies are reasonably consistent over time for the sample as a whole.

In order to test whether there is a time lag between external sourcing and ROS the exact same models were ran substituting purrat98 by purrat97 or purrat96[61]. If the model from formula 2 is applied, purrat97 or purrat96 have a lower explanatory value than purrat98. This implies that the effects that were found are strongest when using external sourcing data from the same year as ROS data. Also, the model itself loses explanatory value (R^2 decreases) and the model fit F becomes worse. This is even more true for using the 1996 measure than it is for using the 1997 measure. After that another model was ran to determine whether including both the 1997 and 1998 measures would alter the model. Doing this improved the explanatory value of the model, as the adjusted R^2 for this model was .29 as well as the model fit, since the F value rose to 22.3. However, this model already seemed to generate some minor problems of multicollinearity, since tolerance values for purrat97 and purrat98 dropped to .23 and .24. In this model there was a negative relation between external sourcing and ROS98 for both 1997 and 1998. The effect was larger for 1998 than for 1997. As this analysis was expanded further to include the 1996 external sourcing measure, no model improvement was obtained. The purrat96 variable was also negatively related to RO98 but barely significant. Furthermore the problems of multicollinearity increased as tolerance values dropped as low as .18. Thus it seems that there are some spillover effects from one year to another but *most ROS effects of external sourcing occur within the same year*.

When these analyses were performed for the market share analysis a slightly different picture emerged. Substituting the level of external sourcing in 1998 by that in previous years

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[61] Most model data are not reported here but are available upon request. Obviously some of the underlying correlations are slightly different from one year to another but no relation seems to change much. The number of firms changes between years but not by much. Neither of these effects appears to influence the essence of the analysis.

actually increase explanatory power. This effect became strongest in 1995 and then decreased again. This implies that the level of external sourcing in 1995 is a better predictor of market share in 1998 than the level of external sourcing in 1998. Thus the positive effects of external sourcing on market share appear to be lagged 3 years. These results seem to *confirm that achieving strategic performance will take longer than achieving economic performance.* Including multiple years of the external sourcing variable confirmed the large explanatory value of the 1995 variable. Interestingly, in some of these models other years of data (mostly 1993), actually took on a negative, significant value. This is indirect evidence that over an even longer-term period, 5 years, external sourcing again has a negative impact on market share. The size of this 5-year effect was quite limited compared to some of the other variables, although almost as large as the positive effect of the 1995 variable. In the case of market share spillover effects from one year to the other appear to be more important.

5.2　　Findings from the database

These analyses support several interesting observations. The models that were tested to account for return on sales proved to be *quite strong both in terms of model fit and explanatory value.* In these models there were few econometric problems, although some limitations were posed on the analyses by the fact that certain variables, like asset specificity and R & D, were only available at the industry level. The models that were tested to assess effects of sourcing on market share were also quite strong although the effect of sourcing was one of the weaker effects.

Strong support for several hypotheses

Hypothesis 1b, of a negative relation between external sourcing and economic performance, was strongly supported throughout the analyses[62]. This also implies that hypothesis 1a, a positive relation, is refuted. Hypothesis 2 of a negative relation between external sourcing and strategic performance was refuted. In fact, some evidence was found for the opposite effect of external sourcing having a positive effect on market share, at least in the longer run. Strongly supported in the ROS regressions were hypotheses 7, 8, and 9. Hypotheses 8 and 9 were also confirmed in the market share regressions. Hypothesis 7 was insignificant in these analyses. Hypothesis 10 was not only refuted but in fact an opposite effect was found in both the ROS and market share regressions, although that was only marginally significant. In the discussion these findings will be explored further theoretically.

Furthermore there is evidence for performance effects of other variables that were not hypothesised because they were not at the centre of attention. The most important of these are size of the firm and productivity, both of which relate strongly positively to performance. That size is positively related to profitability is hardly surprising given earlier evidence, for example in the PIMS studies. Productivity, measured here as turnover per employee, also

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[62] In this chapter as well as subsequent chapters there will be many references to strong, moderate and weak effects. It is difficult to specify exactly what is a strong or weak effect. The strength of an effect relates mostly to its significance within the model. Strong effects have to be obtained from a model with a high fit and be very significant.

related positively to firm performance, whether measured as ROS or as market share. In fact, one might think of productivity as an intermediate performance measure, although not one appropriate for measuring the effects of sourcing strategy. If a firm is good at obtaining advantage from internal resources, like personnel or IT systems, this should provide a competitive advantage over other firms. This appears a likely explanation for the effect that was found. Furthermore several industry dummies were significant in various analyses, implying that the industry a firm operates in, co-determines the firm's profitability. This was expected and confirms earlier strategic management research.

There is no real evidence for effects of export intensity on ROS, at least not when other variables are included in a multiple regression analysis. The relation between export intensity and ROS swings from positive to negative and from moderately significant to totally insignificant depending on what other variables are included in the analysis. There is the expected positive link between export intensity and the firm's market share. Larger firms export more products because of saturation of domestic markets and a self-selection bias.

Finally, there is some evidence that being in an R & D intensive industry is positively related to profitability but negatively to market share. The profitability effect can best be explained by looking at the entry barriers and high concentration ratios that are created in R & D intensive industries (Porter, 1980). If much R & D activity is needed to compete, scale effects increase and larger firms will be most competitive. Because R & D activity is path dependent, R & D investments will create exit barriers as these investments can not be fully employed elsewhere. It will be increasingly difficult for new entrants to join the industry. This will decrease competition and increase average industry profitability (Porter, 1980). This may not be the case for new and emerging industries like biotechnology, but those industries are only a very limited part of this sample. The negative effect of R & D on market share might have to do with the fact that market share is dependent upon the industry a firm operates in and R & D is also an industry level indicator. Asset specificity and R & D intensity of an industry may very well be positively related to the size of the industry, which again determines the number of firms and average market shares. In larger industries more firms operate. Finally, uncertainty is negatively related to market share, which appears to be a 'small firm' problem. Smaller firms, which obviously have smaller market shares, experience larger swings in profitability and turnover relative to larger firms, which are usually more stable in this respect. Table 10 summarises the findings from the database.

	Economic performance (ROS)	Strategic performance (marsha)
Independent variable	• Strongly negative relation	• Moderately positive relation (not in all models)
Moderators	• Asset specificity: strongly negative interaction effect • Uncertainty: strongly negative interaction effect • R & D intensity: strongly negative interaction effect • Foreignness: moderately positive interaction effect	• Uncertainty: strongly negative interaction effect • R & D intensity: strongly negative interaction effect • Foreignness: moderately positive interaction effect

	Economic performance (ROS)	Strategic performance (marsha)
Other effects	• (Log) size is strongly positively related • (Log) productivity is strongly positively related • R & D intensity is moderately positively related • Various industry dummies are positively or negatively related	• Industry concentration is strongly positively related • (Log) productivity is strongly positively related • Export intensity is strongly positively related • R & D intensity is strongly negatively related • Asset specificity is negatively related • Uncertainty is moderately negatively related • Being a foreign firm is moderately positively related

Table 5.10: Summary of significant findings from the database.

5.3   Analysis of the survey

The survey provides another look at the same issues. The survey obviously draws on a much smaller number of firms, 200. Furthermore many of the measures are perception-based and not hard data. On the other hand, the survey also provides much more of an in-depth look at many issues since it entails variables that the database does not provide. This includes firm level data on asset specificity, innovation, and general firm strategy.

Many descriptives were already provided in chapter 4 as part of describing the survey. More descriptives are presented in table 11 and several outcomes appear worrisome. First of all standard deviations on the performance scores are low, implying there is not much difference between respondents in how they have answered the performance questions (the variance is low). Inspection of frequencies reveals that most respondents have placed their answer right in the middle of the 5-point scales, saying their performance is average. This may cause problems in the analyses since these analyses are based on explaining variance. A lack thereof frustrates efforts to find statistical relations. Second, the core question for answering the questions on external sourcing contains some odd answers. Several firms have indicated they are either 0% or 100% reliant upon external suppliers for their production. This seems strange and could indicate the question was formulated in the wrong manner. Another problem is that the alternative question that is similar to the database measure is inconsistent. The purchasing budget appears to be correctly answered given the outcomes. However, the turnover question asked for corporate turnover. Not all respondents interpreted it correctly as an analysis of well-known firms revealed. Thus an inconsistent measure has been obtained. Furthermore, in retrospect it would have been better to ask for *business unit turnover* to be able to use this as a measure of external sourcing. In later analyses these issues may cause problems. In this section the key variables in the analysis are *economic performance (FINAPERF), strategic performance (MARKPERF), firm performance (FIRMPERF). external sourcing (both PURRATSU and TOTPROCO), asset specificity (ASSETSPE), uncertainty (UNCERTAI) and firm innovation (TOTINNOV).*

Variable	Measure for	N	Minimum	Maximum	Mean	Std. Dev.
MIXSTRAT	Varying strategy	200	0	1.00	.1400	.3479
RESPJOB	Job of respondent	200	0	1.00	.5650	.4970
PURINTEG	Degree of integration	200	1.00	5.00	3.145	1.140
FIRMSTRA	Firm strategy	172	1.00	5.00	3.611	1.152
TECHUNCE	Techn. uncertainty	198	2.00	10.00	5.147	2.036
VOLUNCER	Volume uncertainty	198	2.00	10.00	5.833	1.841
FINAPERF	Financial performance	189	2.00	10.00	6.397	1.156
MARKPERF	Market performance	197	3.00	10.00	6.751	1.353
PROCINNO	Process innovation	190	0	14.00	8.511	2.891
PRODINNO	Product innovation	193	0	15.00	8.746	2.784
UNCERTAI	Total uncertainty	198	4.00	19.00	10.98	3.143
ASSETSPE	Asset specificity	197	3.00	21.00	11.25	4.332
FIRMPERF	Firm performance	189	8.00	20.00	13.14	2.081
TOTINNOV	Total innovation	189	0	29.00	17.26	5.339
PURRATSU	External sourcing	197	.03	111.11	39.22	21.21
PERCSTAN	Standardised product	197	0	100.00	47.50	34.77
TOTPROCO	External sourcing	198	0	100.00	49.98	31.66
RESPEXP	Respond. experience	200	1965.00	2001.00	1993.8	7.057
PURBUDGET	Purchasing budget	199	1,000,000	3,000,000,000	79,653,175	253,399,553
TURNOVER	Firm turnover	197	6,000,000	160,000,000,000	2,215,670,051	13,241,362,891

Table 5.11: descriptives for the survey variables used in the analysis (key variables are in bold). A description of all variables can be found in table 4.37. Please note that the variables mixed strategy and respondent's job are dummy variables. All other variables are numerical variables except purratsu, percstan and totproc, which are percentages, respexp which is a year and purbudget and turnover which are expressed in Dutch guilders. Valid listwise N (number of firms with all data) = 151.

Table 4 in appendix C gives an overview of the correlations between the variables. The various measures of firm performance are correlated in particular with innovation measures (positively) and mixed strategy (negatively). There are also positive links between financial performance and the job of the respondent as well as the percentage of standardised products being sourced. The external sourcing measure is positively linked to general firm strategy. Other links include the expected positive link between technological uncertainty and innovation and the expected negative link between mixed strategy and innovation. Furthermore as expected, asset specificity is positively correlated with innovation and negatively with the use of standard products. Then uncertainty is positively related to general firm strategy. In general the correlations between the variables in this part of the survey are not very strong.

Economic performance

The analysis again starts with a basic model that incorporates the industry, firm size, the degree to which purchasing is integrated in the firm, general firm strategy, the degree of product standardisation, respondent job, and respondent experience. Given the fact that the number of observations is limited, which limits the number of variables that can be used, and the fact that the independent variable was measured relative to industry competitors thus

reducing inter-industry differences (the measure standardises a firm's performance), industry is here measured as a threefold distinction[63]. There are firms active in process industries, firms active in traditional industries and firms active in product industries of composed products[64]. The process industry comprises food & beverages, tobacco products, paper, publishing, chemicals, rubber and plastics, basic metals, and simple metal products. The traditional industry category consists of textiles, apparel, wood products, glass products, and furniture & other products. In the product industry category are included machinery & equipment, office machinery & computers, electrical machinery, radio, television & communication equipment, medical & optical equipment, motor vehicles, and shipbuilding & bicycles. Dummies were created for each of these three categories. Given the problems described earlier with the turnover measure, size was here measured as the logarithm of the purchasing budget. The respondent's job consisted of 5 dummy variables[65]. And 6 dummies were created for firm strategy. As it turned out this still produced too large a number of variables given the sample size. Therefore firm strategy was reduced to the 4 Miles and Snow types and respondent's job was reduced to three types (top management, purchasing specialist and other). Then the following basic model was tested.

(4) $ECONPERF = \beta_0 + \beta_1 * logpursu + \beta_2 * respjob + \beta_3 * respexp + \beta_4 * industry + \beta_5 * purinteg + \beta_6 * percstan + \beta_7 * firmstra + \varepsilon$

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		6.299	.000		7.382	.000
LOGPURSU	-.167	-2.210	.028	-.142	-1.941	.054
TOPMAN	-.121	-1.418	.158	-.138	-1.844	.067
PURCHSPE	.028	.314	.754			
ANALYSER	.354	1.874	.063	.266	2.628	.009
PROSPECT	.351	1.781	.077	.238	2.383	.018
REACTOR	.096	.641	.522			
PROCINDU	.065	.522	.602			
PRODINDU	-.083	-.633	.528			
RESPEXP	.013	.167	.867			
PURINTEG	.054	.724	.470			
PERCSTAN	-.102	-1.320	.189	-.072	-.989	.324
	F-test: 1.622		.096	F-test: 2.729		.021
	R²: .094			R²: .071		
	Adj. R²: .036			Adj. R²: .045		

Table 5.12: basic model for explaining economic performance with survey data. N = 185.

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[63] With a sample size of less than 200 a rule of thumb is to use a maximum of around 15 to 20 variables in the analysis. As there are more than 20 industries involved, it is necessary to reduce this number. The threefold distinction that is used here appears to be generally accepted in production and operations management as well as in Dutch industry.
[64] As noted before there is a distinction in sourcing behaviour between these three industry types (Mol, Schreuder and Goedegebuure, 2001).
[65] There was one respondent providing the job title 'purchasing consultant'. This respondent was added to the group of respondents that provided the title 'other'.

The results of this test are presented in table 12. The test showed that the model did not come out significantly when these variables were included. This model does not significantly help in understanding economic performance of the firm. However, there are several variables in the model that come out as useful predictors of economic performance. The model was optimised to see whether these variables alone would yield a better model. The optimised model is the second model in table 12. This model is marginally significant. It mostly provides indications that firms following a differentiation strategy (analysers and prospectors) perform better. The fact that the constant is the most significant variable is not a good sign either.

The model was extended to include the effects of external sourcing similar to equation 2:

$$(5)\ \text{ECONPERF} = \beta_0 + \beta_1 * \text{logpursu} + \beta_2 * \text{respjob} + \beta_3 * \text{respexp} + \beta_4 * \text{industry} + \beta_5 * \text{purinteg} + \beta_6 * \text{percstan} + \beta_7 * \text{firmstra} + \beta_8 * \text{external sourcing} + \varepsilon$$

Actually both measures for external sourcing were tested. The question on the extent to which external suppliers carried total production costs is lined up in the first model of table 13. In the second model the purchasing rate as it was calculated in the survey was used. Both models are non-significant and both variables are non-significant within the context of these models. Again the most important predictors appear to be analyser and prospector strategies. A third model was tested that included both variables. Since the two measures are mostly uncorrelated (a .062 correlation with .386 significance level) this is possible. The third model was optimised to obtain the highest possible explanatory value (adjusted R^2). This is a reasonable model compared to previous models. In this model the percentage of total production cost carried by external suppliers is positively related to economic performance. The other external sourcing variable, purchasing rate, has the expected negative sign but is not significant. Also, size of the firm is negatively related to economic performance.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		6.512	.000		6.201	.000		7.428	.000
LOGPURSU	-.193	-2.527	.012	-.154	-1.982	.049	-.156	-2.066	.040
TOPMAN	-.145	-1.682	.094	-.107	-1.230	.221	-.137	-1.782	.077
PURCHSPE	-.007	-.076	.939	.023	.258	.797			
ANALYZER	.366	1.944	.053	.384	2.007	.046	.283	2.734	.007
PROSPECT	.343	1.751	.082	.386	1.914	.057	.228	2.241	.026
REACTOR	.090	.613	.541	.123	.810	.419			
PROCINDU	.052	.417	.677	.050	.390	.697			
PRODINDU	-.120	-.912	.363	-.093	-.698	.486			
RESPEXP	.024	.320	.749	.024	.322	.748			
PURINTEG	.038	.500	.618	.045	.603	.547			
PERCSTAN	-.115	-1.489	.138	-.112	-1.443	.151	-.091	-1.240	.216
TOTPROCO	.139	1.808	.072				.139	1.863	.064
PURRATSU				-.077	-.989	.324	-.063	-.836	.405
	F-test: 1.778		.055	F-test: 1.542		.113	F-test: 2.569		.015
	R^2: .111			R^2: .098			R^2: .094		
	Adj. R^2: .049			Adj. R^2: .035			Adj. R^2: .057		

Table 5.13: basic model for explaining economic performance with
survey data including external sourcing measures. N = 185 / 184 / 183.

As in the database analysis the analysis is now extended to include the effects of possible moderators. The following formula is used for this model:

(6) $\text{ECONPERF} = \beta_0 + \beta_1 * \text{logpursu} + \beta_2 * \text{respjob} + \beta_3 * \text{respexp} + \beta_4 * \text{industry} + \beta_5 * \text{purinteg} + \beta_6 * \text{percstan} + \beta_7 * \text{firmstra} + \beta_8 * \text{external sourcing} + \beta_9 * \text{moderator} + \beta_{10} * \text{external sourcing} * \text{moderator} + \varepsilon$

Unlike the database analysis it is possible this time to include both the moderators and the interaction variables at the same time because problems of multicollinearity are absent among these variables. Due to space constraints the only models that are reported here are those in which the moderating or interaction variable had any impact. Neither the foreignness moderator nor its interaction had any impact. The asset specificity interaction had the expected negative impact for both versions of external sourcing but this was not significant. The process and product innovation interactions with both external sourcing measures also consistently showed the predicted negative sign but also consistently did not have significant impact. The same was true for volume uncertainty. For technological uncertainty there was also a negative sign for the interaction with the percentage of production costs but a positive sign for the interaction with the purchasing rate. The model that is presented in table 14 contains only the moderating variables. This model was again obtained by optimising the adjusted R^2. It shows that product innovation has a positive impact on economic performance, along with the variables found in earlier analyses. The percentage of production costs variable has lost significance in this model.

	Stand. β	t-value	Sig.
(Constant)		6.558	.000
LOGPURSU	-.129	-1.691	.093
TOPMAN	-.133	-1.711	.089
ANALYZER	.263	2.504	.013
PROSPECT	.189	1.807	.073
PERCSTAN	-.082	-1.110	.269
PURRATSU	-.089	-1.163	.246
TOTPROCO	.119	1.578	.116
PRODINNO	.138	1.842	.067
	F-test: 2.435		.016
	R^2: .103		
	Adj. R^2: .061		

Table 5.14: extended model for explaining economic performance with survey data. N = 178.

Firm performance
The analyses that were used to assess the effects on strategic performance showed very similar results and problems to the analyses on economic performance. In fact, the problems were

even worse[66]. It seems rather useless to report all these outcomes here. However, there is another possibility to obtain extended insights into the survey results. Given the high correlation between the two types of performance in the study and the fact that only two questions were used per scale an obvious possibility was to analyse the effects on firm performance as a whole. Firm performance is obtained by cumulating the economic and strategic performance measures from the survey, which results in a 4-item scale. As was demonstrated in chapter 4 this is actually a more reliable measure than the separate performance measures. Furthermore it has the added advantage of having a larger range of data points in the dependent variable, meaning more variance can be measured.

Table 15 presents the basic model and both variants of the basic model with an external sourcing extension. The first model is described by formula 4 while the other 2 models are described by formula 5.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		5.596	.000		5.798	.000		5.452	.000
LOGPURSU	-.049	-.641	.523	-.074	-.967	.335	-.036	-.460	.646
TOPMAN	-.050	-.589	.557	-.073	-.842	.401	-.036	-.414	.679
PURCHSPE	.117	1.325	.187	.085	.943	.347	.118	1.329	.186
ANALYZER	.258	1.360	.176	.271	1.436	.153	.282	1.463	.145
PROSPECT	.293	1.481	.140	.286	1.450	.149	.327	1.615	.108
REACTOR	.022	.144	.886	.014	.092	.926	.051	.338	.736
PROCINDU	.040	.320	.750	.025	.200	.842	.026	.199	.842
PRODINDU	-.121	-.922	.358	-.158	-1.196	.233	-.135	-1.011	.313
RESPEXP	.006	.078	.938	.016	.219	.827	.009	.120	.905
INKINTEG	.019	.254	.800	.001	.014	.989	.017	.227	.821
PERCSTAN	-.005	-.058	.954	-.017	-.222	.824	-.005	-.064	.949
TOTPROCO				.144	1.868	.063			
PURRATSU							-.066	-.851	.396
	F-test: 1.494		.137	F-test: 1.649		.082	F-test: 1.382		.179
	R^2: .087			R^2: .104			R^2: .089		
	Adj. R^2: .029			Adj. R^2: .041			Adj. R^2: .025		

Table 5.15: basic model for explaining firm performance with survey data including external sourcing measures. N = 185 / 184 / 183.

The next table, table 16, presents the model with the largest explanatory value that includes moderators but not interactions. This model was developed after optimising a model with many variables. Taking into account the previous models this is a strong model with both a much higher model fit, that is significant at the highest level and a much higher adjusted R^2 of .12. The reason for this is mostly the strong link between product innovation and firm performance that was found in the survey. Reactor strategies that involve a mix of approaches are related to lower firm performance.

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[66] Results are available upon request.

	Stand. β	t-value	Sig.
(Constant)		17.114	.000
PURCHSPE	.109	1.523	.130
REACTOR	-.137	-1.918	.057
PURRATSU	-.107	-1.496	.137
TOTPROCO	.117	1.636	.104
PRODINNO	.297	3.889	.000
TECHUNCE	-.085	-1.123	.263
	F-test: 4.897		.000
	R^2: .147		
	Adj. R^2: .117		

Table 5.16: extended model for explaining firm performance with survey data. N = 178.

Finally, *interaction effects* were tested between the moderating variables and external sourcing, in table 17. As in the analyses on economic performance most interactions had the appropriate sign but were not significant. The interactions between product innovation and external sourcing caused some problems of multicollinearity. Finally, one effect did show up significantly in the model and actually increased the adjusted R^2 to .13, which is highest among all models tested in this section. This is the effect between external sourcing and asset specificity, which shows the predicted negative sign, confirming transaction cost logic. This analysis follows equation 6.

	Stand. β	t-value	Sig.
(Constant)		11.430	.000
REACTOR	-.136	-1.905	.058
PURRATSU	-.115	-1.610	.109
TOTPROCO	.487	2.420	.017
PRODINNO	.287	3.760	.000
TECHUNCE	-.080	-1.057	.292
PURCHSPE	.120	1.686	.094
ASSETSPE	.159	1.268	.206
TOTPROCO X ASSPEC	-.453	-1.954	.052
	F-test: 4.240		.000
	R^2: .167		
	Adj. R^2: .128		

Table 5.17: extended model including interaction variables for explaining firm performance with survey data. N = 178.

5.4 Findings from the survey

By now it should be clear that any findings from this part of the survey are to be looked upon with some suspicion. There are apparent measurement problems in the survey and for the most part models do not seem to work out as they should. Nevertheless several of the predicted effects were found in the data. First these problems will be discussed and then the findings from the survey will be related to the conceptual framework of this study.

Chapter 5

Measurement problems

There are problems related to the measurement of the dependent variable in this part of the survey, which can be witnessed by looking at the relatively low R^2 values of these regressions. Most respondents did not deviate from the average score, meaning there are quite a few respondents that scored 3s for both questions on economic performance or both questions on strategic performance. Thus the variance between firms may be causing the regressions to be ineffective since regression analysis seeks to explain variance between respondents. In retrospect it might have been better to pose the performance questions slightly differently. Instead of asking for a 'much lower' or 'much higher' performance vis-à-vis competitors, a 'lower' or 'higher' performance would probably have generated more variance. Few respondents in the survey chose the extreme value 5 and even fewer opted for 1. On the other hand, it seems there is enough variance to explain at least part of the performance of firms.

What is more troublesome is that there are severe problems with measurement of the key independent variable. Two measures were used that both were not completed as intended. The question 'what percentage of your production costs is currently supplied by external suppliers' was probably not well understood by respondents. Many respondents came up with values that appear quite unlikely. The second measure was designed wrongly. This measure should have been based on business unit turnover. However, respondents were asked to fill in the corporate turnover. Yet not all respondents did that. Thus *the purchasing rate measure that was calculated from the survey is both inconsistent and only partly useful*. A small test was conducted to see whether this was indeed a problem. Since analysis of the database had shown that the degree of external sourcing did not vary much between years the database values of external sourcing for 1998 were compared with the survey values (2000). These data were available for 180 firms. Then those firms that had obviously not completed the survey with business unit purchasing and business unit turnover in mind were deleted from the sample. A regression on the firm performance measure in the survey was ran for the remaining 138 firms. In this regression the negative relation between external sourcing and firm performance became much stronger and it was the most significant variable along with product innovation. Thus a better measurement of the same variables would have led to results similar to those found in the analysis of the database. In retrospect it would have been better to ask a different question in the first place.

The fact that two measures that are supposed to represent the same theoretical value are almost unrelated also suggests that at least one of the measures does not function properly, since theoretically similar measures should ideally have a strong and positive correlation. There is little that could be done to repair these faults once the survey had been returned. However, this is reason for concern over the findings in this section. In particular, there is reason to believe that the relations that were found would have been stronger with correct data. The results from the database analysis also seem to support that statement. Luckily a backup for this analysis is readily available in the form of the analysis of the database presented at the beginning of this chapter although that backup lacks some of the detailed measures that the survey presents.

Limited support for hypotheses

It is very *difficult to say whether hypothesis 1a or 1b and 2 are actually supported* by the survey data. In fact, the two measures disagree with one another as to the nature of the relation. There was partial evidence that the hypothesised negative interaction effect in hypothesis 7 on the relation between external sourcing and performance exists. No significant evidence was found in the survey data that uncertainty plays a part in explaining performance directly or through an interaction with external sourcing as was claimed in hypothesis 8. Tests were conducted for both volume uncertainty and technological uncertainty and most tests, though not all tests, came up with the predicted negative sign but it was not significant. There is no evidence in the survey data that innovation plays a significant role as an interaction variable on the external sourcing – performance relation (hypothesis 9). There is, however, substantial evidence that innovation and in particular product innovation is positively related directly to both economic and strategic performance. No significant evidence was found in the survey data that foreignness plays a part in explaining performance directly or through an interaction with external sourcing as predicted by hypothesis 10. However, the sign of the interaction variable did point in the appropriate direction. There is some support for other performance effects in the survey. Innovation, in particular product innovation is strongly positively related to both kinds of performance. Table 18 below summarises the findings.

	Economic performance	Firm performance
Independent variable	• Unclear due to measurement problem	• Unclear due to measurement problem
Moderators	• Asset specificity: no interaction effect found • Uncertainty: no interaction effect found • Innovation: no interaction effect found • Foreignness: no interaction effect found	• Asset specificity: negative interaction effect found • Uncertainty: no interaction effect found • Innovation: no interaction effect found • Foreignness: no interaction effect found
Other effects	• Product innovation is positively related • (Relatively) market leading strategy is positively related	• Product innovation is strongly positively related • (Relatively) market leading strategy is positively related

Table 5.18: Summary of findings from the survey.

5.5   Discussion

The more a firm sources from outside suppliers the less profitable it is. There are several possible explanations for this finding, which seems unexpected given the managerial logic of the 1990s. First there may be explanations concerned with the *nature of measurement of profitability*. It could be that firms are actually not trying to increase their return on sales but their return on investment. Since investment data are not available it was impossible to test directly whether this is the case. However, it is generally known that return on investment and return on equity measures are externally imposed measures by financiers such as shareholders and banks. These external providers of capital more or less tend to normalise their demands across industries. They demand equal returns on investment from firms in various industries. Obviously this is not completely true given the different risk profiles of firms and industries. If risks are higher, then so will the demand returns. But in the present sample there is little

reason to believe there are large differences in risks. Why would one expect much higher or much lower risks for firms that manufacture food products than for firms that manufacture metal products? If new services and start-up firms, particularly of the dot.com type, would be included this would be a different story. Given the fact that the industries in the sample are more or less similar in terms of ROI and that industry level effects were controlled for in the analyses it seems reasonable to pose that measurement is not the core explanation of the findings. Additional analysis showed that the negative external sourcing – profitability relation holds within industries implying such inter-industry differences in the ROS – ROI relation are not a prominent part of the explanation.

A second possible explanation could be in *reversed causality*. What if firms that perform worse tend to outsource more? This is an interesting explanation that is probably partly the basis for the findings. If certain activities are not performed well within the firm, which will show in its ROS figures, the firm may decide to outsource them. At first sight this is an easy way to get rid of problems. However, these problems are likely to persist since the firm lacks management capability in one way or the other. The management of external suppliers will usually be more difficult than that of internal activities, given the lack of authority incentives (Hennart, 1993). Since the price mechanism is a more important source of governance for external suppliers than it is internally, steering will be based primarily on output and not on processes (Hennart, 1993). The consequence will be that the firm loses its grip of what is happening even more. This runs counter to much of the support that outsourcing has received from people in business, especially consultants. They predict a positive relation, which is far from the empirical truth as it was found here. Moreover the evidence that external sourcing and ROS are negatively related holds over time. In the panel data study mentioned earlier (Mol & Gedajlovic, 2001) year-to-year dummies are not significant, meaning temporary explanations of ROS involving the level of external sourcing among industries are not appropriate. Therefore there is enough reason to believe that reversed causality is certainly not the only explanation for the negative relation, although it is probably a partial explanation. In future research it would be of interest to look into this reversed causality argument more, using other models.

A third and quite viable argument may be that *firms do not have enough insight* into the effects of sourcing on ROS within their own firm. This would explain why firms choose a non-optimal level of external sourcing. Given the quite complicated link between sourcing and ROS that was discussed in chapter 3 in particular, it may be difficult for decision makers to judge whether their overall portfolio of sourcing consists of too little, enough or too much outsourcing. It will be difficult to compare the consequences of internal and external sourcing given difficulties in a) predicting future outcomes, b) the additional transaction costs involved in incomplete contracting, c) aggregating information from a wide range of continuously changing sourcing decisions, d) obtaining information about competitors' behaviours, e) comparing the firm's sourcing strategy - profitability relation with that of competitors given differences in the structure and overall strategy of firms. Therefore it is quite likely that firms are unable to judge the effects of outsourcing on profitability.

A fourth and complementary explanation, is that within industries it is possible to discern *bandwagon effects or isomorphism* (DiMaggio & Powell, 1983). This would imply that there is pressure from the institutional field to increase outsourcing, not knowing this will decrease performance. Throughout the last 20 years, but mostly since the early 1990s, firms in

the Netherlands have been exposed to 'core business' arguments. An often heard riddle from consultants (KPMG, 1994) as well as some academics was that in order to concentrate on the core business or core competencies a firm would have to disengage from activities, both horizontally and vertically. It was suggested that increased focus, by reducing the number of different business lines, would increase performance. Furthermore it was suggested that supply chains should be divided into more separate elements because co-operation would occur across the supply chain (Chesbrough and Teece, 1996). This implied vertical de-integration through outsourcing and increased responsibilities for suppliers. In retrospect it now seems this was ill advice and companies that blindly took this advice may have harmed themselves. Perhaps it is also true that suppliers are unable to handle these increased responsibilities, which will be a topic of further investigation in chapter 6.

Finally, one might turn to missing interaction effects as a possible explanation for the negative relation between external sourcing and economic performance. The interaction between industry and the sourcing-performance relation was tested separately since such an effect would be a prime candidate. For example it has been suggested that the stage of the product life cycle an industry operates in influences the effectiveness of certain sourcing patterns (Kotabe 1992, who quotes Vernon, 1979). In later stages of the product life cycle profit margins tend to erode as products basically become commodities. When products are commodities, it becomes easier to outsource components as the asset specificity decreases. Therefore the negative relation could also be caused by the fact that those industries in which outsourcing is dominant are also the industries in which profitability is low. This line of reasoning was tested here (also in Mol and Gedajlovic, 2001) and it appeared that there may be such an effect but this effect is not such that it reduces the negative relation found here. Thus the PLC argument may contain some truth but is certainly not strong enough to explain the outcomes.

Firms that outsource more seem to be able to gain some market share, particularly after a few years. However, over an even longer time period, the effects might become negative. The sizes of these effects are limited but they do exist. This was contrary to expectations since the predicted sign was negative. Several possible explanations come to mind. Perhaps firms are able through outsourcing to free up resources that they can utilise to accelerate growth. In the Netherlands a fairly stringent firing policy exists, meaning that people can not so easily be fired even after an activity has been outsourced. Firms might re-employ these people elsewhere in the firm to obtain additional sales growth. Another type of resource that is freed could be research and development capacity. As a firm no longer uses certain technologies, it will have to develop less internally and perhaps this benefits other areas of development, which will lead to better products and more market share in the long run.

A second argument is that the activities that were outsourced by manufacturing firms in the Netherlands over the time period investigated are really non-core activities that do not lead to breaking of intra-firm linkages. This would imply that hypothesis 2 was incorrect in its suspicion of loss of internal capacity and that the benefits of integration are simply not there. This is obviously an argument that needs further research, probably of a qualitative nature. The argument that outsourcing concerned mostly non-core activities for these firms does appear to be partly true for the period before 1993 (De Wit et al, 1998).

Thirdly, it could be that co-operation with external suppliers is indeed an effective means to improve the attractiveness of products in the marketplace, even though these products come at a higher production cost. Perhaps joint work with suppliers does indeed lead to innovative combinations that increase the value of products (Dyer & Singh, 1998). This could explain that with the increase in external sourcing, firms are able to consolidate or slightly improve their market share. Chapter 6 will deal with this topic in more detail.

A fourth and very interesting option would be that the hypothesised effect does in fact occur, but over a longer time period than was investigated here. Indeed there was some indirect evidence that over a 5-year period the effects of external sourcing on market share could become negative. If this is indeed the case then the argument could be that the loss of internal capabilities does not affect firms for the first few years but only after 5 or more years. In some industries, such as the automobile industry or computers, this period more or less coincides with the period between development and termination of a product : the life cycle of a model. The argument could be that once a new product needs to be developed, firms discover their lack of development capacity. This would imply that the benefits of vertical integration are not felt until after a number of years. To truly test this hypothesis data would be needed over an even longer time period of 10 years or more.

Fifth, *the reversed causality argument applies even stronger here*. What if the firms that outsource activities are mostly the larger firms? If this is the case, market share is not a consequence of outsourcing, but outsourcing is a consequence of firm size. Large firms are more likely to benefit from scale advantages when sourcing externally, which makes outsourcing a more interesting option. Furthermore larger firms are much more likely to be scrutinised by stock markets which have dictated a focused strategy over much of the 1990s and have mostly encouraged outsourcing of activities. Furthermore large firms are likely to suffer from span of control problems. Because they already have many different activities and large numbers of people to manage, outsourcing will provide a kind of instant relief. All these arguments make it quite likely that the positive relation between outsourcing and market share found here is partly due to reversed causality.

Finally, there is an intriguing notion in the possibility of a trade-off between several types of performance. It could be that through outsourcing firms trade financial returns for market share. By giving up some internal activities they lower profitability, but can spur growth. This might be a strategy to obtain dominance in the marketplace in the longer run, which could then be translated back into profitability through monopoly power. Thus firms would be increasing horizontal dominance by lowering vertical integration. This is in fact what some of the proponents of outsourcing suggest (Quinn, 1999), although their arguments usually run through profitability and increased focus on competencies and not through market share. However, if this is really what firms in this sample are trying to do, then the effectiveness of such a strategy is doubtful at the very least. The costs incurred by sourcing externally are huge while the benefits in terms of gaining market share are quite marginal and in fact these benefits even disappear almost completely if one accounts for multiple moderating or interaction effects such as R & D and uncertainty. Firms that follow such a strategy appear to be making quite substantial investments in terms of lower profitability to obtain relatively small gains in market share. A much more effective way of increasing market share appears to be to improve a firm's productivity. Like with the economic performance

regressions, it turned out that industry level interactions (such as product life cycle explanations) did not alter the direction of the main effect.

Several other variables interact with the external sourcing – performance relation. Evidence was found that it is not good for a firm's profitability to outsource under conditions of high asset specificity, confirming hypothesis 7. This confirms expectations placed on the normative use of transaction cost economics by Masten (1993) but also predictions based on the resource based view (Barney, 1999) since it is difficult empirically in this analysis to disentangle asset specificity and the internal resource base. Essentially this implies that once firms have invested in productive capacity they are best off by deploying that productive capacity as much as possible instead of outsourcing, which would be equal to a divestment. This counters the popular notion in finance theory and stock markets, which suggests that the less a firm does internally, the more efficiently it uses its equity base. Furthermore it suggests that there are strong switching costs involved when moving from internal to external sourcing and even more so when moving from external sourcing to internal sourcing because the effectiveness of internal sourcing is dependent upon a certain threshold level of investments.

Then there was evidence of hypothesis 8 for both profitability and market share. When firms face a lot of uncertainty, in terms of profitability fluctuating over time, they are better off by internalising activities. This confirms certain earlier views (Gilley & Rasheed, 2000; Nishiguchi, 1994) and rejects or at least questions the importance of arguments by others (Semlinger, 1993). For several reasons it appears better not to outsource the uncertainty or risks a firm faces. First, as suggested before there are switching costs involved that may be difficult to recuperate. If an external supplier has to take over production, there will be set-up costs of production lines and also costs to do with quality control and so on. Furthermore terms will have to be negotiated, implying there will be new transaction costs with each switch between internal and external sourcing. And there may be a reputational mechanism at work here: firms that are known to outsource under good conditions and then terminate contracts when the market situation deteriorates may not be the most attractive customers. As Nishiguchi (1994) suggests the most respected buyers in Japan are those companies that co-operate with suppliers through thick and thin. A lack of reputation in the marketplace could affect not only the willingness of suppliers to serve a certain customer but also quality and service levels attained when supplying that customer[67]. The high transaction costs attached to the use of external suppliers in case of uncertainty outweigh the potential benefits. Therefore the use of (small) suppliers as a flexibility reservoir that is reported by Semlinger (1993) and others may turn out not to be a very effective mechanism to increase performance although outsourcing obviously has a role to fulfil in countering short-term capacity needs.

Hypothesis 9 was also confirmed in both the ROS and market share regressions, meaning that in industries that are highly R & D intensive, outsourcing is not a good mechanism to improve profitability. This confirms views on innovation forwarded by Murray et al (1995a) who base their argument on the seminal work of Buckley and Casson (1976). As firms develop a proprietary knowledge base they will seek to not only protect that from outside suppliers but also to exploit that knowledge base internally. Therefore outsourcing is not a good option under such conditions since technology will have to be transferred. This

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[67] A further example of this will be provided in a case study in chapter 6.

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may not only be difficult to do given the tacit and idiosyncratic nature of certain knowledge but may also be undesirable. There is a potential counter argument to be made based on some of the theory that is used in the next chapter. There is an increasing trend towards developing shared knowledge with suppliers. In order to develop such shared knowledge it is necessary to open up the firm's knowledge base to suppliers. Once knowledge would be shared, internal R & D spending would not be expected to be a negative moderator on the outsourcing - performance relation. It appears there are several empirical reasons why this argument is not valid in the context of this study. First, not very many manufacturing firms in the Netherlands have been able to innovate jointly with suppliers (NEVAT, 2000). Second, even in cases where joint innovation is existent it is often limited to a very small part of the supply base. Thus the extent of inter-organisational innovation is rather marginal in relation to R & D expenditures within the firm. Finally, the measure that was used in the analyses in this chapter does not include such inter-organisational innovation but is an industry level measure of R & D spending. This is a limitation in the sense that it does not allow for a distinction between intra-firm and inter-firm innovation.

Hypothesis 10 was not only refuted but an opposite effect was found meaning that foreign firms are better off using outsourcing than are Dutch firms. Although this effect is only marginally significant at 6.5% for ROS and slightly less for market share it poses an interesting puzzle. Why are foreign firms better at managing external sourcing than are domestic firms? There might be several possible explanations that need further exploring in later chapters. For one, it could be the case that foreign firms are actually not better at managing external sourcing but much worse at managing internal sourcing. That is, they are unable to build up the internal capability base that local firms have constructed and therefore they are relatively better at using external sourcing. Since there is little evidence that foreign firms perform worse overall, this may not be such a viable option. A second option would be that foreign firms somehow have more productive relations with suppliers because they are more connected or embedded. This would suggest that international reputation and fame could be important factors in explaining the effectiveness of buyer-supplier relations. Chapter 6 might shed more light on this view. Third, it could be that the local Dutch firms have become stuck in relationships with their existing suppliers that are no longer competitive. This would imply that foreign firms have a kind of newcomer advantage: they do not yet possess the history that local firms have, for the better and for the worse. Not being embedded gives them more room to operate flexibly in choosing and managing suppliers. Yet a fourth option, which complements this second option, would be that foreign firms are better able to exploit international sourcing to obtain competitive advantage. Their international sourcing network might enable them to pick the best sources all over the world, something domestic firms might not be able to do. This option will be explored further in chapter 7. For now it is difficult to provide a final answer to this question.

Chapter summary

Chapter 5 deals with the performance effects of outsourcing. It does so by using multiple regression analysis to test the hypotheses. The chapter draws upon two sources of data, the database and the survey. On the basis of the database it was established that external sourcing has increased significantly over the course of the 1990s in the Netherlands. The database

analyses further showed that there is a strongly negative relation between the extent of external sourcing and a firm's return on sales figure. It seems outsourcing is not the profitability enhancing mechanism that some academics and many consultants portray it to be. Furthermore a moderately positive relation was found between external sourcing and market share. This effect, however, is not so stable across time and relatively small in size implying that outsourcing to increase market share is not a very efficient strategy. Other than these effects, there were several moderating and control variables that showed statistically significant effects as expected by the hypotheses.

The analyses of the survey did not reveal such clear relations, as the problem with the independent (external sourcing) variable identified in chapter 4 caused contradictory and insignificant findings. Moreover the lack of variance in the dependent variable also implied that findings were not very strong. One important finding in the survey data, which confirmed the database analysis, was the positive relation between product innovation and firm performance. In the discussion section the findings were analysed.

Chapter 6: A behavioural view of supplier relations

This chapter is concerned with supplier relations and how these can be employed by firms to obtain competitive advantage. It attempts to provide insights into how supplier relations influence competitive advantage of the firm by drawing mostly upon survey data. In the first section the focus will be on the analysis of economic performance of suppliers. In the second section, the focus will shift to strategic performance of suppliers. Section three summarises the findings of these first two sections. The fourth and final section of this chapter discusses the results from the earlier sections. Various elements of supplier relations will be discussed and linked to supplier performance empirically. In doing so this chapter draws on the theoretical model presented in figure 3 in chapter 3. Figure 1 briefly repeats the theoretical model that lies behind this chapter.
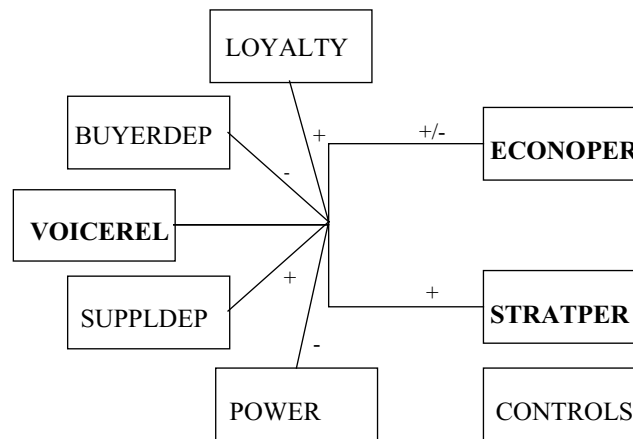
Figure 6.1: Overview of the voice relation model and its moderators.

6.1   Economic performance

Table 1 presents some descriptives of the variables from the survey. In chapter 4 some of these variables were already discussed as a part of establishing the scales. The *key variables in this section are economic performance (ECONPERF), strategic performance (STRATPERF), voice relations (VOICE), supplier power (POWER), buyer dependence(BUYERDEP), supplier dependence (SUPPDEP), trust (TRUST) and loyalty (LOYALTY).* The table shows several interesting outcomes. It appears that on the performance variables the appropriate variance has been attained. This means that performance outcomes vary among firms unlike the performance variables used in chapter 5. This should improve the effectiveness of later analyses in the sense that if there is more variance to explain, the analyses will reveal more effects. Also note that economic performance measures, with an average of 5.13 (25.64 over 5 measures) are substantially

higher than strategic performance measures at an average of 4.48 (13.44 over 3 measures). Given that these questions contain 7-point scales the 'normal' score would be 4. Obtaining economic supplier performance appears to be less problematic than strategic supplier performance.

Furthermore it is interesting to note that in this sample sourcing firms admit to being more dependent on their suppliers for their purchasing volume than suppliers are dependent on the buyers for their sales volume. This does not counter the notion of sourcing firms always being larger than their suppliers, because the survey asked for the largest supplier but the buyer that completed the survey obviously need not be the largest buyer of that supplier. When further analysis was undertaken to look at the frequencies it appeared that a very substantial group of firms believed that suppliers were only around 0 to 20% dependent on them as a buyer. At the same time a substantial group of firms admitted to being over 30% dependent on their suppliers. The fact that 28 firms were unable to answer the question: 'how dependent is your supplier on you' is something that might introduce bias and could distort the analyses, which will be a point of further discussion. Something else that this table shows is that two firms actually have a relationship with their key supplier for around 100 years now, thus surviving several generations of management and several waves of integration and outsourcing. Obviously for this to occur special conditions are required like very high switching costs in the form of high transportation costs or specialised knowledge.

Variable	Measure for	N	Range	Minimum	Maximum	Mean	Std. Dev.
DEFENDER	No innovation strategy	200	1.00	.00	1.00	.045	.2078
TOPMAN	Top management	200	1.00	.00	1.00	.085	.2796
REACTOR	Low innovation strategy	200	1.00	.00	1.00	.140	.3479
OTHERJOB	Other job	200	1.00	.00	1.00	.175	.3809
ANALYZER	Medium innovation strategy	200	1.00	.00	1.00	.320	.4676
PROSPECT	High innovation strategy	200	1.00	.00	1.00	.495	.5012
PURCHSPE	Purchasing specialist	200	1.00	.00	1.00	.740	.4397
RELGROWT	Growth of relation	199	8.00	2.00	10.00	7.171	1.525
LOYALTY	Loyalty towards supplier	199	11.00	4.00	15.00	11.70	2.240
VOICEREL	Voice relation with supplier	200	11.00	4.00	15.00	11.71	2.275
POWER	Supplier power	198	17.00	3.00	20.00	12.40	3.583
STRATPERF	Strategic performance	191	15.00	5.00	20.00	13.44	3.079
TRUST	Trust in supplier	199	15.00	5.00	20.00	14.51	2.935
BUYERDEP	Dependence on buyer	172	94.99	.01	95.00	15.41	18.34
RELLENGTH	Lenth of relation	200	99.50	.50	100.00	15.87	13.84
ECONPERF	Economic performance	200	22.00	13.00	35.00	25.64	4.819
SUPPLDEP	Dependence on supplier	199	99.50	.50	100.00	32.06	25.13

Table 6.1: Descriptives of the variables used in the analysis (key variables in bold)[68]. Table 4.37 contains an overview of all variables. The listwise valid N = 165.

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[68] As discussed in chapter 4 there are sometimes multiple possibilities for the scales to be summated. For all the variables for which there were multiple possible scales the widest viable and theoretically most inclusive solution has now been chosen meaning the econperf measure shown here contains 5 items and not 4. This also concerns the measures for power, stratperf, loyalty and trust. When later analyses deviate from these wide measures, a remark will be made.

A behavioural view of supplier relations

The next analysis that was performed concerned the bivariate correlations between variables. As before these correlations have been added to appendix C, table 5. Various strong correlations exist. *Both long-term and short-term supplier performance relate strongly positively to voice, trust, loyalty, and relational growth*. This provides a first indication that in order to have high supplier satisfaction voice, trust and loyalty must be present in some form. As expected there are also positive correlations among voice, trust and loyalty. These seem to be mechanisms that reinforce each other. Power relates negatively to both performance measures, which also seems to confirm the hypotheses in chapter 3. Relational growth is another measure that is positively connected to these measures indicating that relations that are improved over time perform better. Power is related negatively to these other measures, confirming it is a countervailing mechanism. Its working is opposite to that of the relation building mechanisms. Buyer and supplier dependence appear to be linked weakly to some other measures. Buyer dependence is related negatively to economic performance and positively to loyalty and relational growth. Supplier dependence is only related positively to relational growth, which appears at odds with some predictions. Finally it is interesting to note that the length of the relation appears to almost completely unconnected to all other measures, which would suggest that it does not matter much how long a buyer and supplier have been working together. All of these effects will be explored further in the regression analyses.

Economic performance at the level of a supplier as it was defined in chapters 3 and 4, includes five elements. These five elements are measures of satisfaction with quality, costs, speed, responsiveness and reliability of deliveries. In this section the relation between the use of voice in a relation and these five economic supplier performance measures will be investigated. Again, as in chapter 5, mathematical representations of the model will precede the statistical analyses, which are based on the measures described in table 4.37.

The basic model used for the analysis of economic performance includes firm size, industry level explanations, respondent characteristics, length of the relation, development of the relation over time and trust. Since the previous chapter showed that the best size measure available in the survey seems to be total purchasing, this variable is used. Given its exponential distribution a log purchasing was created. The basic model can be specified by the following equation:

(1) $ECONPERF = \beta_0 + \beta_1 * \log purchasing + \beta_2 * respexp + \beta_3 * respjob + \beta_4 * industry + \beta_5 * rellength + \beta_6 * reldevel + \beta_7 * trust + \varepsilon$

Given that the problem with the large number of industries that was described in the previous chapter obviously resurfaced, the same threefold distinction between traditional, process and product based industries was again applied[69]. The basic model was tested in two separate

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[69] There is a difference with the previous chapter though. In the previous chapter the performance measures were related to industry competitors and therefore industry level effects on performance were quite minimal. In this chapter there is no predefined relation between industry and performance. Therefore larger effects of industry on performance may be expected and indeed are found throughout the chapter. Using all industry dummies would statistically be a preferable solution to using the three measures described above. However, since the number of variables needs to be limited, this is simply not

steps. The first model in table 2 tests whether respondent, firm and industry characteristics combine for a stronger model than nothing at all. The answer to this question is that this is marginally so. In particular the experience of the respondent and whether the respondent is a purchasing specialist influence economic performance positively. It is also noteworthy that firms in the 'product' industry report lower performance. However, overall this is not such a strong model. As the model is extended to include relationship level variables, this picture changes completely. In particular, the addition of trust strongly increases the explanatory value of the model. Trust is positively related to economic performance. The effects of being a purchasing specialist and the product industry are strengthened while the effect of respondent experience is weakened.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		6.134	.000		3.285	.001
TOPMAN	.060	.731	.466	.078	1.151	.251
PURCHSPE	.148	1.769	.079	.147	2.115	.036
RESPEXP	.098	1.364	.174	.049	.821	.413
PRODINDU	-.121	-.990	.323	-.126	-1.254	.211
PROCINDU	.054	.439	.661	.035	.353	.725
LOGPUR	-.053	-.758	.450	-.044	-.752	.453
TRUST				.541	8.276	.000
RELGROWT				.064	.968	.334
RELLENGTH				-.045	-.769	.443
	F-test: 2.183		.046	F-test: 13.217		.000
	R^2: .064			R^2: .389		
	Adj. R^2: .035			Adj. R^2: .359		

Table 6.2: basic model for explaining economic performance of supplier relations. N = 199 / 197.

This model is then extended to include the key independent variable, voice relations. The following model is applied:

(2) ECONPERF = β_0 + β_1 * log purchasing + β_2 * respexp + β_3 * respjob + β_4 * industry + β_5 * rellength + β_6 * reldevel + β_7 * trust + β_8 * voicerel + ε

Table 3 contains the results of this model. It shows that voice relations are strongly positively related to economic performance. The model improves with the inclusion of voice relations as an explanatory variable. Furthermore all previous relations hold and become stronger. As in the previous chapter an effort was undertaken to improve the model. This resulted in the second model in table 3. After this point it was no longer possible to improve the model further. As expected some variables are removed from the model. Voice and trust are the most important predictors of economic performance. Furthermore it is interesting to note that being in the product industry quite strongly negatively influences the economic supplier

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possible. Including all industry dummies alone implies more than 20 variables to start with. Furthermore adding more industry variables contributes less to explanatory value than adding other variables that are related directly to the buyer-supplier relation.

satisfaction. Finally, top managers and especially purchasing specialists are far more positive about economic supplier performance.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		2.847	.005		3.020	.003
TOPMAN	.105	1.628	.105	.107	1.687	.093
PURCHSPE	.152	2.302	.022	.157	2.451	.015
RESPEXP	.014	.251	.802			
PRODINDU	-.125	-1.314	.190	-.172	-3.053	.003
PROCINDU	.059	.617	.538			
LOGPUR	-.053	-.956	.340	-.049	-.909	.365
TRUST	.364	4.980	.000	.332	4.827	.000
RELGROWT	.016	.256	.798			
RELLENGTH	-.060	-1.069	.286	-.059	-1.067	.287
VOICEREL	.329	4.601	.000	.332	4.827	.000
	F-test: 15.295		.000	F-test: 22.245		.000
	R^2: .451			R^2: .450		
	Adj. R^2: .422			Adj. R^2: .430		

Table 6.3: basic model for explaining economic performance of supplier relations including voice relations. N = 197 / 198.

Given that the main theoretical effect has now been investigated, it is interesting to look at the hypothesised interaction effects. Like in chapter 5 the model is expanded to include moderating variables. It then takes on the following general shape:

(3) ECONPERF = $\beta_0 + \beta_1$ * log purchasing + β_2 * respexp + β_3 * respjob + β_4 * industry + β_5 * rellength + β_6 * reldevel + β_7 * trust + β_8 * voicerel + β_9 * moderator + β_{10} * voicerel * moderator + ε

The interaction effects that were calculated once again confirmed what was seen in the previous chapter: correlations between the moderating variable and the interaction effect are quite high. Table 6 in appendix C provides the correlations between various variables. Thus *multicollinearity problems* are again to be expected and indeed appeared when the moderating variables, voice relations and interactions were tested in the same model[70]. Thus, as in chapter 5 the analyses of moderators and interactions were separated and will be shown in two different tables.

Table 4 shows the model incorporating moderating variables but no interactions. In this model loyalty is positively related to economic performance, while power and dependence of the supplier on the buyer are negatively related. Also note that the product industry does not have a negative significant impact anymore. Instead the process industry dummy has taken on a positive significant impact. The earlier positive relation between trust, voice and being a purchasing specialist and economic performance still holds. The second model in this table is an optimised form of the first model that is in fact little different from this first model.

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[70] In these analyses tolerance values dropped to as low as 0.04.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		1.562	.120		2.773	.006
TOPMAN	.083	1.233	.219	.083	1.245	.215
PURCHSPE	.171	2.457	.015	.154	2.310	.022
RESPEXP	.001	.009	.993			
PRODINDU	-.005	-.047	.963			
PROCINDU	.186	1.824	.070	.184	3.176	.002
LOGPUR	.007	.114	.909			
TRUST	.300	3.937	.000	.278	3.730	.000
RELGROWT	.080	1.219	.225	.083	1.280	.202
RELLENGTH	-.076	-1.293	.198	-.071	-1.242	.216
VOICEREL	.243	3.119	.002	.265	3.530	.001
LOYALTY	.182	2.728	.007	.172	2.699	.008
POWER	-.145	-2.419	.017	-.141	-2.442	.016
BUYERDEP	-.176	-2.819	.005	-.172	-2.928	.004
SUPPLDEP	-.062	-1.007	.315			
	F-test: 11.824		.000	F-test: 16.536		.000
	R^2: .516			R^2: .508		
	Adj. R^2: .473			Adj. R^2: .478		

Table 6.4: extended model for explaining economic performance of supplier relations including voice relations and moderating variables. N = 170 / 171[71].

	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.
(Constant)		2.452	.015		2.897	.004		1.382	.169		2.873	.005
TOPMAN	.108	1.694	.092	.108	1.705	.090	.085	1.221	.224	.105	1.622	.107
PURCHSPE	.165	2.500	.013	.151	2.324	.021	.147	2.065	.041	.152	2.285	.023
RESPEXP	.008	.142	.887	.031	.540	.590	-.031	-.516	.606	.021	.374	.709
PRODINDU	-.099	-1.038	.300	-.108	-1.147	.253	-.042	-.395	.693	-.142	-1.485	.139
PROCINDU	.076	.806	.421	.060	.647	.518	.151	1.442	.151	.071	.740	.460
LOGPUR	-.030	-.547	.585	-.054	-.980	.329	-.002	-.033	.974	-.056	-.998	.320
TRUST	.346	4.745	.000	.335	4.629	.000	.353	4.604	.000	.357	4.782	.000
RELGROWT	.037	.572	.568	.028	.459	.647	.057	.857	.393	.028	.439	.661
RELLENGTH	-.053	-.942	.347	-.053	-.956	.341	-.070	-1.163	.246	-.072	-1.261	.209
VOICEREL	.408	5.215	.000	.178	1.677	.095	.356	4.741	.000	.347	4.774	.000
VOICEREL X POWER	-.150	-2.319	.022									
VOICEREL X LOYALTY				.205	1.936	.054						
VOICEREL X BUYERDEP							-.150	-2.362	.019			
VOICEREL X SUPPDEP										-.068	-1.107	.270
	F-test: 14.602		.000	F-test: 15.216		.000	F-test: 13.043		.000	F-test: 13.789		.000
	R^2: .466			R^2: .476			R^2: .476			R^2: .452		
	Adj. R^2: .434			Adj. R^2: .445			Adj. R^2: .439			Adj. R^2: .419		

[71] With the inclusion of the buyer dependence variable just over 25 cases are lost. Analyses revealed that this does not change the model, although it does lower the level of significance of several relations. This confirms that missing values are not a serious problem in later analyses.

Table 6.5: hierarchical regression models for explaining economic performance of supplier relations including voice relations and various interaction effects. N = 196 / 196 / 170 / 196.

In table 5, various *interaction effects* of voice relations and moderating variables are described. As expected, the interaction with power shows a negative pattern. Also, the interaction effect with loyalty is positive, as hypothesised, although this effect is only marginally significant. Since the significance of voice relations also decreases quite a bit there is reason to believe these variables have some overlap with each other. However, this overlap is not so big as to create problems of multicollinearity. As expected the interaction with buyer dependence, the dependence of suppliers on a buyer, also contributes negatively to performance. Finally, the supplier dependence interaction was negative but was not found to be significant.

6.2   Strategic performance

The previous section provided ample evidence that voice relations matter if firms wish to establish high economic supplier satisfaction in terms of quality, costs, reliability, speed and responsiveness. The correlations table demonstrated that strategic performance and economic performance are positively related, which might lead one to conclude that similar results will be found in this section. But strategic performance measures scored lower average values, meaning firms are more satisfied with short term, economic supplier performance than with long term, strategic supplier performance. This could indicate other results may be be found in this section. The same models were used to assess that question.

Thus first a model is assessed similar to equation 1. Results are provided in table 6. These results are again split into a model excluding supplier relation variables and a model including them. The basic model without supplier relations variables is not a very useful explanation for strategic supplier performance. All variables are insignificant, as is the model. However, once we include trust, relational growth, and length of the relation a better model emerges. As with economic performance, trust is a necessary condition to obtain strong performance. But unlike economic performance for obtaining strategic performance the relation must be improved over time. Again, relation length as such does not seem to matter.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		5.078	.000		1.974	.050
TOPMAN	.017	.193	.847	.039	.546	.586
PURCHSPE	.078	.886	.377	.079	1.074	.284
RESPEXP	.070	.935	.351	.007	.114	.909
PRODINDU	-.042	-.325	.745	-.069	-.650	.517
PROCINDU	-.080	-.620	.536	-.110	-1.039	.300
LOGPUR	-.056	-.745	.457	-.054	-.877	.381
TRUST				.450	6.589	.000
RELGROWT				.216	3.132	.002
RELLENGTH				-.007	-.106	.916
	F-test: .520		.793	F-test: 10.639		.000
	R^2: .017			R^2: .348		
	Adj. R^2: -.015			Adj. R^2: .316		

Table 6.6: basic model for explaining strategic
performance of supplier relations. N = 190 / 189[72].

Table 7 displays the results of the analysis after including voice relations. This analysis runs parallel to equation 2. As with economic performance, voice relations are positively related, implying that having a voice-based relation, rather than an exit-based relation is beneficial for strategic supplier performance. Furthermore the results from previous analyses hold in this model. Attempts were undertaken to improve the model, resulting in the second model in table 7. This model is almost similar to the model on the left-hand side in terms of the effects of remaining variables, implying that other firm level and industry level characteristics barely play a role in explaining strategic supplier performance.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		1.384	.168		1.330	.185
TOPMAN	.051	.741	.460			
PURCHSPE	.083	1.163	.247	.057	.984	.326
RESPEXP	-.022	-.362	.718			
PRODINDU	-.074	-.724	.470			
PROCINDU	-.105	-1.023	.308	-.051	-.855	.394
LOGPUR	-.054	-.898	.370	-.050	-.848	.398
TRUST	.300	3.851	.000	.301	3.909	.000
RELGROWT	.184	2.731	.007	.182	2.738	.007
RELLENGTH	-.012	-.202	.840			
VOICEREL	.273	3.626	.000	.266	3.589	.000
	F-test: 11.540		.000	F-test: 19.320		.000
	R²: .393			R²: .389		
	Adj. R²: .359			Adj. R²: .369		

Table 6.7: basic model for explaining strategic performance
of supplier relations including voice relations. N = 189 / 189.

As before the model is now extended to include moderating variables and interaction effects. Including both of these categories of variables simultaneously will once again introduce problems of multicollinearity and thus they are estimated separately. The model including all moderating variables is shown in table 8. Loyalty has a strongly positive relation with strategic supplier performance. Interestingly, the inclusion of the loyalty variable tends to 'eat away' the effects of voice relations, implying that loyalty may be a very strong indicator of strategic performance that overshadows voice relations. In the optimised model, which is the second model presented in table 8, voice relations actually become insignificant, although this is partly related to the decreased sample size. The positive effects of trust, loyalty and relational growth

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[72] The number of firms in the strategic performance regressions is slightly lower than in the economic performance regressions. Several firms were unable to answer the question relating to network management by suppliers. However, these missing values do not seem to influence the outcomes. Also, as industry is again simplified into three categories, a check was performed whether this influences the outcomes significantly. While the R^2 of the models including all industries rose to .12, adjusted R^2 remained at 0. Thus including these 20 dummies is in effect not better than using the simplified form.

are maintained in this second model. Also note that industry effects do not seem to play a large role here.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		1.363	.175		1.373	.172
TOPMAN	.054	.688	.492			
PURCHSPE	.129	1.601	.112	-.054	-.812	.418
RESPEXP	-.032	-.466	.642			
PRODINDU	-.046	-.377	.707			
PROCINDU	-.034	-.287	.775			
LOGPUR	-.060	-.863	.390	.098	1.478	.141
TRUST	.250	2.823	.005	.250	2.879	.005
RELGROWT	.179	2.361	.020	.179	2.410	.017
RELLENGTH	.004	.065	.949			
VOICEREL	.154	1.729	.086	.142	1.650	.101
LOYALTY	.222	2.908	.004	.232	3.158	.002
POWER	-.082	-1.195	.234	-.085	-1.264	.208
BUYERDEP	-.049	-.678	.499	-.060	-.882	.379
SUPPLDEP	-.094	-1.311	.192	-.091	-1.362	.175
	F-test: 6.533		.000	F-test: 10.350		.000
	R^2: .380			R^2: .377		
	Adj. R^2: .322			Adj. R^2: .340		

Table 6.8: extended model for explaining strategic performance of supplier relations including voice relations and moderating variables. N = 164 / 164[73].

What are the effects of the interactions between voice relations and the moderating variables? In table 9 each of these effects is presented in four different models. The interactions with power, buyer dependence and supplier dependence do not yield significant outcomes. In each of these models the variables that were found to be important in previous analyses still hold. The interaction with loyalty is strongly positively significant, as hypothesised. In fact, this interaction completely erases the direct effects of voice relations, implying that with loyalty included the effects of voice are negligible. In this model there was no problem of multicollinearity so the interaction effect simply prevails over the direct effect.

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[73] Please note that the number of firms in these models drops significantly because both the buyer dependence and strategic performance variables have missing values. An analysis that was performed excluding buyer dependence generated a similar model though. The main difference was that voice relations would once again become significant at the 1.5% level.

	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.	St. β	t-value	Sig.
(Constant)		1.320	.189		2.258	.025		1.615	.108		1.407	.161
TOPMAN	.055	.791	.430	.057	.842	.401	.052	.647	.518	.052	.739	.461
PURCHSPE	.096	1.355	.177	.094	1.353	.178	.101	1.237	.218	.083	1.152	.251
RESPEXP	-.034	-.566	.572	.008	.142	.888	-.072	-1.043	.299	-.016	-.254	.800
PRODINDU	-.058	-.566	.572	-.040	-.399	.691	-.083	-.671	.504	-.091	-.880	.380
PROCINDU	-.081	-.788	.432	-.086	-.859	.391	-.069	-.569	.570	-.096	-.935	.351
LOGPUR	-.051	-.851	.396	-.073	-1.255	.211	-.057	-.821	.413	-.057	-.946	.346
TRUST	.302	3.867	.000	.248	3.206	.002	.286	3.240	.001	.294	3.693	.000
RELGROWT	.196	2.891	.004	.166	2.513	.013	.156	2.024	.045	.196	2.871	.005
RELLENGTH	-.012	-.202	.840	-.012	-.197	.844	.010	.139	.890	-.023	-.367	.714
VOICEREL	.312	3.774	.000	-.002	-.015	.988	.250	2.937	.004	.288	3.757	.000
VOICEREL X POWER	-.088	-1.277	.203									
VOICEREL X LOYALTY				.367	3.321	.001						
VOICEREL X BUYERDEP							.016	.218	.828			
VOICEREL X SUPPDEP										-.060	-.915	.361
	F-test: 10.883	.000		F-test: 12.084	.000		F-test: 7.026	.000		F-test: 10.354	.000	
	R²: .405			R²: .429			R²: .337			R²: .393		
	Adj. R²: .368			Adj. R²: .393			Adj. R²: .289			Adj. R²: .355		

Table 6.9: hierarchical regression models for explaining strategic performance of supplier relations including voice relations and various interaction effects. N = 189 / 188 / 164 / 188.

6.3 Findings from the survey

A wide range of models was attempted to look at the effect of voice relations and several moderators on supplier performance. The analyses of the survey seem to provide support for several hypotheses. Furthermore the quality of the data and the analyses appears to be appropriate.

Few measurement or econometric problems

There do not appear to be major measurement problems with variables in this part of the survey. A normal distribution of the dependent variables with substantial variance was achieved. This implies that it is possible to find effects of the independent variables on the dependent variables. Also, as noted in chapter 4, the Cronbach's Alpha obtained on these performance measures is good to very good. The measurement of the key independent variable, voice was also satisfactory in terms of reliability and validity as well as the variance obtained on this variable.

With regards to the other variables no evidence was found that excluding items would improve the variables. In fact a whole series of models were run to test different measures, for example trust including 3 and trust including 4 items. All of these analyses pointed out that the directions of relations did not change and that including the largest possible number of items led to improvements in the strength of the relations. Thus the

dilemma posed in chapter 4 between optimising Cronbach's Alpha and having a theoretically most appropriate variable was invariably solved by choosing the theoretically most appropriate variable. Since this is in most cases a matter of choosing between rather marginal Alpha improvements of around 0.01 and dropping a substantial part of the theoretical foundation of the study this amounts to a rather simple choice in the end. Achieving minor statistical improvements is somewhat useful. Having to lower one's theoretical impact is quite dramatic. Perhaps the best illustration is in the economic supplier performance variable. Here there are two alternatives. There is a scale including cost of the product with an Alpha of .8314 and there is a scale excluding cost of the product where the Alpha value is .8450. Obviously reaching a 0.85 value on a scale is quite nice. However, the increase of the value will be only 0.0136 and the Alpha value without this item is 0.83, which is a very decent value by all means. Looking at the theoretical change that occurs as a result of this operation we see a quite fundamental shift. What practitioner or scholar of management would be willing to suggest that the cost price of products plays no role in determining how well a supplier performs? Thus making the choice between excluding or including this item in the scale is really rather obvious in the end.

Some additional evidence was gathered to conclude that there do not appear to be econometric problems with any of the regressions used:

- The dependent variables are more or less normally distributed
- Inspection of residuals from the analysis did not reveal major departures from normality.
- Visual inspection of partial plots of the dependent variable and the key independent variables did not reveal heteroskedasticity.
- Durbin-Watson tests produced figures close to 2, meaning no serial correlation (autocorrelation) is found among the residuals.
- None of the independent variables in the models presented here have tolerances that approach 0; implying multicollinearity is not a problem in the models presented.

Support for several hypotheses

There was strong support for hypothesis 3b as well as hypothesis 4: voice relations positively influence both economic (3b) and strategic (4) supplier performance. Hypothesis 3a was rejected. Apparently firms need to co-operate closely with their key supplier not only to achieve long term goals but also to achieve desired quality, cost, speed, reliability and responsiveness levels. Furthermore there was support for several moderating hypotheses. Hypothesis 11 of a moderating effect of loyalty was supported for both economic and strategic performance. In the case of strategic performance the loyalty effect was even larger than the voice effect. Hypothesis 12 of buyer dependence being a negative moderator was accepted for economic performance. For hypothesis 13, supplier dependence being a positive moderator, no significant evidence was found. Finally, for hypothesis 14, firm power being a negative moderator, evidence was found for economic performance but not for strategic performance.

	Economic performance	Strategic performance
Independent variable	• Strongly positive relation	• Strongly positive relation
Moderators	• Power: strongly negative interaction effect • Loyalty: moderately positive effect • Buyer dependence: moderately negative interaction effect	• Loyalty: strongly positive interaction effect that negates the effects of voice
Other effects	• Trust is strongly positively related • Loyalty is positively related • Power is negatively related • Buyer dependence is negatively related • Product industry is negatively related and process industry is positively related • Purchasing specialist is positively related	• Trust is strongly positively related • Improvement of the relation over time is strongly positively related • Loyalty is strongly positively related

Table 6.10: Summary of significant findings on supplier performance from the survey.

6.4 Discussion

Voice relations positively influence supplier performance. In itself this is not a particularly new finding. What makes it interesting is that both short-term and long-term effects of voice were tested along with several moderating effects. These moderators will be discussed later. First the main finding will be discussed. Voice relations essentially imply that a buyer and supplier engage in communication to solve problems. The fact that this is more effective at achieving joint innovation, learning and network effects than exit relations, where there is a constant threat of disengagement, appears obvious. Under conditions of low commitment and lack of co-operation, it will be very hard to achieve these goals. Certain preconditions are necessary for relations to be effective in the long run. If there is no ongoing communication within the relation it will be impossible to exchange the information needed to achieve joint innovation. Furthermore such innovation or creation of capabilities between firms will be difficult under conditions of adversity. If there is a constant threat of exit, where one or both parties might leave the relationship this will discourage joint work at all levels. *Voice is needed for long term supplier performance*. This finding confirms mostly everything what has been written on inter-organisational relations in general and buyer-supplier relations in particular.

However, what is perhaps somewhat surprising is that *voice relations are also needed to obtain desired economic performance levels*. Adherents of the market model might tend to believe that more or less objective qualities like price, quality, speed, reliability and responsiveness could best be generated by arm's length relations that allow buying firms to simply negotiate terms. Firms that desire voice relations will need to make investments up front that might be difficult to recoup in the case of uncertainty. Therefore setting up such relations with an eye towards achieving short-term goals does not appear to be lucrative. Apparently such is not the case for manufacturing firms in this sample in the Netherlands. This research finding seems to confirm another view, which suggests that co-ordination among partners is crucial to obtain any sort of superior performance from supplier relations. It conforms to statements by Richardson (1972) and Simon (1991). They both argue that *most markets are best seen as sets of interdependent actors*. An atomistic view of markets, where each actor is a completely independent actor, is not warranted in practice (Simon, 1991). This amounts to the same as arguing that in most situations a mix of authority and

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price mechanisms is used (Hennart, 1993). Since this study focused on the largest suppliers in business-to-business markets it does not seem unreasonable to suspect voice or at least a minimum amount of voice to be necessary to achieve economic supplier performance. Exit may not be appropriate in such cases. In fact, under these conditions of few buyers and few suppliers that are convicted to work with each other opportunism seems an extremely limited strategy. Hence opportunism is less likely to occur under such circumstances. In the face of large reputation losses, in the market, loss of credibility and so forth both buyers and suppliers that want to end relations may be very willing to settle for a quiet ending to their relationship and not blow it up. Furthermore, there is a large literature in supply chain management (Van Weele, 2000), which suggests that in order to optimise supply chains in terms of measures of economic supplier performance it is necessary to co-operate across firm boundaries. This finding seems to confirm that view.

The strongest moderating factor in the analyses was loyalty to the supplier. A positive direct effect and a positive moderating effect were found in analyses of both economic and strategic performance. Both effects were much stronger for strategic performance than for economic performance. The direct effect can be explained by looking at the effects of loyalty on the partner. If the supplier perceives the buyer to be loyal to the supplier, meaning the buyer's willingness to stay with the supplier is high and the buyer will not tend to switch unless drastic changes occur in the relation, this will generate more commitment from the supplier as well. Both parties extend their time horizon from perhaps weeks or months to years to come. Given this extended time horizon the other party's investments will be seen in a more positive and long-term light as well.

The predicted moderating effect of loyalty on the relation between voice and performance occurred as well. Thus if there is loyalty the voice mechanism becomes more effective, in line with what Hirschman (1970) predicted. If both parties know there is a commitment to sustain the relation, this makes the voice mechanism work better. A buyer and supplier might engage in a joint effort to improve the quality of a component. Because of the fact that a joint effort is undertaken (voice) the result of this quality improvement initiative is more likely to be positive. However, it the parties undertake a joint effort knowing that their current co-operation relation is robust (loyalty) the outcome is likely to be even more positive. This mechanism was witnessed for both economic and strategic performance with the difference being the magnitude of the effect. In the case of strategic performance the interaction effect between voice and loyalty is much stronger. It is in fact so strong that it overshadows the direct effect of voice. This needs some explaining. Without including the interaction with loyalty, voice is an important explanatory variable but when including this interaction it becomes insignificant. Apparently when trying to obtain strategic performance effects loyalty is so important that voice can not be effective without loyalty. In the case of strategic performance committing to a long-term relation is so important that it makes co-operation a given. This seems to make sense since a long-term perspective is needed to develop these benefits and particularly to exploit these benefits.

The moderating role of power in obtaining performance through voice is interesting. First a direct effect was found. The more power the supplier has over the buyer, the less satisfied a buyer is with that supplier's economic performance. However, this relation was not confirmed

when analysing strategic performance. Thus it seems *power is a useful mechanism for a supplier to redistribute some economic rents towards itself*. When a supplier has power, it can simply negotiate better contract terms or alternatively when the supplier has limited power the buyer can do so. This again is a finding that confirms existing theory, as well as managerial and ordinary intuition. The fact that the moderating influence of power is not replicated for strategic performance is something more of a puzzle. Several possible explanations appear. It could be that *the ability to appropriate these 'strategic rents' is not a function of power but a function of firm capabilities or absorptive capacity* (Cohen and Levinthal, 1990). Often these rents appear in a very tacit form and are inseparable so it will be impossible to simply negotiate with the other partner and split the pie. So only the firms that are willing and capable to absorb learning, innovation, and network effects are able to capture these effects. Also *the value of strategic rents is often not the same to the partners* since they have very different interests. Unlike economic effects like price that have similar value for both partners, the strategic effects may consist of an innovation that is useful not only in this product to this buyer but to all the products the supplier makes or vice versa. Therefore there is an asymmetric value attached to the co-operation. This is related to the extent to which spillover can occur from one product to the other.

Then there is also the expected negative interaction effect between voice and power for economic performance in accordance with hypothesis 14 but not for strategic performance. This implies the effectiveness of using a voice strategy decreases with the existence of power differentials in the relation. When a supplier is less powerful it will use voice to create added value. When it is more powerful there is no need for the supplier to engage in voice since it can appropriate enough rents from this relation through its power base. Consistent with the predictions the stronger party will feel less need to engage in co-operative efforts since these are extra investments that are unnecessary to obtain the desired goals. For obtaining strategic performance this is again different. If power differences are used as the basis of appropriating strategic performance, it is unlikely to be obtained at all. Obtaining strategic performance requires a long-term commitment regardless of power differentials.

Buyer dependence, the extent to which suppliers are dependent upon buyers, was the first of two dependence effects tested. Buyer dependence was seen as an incentive to commit resources to the relation thereby improving its performance. The effects of buyer dependence were only present in the case of economic performance both directly and through the interaction effect. With much buyer dependence the economic performance of the relation decreases, implying that *if the supplier is largely dependent on this single buyer it does not perform so well*. Several causes for this effect are possible. The most plausible explanation is that there is a lack of incentives for the supplier to perform well, particularly in terms of objective, 'hard' measures such as price. If the supplier has been a major supplier to this firm for a long time, it may lack the necessary price incentives from the market that stimulate economic performance. Having a wider range of buyers also gives access to more performance improvement techniques. Furthermore the buyer may find it difficult to disengage from the relationship given the large dependence of the supplier on the buyer. If the buyer decides to stop buying from the supplier, it is quite likely that the supplier will be forced to cut part of its labour force or it might even go out of business entirely. Therefore

the buyer will be willing to accept a lower performance by the supplier without parting from it. The exit mechanism is not viable under these circumstances. This is why certain firms in some industries, such as the electronics industry, usually limit dependence on one buyer to around 30% as a rule of thumb (this was also one of the outcomes of the interviews, see Tecson, 1998).

As opposed to the hypothesis, the interaction effect between voice and buyer dependence was also negative for economic performance. For strategic performance no significant effect was found. This implies that under conditions of high buyer dependence the voice strategy will be less effective. As noted if there is high buyer dependence the exit mechanism is less likely to be used. Given a lack of exit possibilities, voice is not as effective as it could be. This is in fact one of the statements that Hirschman (1970) himself made concerning the effectiveness of voice. Again, it is most likely to involve economic performance because the market (through the exit option) will assert the most influence on directly and unambiguously measurable items like price, quality and speed.

The fourth interaction effect concerns supplier dependence for which neither direct effects nor indirect effects were found. There does not appear to be any measurement error of this variable. Neither is it the case that the power of the supplier, which could be though of as a similar variable, captures all the effects of supplier dependence. *There simply are no effects related to supplier dependence*. What are possible reasons for this? First, suppliers might not know how important they are to their buyers[74]. If they do not know their importance, they can not effectuate it in their bargaining strategies. Second, supplier dependence as it was measured may contain two opposite effects. On the one hand high supplier dependence may give more bargaining power to suppliers, leading them to appropriate economic rents, which again leads to lower economic performance for the buyer. On the other hand high supplier dependence may also increase the buyer's investments, leading to higher economic performance for the buyer. This would suggest that in future research two separate measures should be created, one looking at appropriation by the supplier and the other looking at investments by the buyer. Of course it could simply be the case that the hypothesis is refuted because it is wrong and there is no effect connected to supplier dependence. On the basis of the results presented here this is not an improbable scenario, though one that needs further exploring.

Like voice, trust has a large role in explaining both economic and strategic performance. The more trust in the supplier, the likelier it is high supplier satisfaction is obtained. This confirms existing research, which shows that trust in the partner is a necessary precondition for high relationship performance. Without trust the partner's actions will be viewed conspicuously and a negative atmosphere emerges that makes it hard to perform well. Trust was measured here by confidence in the partner's actions in terms of fulfilling obligations, taking appropriate decisions and providing good deals as well as by harmony in the relationship. The measure of trust used here is best seen as a measure for relational trust as opposed to institutional or

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[74] To support this statement keep in mind that a substantial number of buyers in the survey did not know how important their purchases were to their suppliers. This may be the same with the suppliers. Conversations with people at NEVAT, the Dutch suppliers association, also lend support to this view, as NEVAT members are often unaware of their importance to buyers.

calculative trust (Mayer, Davis, & Schoorman, 1995). This is coherent with an understanding that relational trust is the most effective means of increasing performance of relations. Institutional trust can hardly be moulded by firms. Calculative trust is very important in the context of single transactions but loses much of its significance in the context of an ongoing relation. Both institutional trust and calculative trust are likely to exist in similar quantities among all of the relations investigated here. The degree of relational trust, however, obviously varies among relations. Trust is also an outcome of the number of previous co-operative efforts (Gulati, 1995). As relational trust increases, so do the possibilities for using the relation to obtain performance. Furthermore the effects of trust and voice are more or less independent statistically in the analyses, meaning they explain different parts of the variance in performance. While trust is best seen as a necessary precondition for an effective relation, voice is a mechanism created by the parties to improve the relation.

Whether a relation has grown over time in terms of the nature of the relation and purchased volumes matters not to economic performance, but does matter to strategic performance. This provides more evidence that in order to obtain strategic performance firms must address a different set of things than when they wish to obtain economic performance. For obtaining economic performance it is necessary to have a solid base of trust and loyalty as well as a voice strategy. But apparently it is not necessary to constantly improve the relationship. If a firm is looking for long term benefits it needs to not only be committed for a longer period of time, but also to express that commitment over time by purchasing more and improving the relationship. In fact, an improved relationship may be a necessary consequence of the choice to engage in joint innovation or learning. Only by taking a relationship to the next level are parties able to achieve more abstract and more complicated goals.

The length of the relation does not matter to assess performance. Perhaps this comes as something of a surprise, given that one would expect a buyer-supplier relation to last longer if its performance is higher. However, there are several plausible explanations for this finding. First, the fact that two parties have been together for a very long time may often reflect something other than satisfaction, namely lock-in. The two parties may be committed to one another because of a lack of plausible alternatives, high investments, corporate standards or a range of other reasons. In such cases, they may not be very satisfied with performance, yet unable to switch to another partner. Second, in a long relationship the incentives to renew and innovate may no longer exist. This is a common difficulty in relationship management: in the beginning both partners have a range of new ideas and initiatives but as the relationship lasts longer, this flow of ideas decreases. This can undermine performance as well. Third, the length of the relationship might matter, but not beyond a certain threshold level. For instance there may not be a difference in performance once a relationship is 2 years or older. This idea was explored in some analyses and graphical tests and what seems to be the case is that the top quartile performance scores are not obtained until after a 3 year period. After that period different performance scores appear quite unrelated to length of the relation. However, since only 13 firms admitted to a relationship of 2 years or less, this is anecdotal evidence. At this point it is safest to say that this option can not be ruled out and may be a point of further research.

Being in what is defined as the product industry, all firms assembling complex products like vehicles, machines, computer and electronics was found to be negatively related to economic performance while in the process industry, featuring food and beverages,

chemicals and others, there was a positive relation. This could be seen as a coincidence but there is also a plausible explanation for these effects. The process industries have seen much more standardisation of products. As a consequence supply chains tend to take on much more sharply defined conditions. In the chemicals industry, for example, the quality of deliveries is hardly an issue of concern anymore since suppliers work by pre-defined standards. Similarly it is easier in process industries to come up with a constant supply of the product, making it easier to create reliable supply chains. If specifications change regularly and new components need to be engineered, as is for instance common in the machinery industry, creating a reliable supply chain may be more challenging. For strategic performance there was no significant industry effect but here there are no clear reasons to believe that industries differ. Why would some industries not seek innovation or learning effects?

Another finding was that being a purchasing specialist was positively related to rating economic supplier performance. This appears to be a case of perception bias. Sourcing specialists of course like to think of their key supplier as performing well. Thus by responding positively they are defending their own actions and ground. Interestingly enough, they are not defending their turf vertically, towards top management, but horizontally towards other functional areas of management. This can be concluded from the fact that top management was also connected to above average performance ratings, though not always significantly. Apparently those that are most closely responsible for supplier relations, also tend to judge these relations as doing well. This is a finding consistent with other survey research and proves that including the respondent's job as a variable was useful.

Chapter summary

Chapter 6 deals with the influence of the design of buyer-supplier relations on the performance of these relations. It draws upon regression analyses of survey data and a case study. The exit – voice model is applied. Both expected and unexpected results emerged. As expected voice (partnership) strategies produce higher strategic supplier satisfaction rates. If firms co-operate with their suppliers more joint innovation and competence building and network effects emerge. However, for economic performance measures, which include the delivery attributes of costs, reliability, speed, quality, and service levels, voice emerged as the superior strategy as well. This implies firms also need to co-operate intensely to obtain effective, low cost supply chains. The market mode of sourcing is not a sufficient means to obtain such benefits.

Four moderating effects on the relation between voice and performance were investigated. Being loyal to the supplier had a direct and interaction effect for both economic and strategic performance. For economic performance these effects were moderate, suggesting loyalty is helpful but perhaps not strictly necessary. For strategic performance the effect was very strong, in fact it even overshadowed the effect of voice. Hence loyalty is a crucial characteristic of buyer-supplier relations that are successful in the long run. Power of suppliers had a negative direct and interaction effect on economic performance, implying that the more powerful suppliers are vis-à-vis buyers, the more they are able to extract economic rents from the relation. For strategic supplier performance this effect does not exist, which means that asymmetric value and the diffuse nature of these rents prevent a bargaining game from

occurring. The extent to which the supplier is dependent on the buyer had an economic performance effect similar to power, suggesting that supplier that are overly dependent on buyers also lose out in such bargaining games. For dependence of the buyer on the supplier no effects were found[75].

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[75] At this point the reader is referred to *Appendix D* for an excursion into the role of the Internet in sourcing. While this section was originally a part of this chapter, it is best seen as a separate element of this study, since it deviates from the leading research question. Paul Matthyssens and Masaaki Kotabe are recognised for pointing this out in comments on a previous version.

Chapter 7: ~~Glob,region,loc~~all sourcing

This chapter deals with the process of internationalisation in sourcing[76]. Global outsourcing of entire components or subunits is a relatively new phenomenon. In order to illustrate the benefits of global sourcing as well as its challenges, it is useful to look at a practical example of global sourcing. In the first section a case study of Ford's world car project is presented as a practical illustration of global sourcing and its performance consequences. The second section deals with the consequences of internationalisation of the supply base on firm performance based on survey data. The third section focuses more narrowly on the performance consequences of having a largest supplier that is located abroad, based on the survey as well. The fourth and final section will discuss the findings. Figure 1 below recaptures the model that was first presented in figure 4.3.
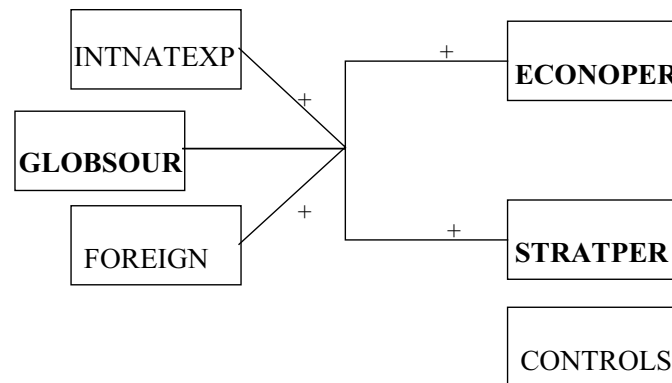
Figure 7.1: overview of the international sourcing model and its moderators

7.1 Global sourcing in practice: Ford Mondeo[77]

Given the general lack of knowledge of international sourcing activities described in chapters 1 through 3, it is useful to supplement quantitative methods by a more qualitative analysis. A case study of Ford Motor Company serves this purpose well. This case study is based entirely on secondary materials.

Background

This case deals with the Ford Mondeo[78], a car introduced by Ford in 1993 as a *'world car'*. Ford Motor Company barely needs any introduction. It is of course known as one of the world's

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[76] Please note that the focus of this chapter is on global external sourcing, that is global sourcing from external suppliers and not internal production across borders.

[77] A full version of this case study has recently been published elsewhere (Mol, in print).

[78] The Mondeo was the European version of the car. The North American names are Mystique and Contour. Because the Mondeo was built in the largest quantities, produced and sold earlier, it is generally referred to as 'the world car' by the business press but also by Ford itself. In the remainder of the text

premier manufacturers of automobiles. Its cars have been sold all over the world for many decades now. A world car is a single car that is sold in different parts of the world, although slight variations may be made to the model. Three key issues will be illustrated.

The first issue deals with the *advantages of going global* with its Mondeo for Ford and the barriers it faced by doing so. Obviously Ford must have thought there were important advantages attached to producing the first ever world car. These globalisation advantages will be discussed in the case in order to get an idea of the strategic motives behind this decision. On the other hand the automobile industry has always faced local constraints, for example in terms of traffic rules, that needed to be overcome. Therefore a delicate balance needs to be found and maintained between going global and operating locally. What kind of managerial challenge did Ford face here?

The second issue is whether *new IT* was the key enabler in establishing this global production and supply structure. A world car poses new and possibly very different demands upon the organisation and technology in use by Ford. Even if the parts going into a world car and the production technology are essentially the same with an ordinary car, a new logistics and communication structure is required to produce the car. From an IT perspective it is especially interesting whether it was the new technology that helped Ford to produce globally or other factors. It has often been suggested that IT is one of the key drivers of the process of globalisation. Does the Mondeo case confirm this?

Finally there is a question about the *success of the car in terms of firm performance*. Some hailed it as the new 'model T' but is it that successful? Ford attained much of its fame and present status from the highly successful model T, a car produced at a very large scale at the beginning of the previous century. The model T helped Ford to become by far the largest automobile assembler of the world at the time until its demise in the late 1920s caused a severe disruption to the Ford Motor Company. The world car concept inherent to the Mondeo presented a new mass scale production innovation. Was the performance of the Mondeo good enough to call it Ford's new model T?

Ford has always been one of the world's largest and most international manufacturers of cars. It was founded in 1903 and first produced abroad in 1904 in Canada and started intercontinental expansion in 1911 in Manchester, England. Chandler (1964) gives a very detailed description of its early history. Ford differentiated itself from its competitors in 1908 through the unique manufacturing strategy implemented by its legendary founder, Henry Ford. Ford decided that economies of scale and a low cost product would be the key to competitive advantage. Therefore Ford built only one model, the model T, from 1908 onwards and attempted to do this in mass scale, low cost production. The reason Henry Ford chose the model T from his range of designs was that it was most suitable for mass production. The product was fully standardised. One of the innovations Ford introduced was the moving conveyor belt. Demand for the T-Ford grew rapidly, sparked by the low prices and economic growth in the United States. Ford expanded its number of assembly sites across the United States. In 1921 Ford's model T sold 845,000 units for a U.S. market share of 55%. Ford became a huge industrial corporation over the period, in part because it also integrated

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the name Mondeo will be used to designate the entire world car project (including the North American models).

backward by acquiring coal mines, railways and steel mills. However, the model T's success in the end also proved to be its demise. Demand fell steeply after 1921 and in particular during 1926 en 1927 due to the lesser economic situation and increasing substitution by second hand cars. Ironically the second hand market was flooded by Ford's own T model. Those consumers that bought new cars were no longer interested in the simple T-Ford model. With these lower volumes Ford was no longer able to maintain its low costs. This initiated a long rebuilding period for the Ford company, which saw its eternal rival General Motors evolve into the world's largest car manufacturer, which it would remain until the present day. GM's Alfred Sloan introduced a number of managerial innovations like the divisional M-form (Chandler, 1964) that provided GM with the ability to produce multiple models and to reconfigure its organisation more effectively.

A world car

In more recent history Ford initiated a new model, which was also seen to be a breakthrough model. Some observers, though not Ford itself, have likened it to the T-Ford. When Ford Motor Company in 1992 publicly launched its plans to produce a world car this was already its third attempt to do so. The idea behind a world car, sometimes also referred to as a global car, is that one design fits all. More particularly, the efforts by Ford have been aimed at building a car that can at least be mass-sold in both Europe and the United States, by far the largest markets for Ford. The very first attempt by the company to build one single platform that could be sold in different markets all over the globe without major modifications even dates back to 1960 (Kitchen, 1993). This was of course a time when the word globalisation had not entered management vocabulary and most car producers were still mainly oriented towards their domestic markets. The project proved not very successful: some 60 days before production was to be started, the U.S. version was cancelled. The reason was that although the car was innovative, being a front wheel drive economy car, it would also be more expensive to produce than existing larger models. A second try came in 1981 when Ford tried to sell the same Escort model all over the world (Kitchen, 1993). This time a much larger effort was undertaken to design a single model for both markets. Although the Escort in itself proved to be a marketing success, it had little to do with a world car in the end: only two minor parts were identical in the European and North American versions. These two parts were the water pump seal and the Ford oval badge, by the way. This time the main reason was that two distinct development teams had operated simultaneously on both sides of the Atlantic. Each group posed its own idiosyncratic demands. The Ford organisation was still not ready at the time, so it seemed.

Under what circumstances did the Ford Mondeo come onto the market? Ford was still a fairly large firm, which was present in all key markets. Especially in Europe and North America, it had established a broad presence and attained a lot of market share. Ford even was the European market leader in 1984, but slipped back into fifth place around 1992, just before the introduction of Mondeo. More recently, after the introduction of the Mondeo, Ford has grown through acquisitions. In Europe, the purchase of Volvo in the late 1990s is the most obvious example. Over the last two decades Ford also started to invest on a larger scale in Asia. It did so mainly through agreements with Mazda of Japan and Kia of South Korea. In April 1996 Ford even obtained effective control over Mazda. One problem related to both

Mazda and Kia though, was that they were both relatively weak players within their national systems. Kia came close to a bankruptcy in October 1997, after which the Korean government decided to nationalise the company. Mazda has widely been cited as a firm that lacks both scale and bargaining power to be an effective producer on its own. It stands only in fifth place in the ranking of automobile producers in Japan and came close to bankruptcy around 1980. Ford's key financial data are contained in table 1. They show that Ford Motor Company has grown substantially over the last 25 years, which is in large part due to the external acquisitions and the addition of rental and financial services like Hertz.

	1975	1980	1985	1990	1995	1999
Sales North America (thousands of units)	3,072	2,457	3,237	3,284	3,993	4,787
Sales rest of world (thousands of units)	1,618	1,969	2,397	2,588	2,613	2,433
Total sales (millions of US $)	24,009	37,086	52,774	97,650	110,496	162,558
Net income (millions of US $)	323	- 1,543	2,515	99	4,139	7,237
Total employees (numbers)	416,120	426,735	369,300	370,400	346,990	364,550
U.S. Employees (numbers)	203,691	189,917	172,200	180,900	185,960	173,064

Table 7.1: key data for Ford Motor Company, 1975-1999. Source: Ford Motor Company, annual reports 1975, 1980, 1985, 1990, 1995 and 1999. Please note that accounting changes may have occurred over this period. Later years include more revenues and income from services. A net loss is signified by - (1980 only). Ford is currently divided in two sectors: automotive and (financial) services. In services key brand names are Hertz and Kwikfit. In automotive Ford not only owns the Ford brand, but also Volvo, Mazda, Lincoln, Land Rover, Jaguar, Aston Martin and Mercury.

Case description

After the 1960 and 1981 failures Ford started its third attempt to build a world car in 1986. Using the experience of what went wrong in 1981, European and American engineers started designing a new car, under the code name CDW27. Outside suppliers were involved in the project from 1989 onwards to develop specific components and modules of the car in a joint engineering effort. Three different brand names finally emerged, the *Ford Mondeo* for the European market and the *Ford Contour* and *Mercury Mystique* for the North American market. Of these cars, 90% of the elements were identical, although this is hard to see from the outside where the cars appear to be different.

However, certain differences remained. Seat belts and air bags had to be adapted to the local markets. Since U.S. drivers do not always wear seat belts, their cars were provided with larger air bags. European drivers had a smaller, 30-liter air bag. Ford admitted that it had to cope with different supplier processes, which made it tough to achieve the desired component commonality. Furthermore local conditions and mandates forced a number of changes. Most of the problems arose when Ford had to re-engineer the Mondeo for the North American market and encountered U.S. federal standards and market conditions.

The stakes were high enough for Ford to make the success of this new car crucial. Some $ 6 billion were invested before it ever came into production, which is far more money than most competitors spend on a new model (the comparable Chrysler Neon cost only $ 1.3 billion to develop, for example). Because of the radically new concept, it is sometimes referred to as a 'new model T', the car that brought Ford its original fame in the 1920s. In Europe, sales of the Mondeo started in 1993, the United States followed some 14 months later. The car was sold in some 76 countries all over the world, although most sales are obviously realised in the United States and Europe.

Motives

Why did Ford decide to try its luck a third time, despite the fact that nobody else in the car industry was building a world car? The answer provided by the company was a reference to its high degree of internationalisation, not just in terms of sales, but also in the spread of production sites and R&D knowledge. This led Ford to the conviction that it would be beneficial to consider a global approach instead of a multi-regional or multi-domestic approach. Mr. Philip Benton, Ford's President until December 1992, suggested that "A global company can concentrate its resources where they will be used most effectively".

So what advantages did this global structure provide the company with? *Economies of scale* were believed to be the first and most important reason behind the world car project. These economies were not only to be obtained in the production of the different brands, but also in their design and the sourcing of components and parts from third parties. Being able to purchase double the quantities that a normal car model requires obviously gave Ford room for bargaining about prices. A second reason stems from the increased *flexibility* that Ford obtained. Both flexibility in purchasing and flexibility in production are thought to have grown. Ford can switch between locations (Europe and the U.S.) both for its own production as well as for sourcing components from suppliers. It would be easier to cover for delivery deficiencies on either side of the ocean too. Other reasons that were cited less often, include *achieving a global image* vis-à-vis customers, *creating new knowledge* through a world-wide network and a *reactive approach* to the loss of market share in some markets. This last point raises an interesting question: Did Ford decide to build a world car out of a position of weakness, or one of strength? Although Ford was still clearly the number two manufacturer of cars in the world (after its eternal rival General Motors), Toyota was starting to catch up, as were others. Furthermore, Ford had experienced some pretty bad losses, especially in 1991 when it lost almost $2.3 Billion. So the reactive strategy argument seems to have some ground as well, as Ford's position was gradually slipping. Ford felt that it needed to do something new that could again give it a competitive edge over key rivals. Since Ford still had plenty of financial and technical resources available when it embarked on the world car project, it could afford to invest in such a large project. And Ford had the advantages of a strong presence in both the North American and European markets. Ford was strong but getting weaker.

Internal organisation

The Mondeo/Contour/Mystique was built on a project basis, where both the European and North American organisations contributed to the final product. From the earlier adventures with the Escort model, Ford had learned that real integration would be important. When the Escort was designed, two different design teams from Europe and the U.S. were working on it

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simultaneously. As Mr. Benton put it "When there were opportunities to deviate from the shared engineering plan, both teams made the most of them, protecting their own turf and defending their own ideas about what constituted the 'right' product".

Ford's factories in Europe are concentrated mainly in Germany, the United Kingdom and Belgium. The Ford world car was assembled in three different plants, in Genk (Belgium), Kansas City (Missouri, United States) and Cuatitlan (Mexico). The European plant initially produced some 400,000 units annually and the two North American plants some 300,000 in all. So it may well be concluded that there was an even spread between the two continents.

Some key components in the car were sourced internally. At the beginning of the 1990s some 50% of components in the automobile industry were sourced internally, but this percentage decreased rapidly. One example of intra-firm sourcing for the world car was the transmission. The manual transmissions were produced in Halewood in the United Kingdom, and Cologne in Germany. The automatic transmissions came from a Ford plant in Batavia, Ohio. This points to a form of regional specialisation in the sourcing network, since automatic transmissions are far more popular in the U.S. than in Europe with any new car model. Some 9% of the European Mondeo cars were equipped with automatic transmissions, a figure that was still 3% above Ford's expectations.

Role of outside suppliers

Outside suppliers fulfilled a key role in the project, since some $ 2.5 billion were spent annually by Ford on components and parts for the world car. Important issues arise on the nature of the sourcing network. First of all Ford tried to integrate the European and North American supply bases as much as possible. Mr. Albert Caspers, Ford of Europe's chairman before the Ford 2000 program started in 1995, suggests: "The philosophy was to develop a part only once from one supplier in the world. This is the first project where we have done this". One of the key strategies was to reduce the total number of suppliers severely. The Tempo and Topaz models that preceded the American version of the world car had over 700 different suppliers. Ford was able to reduce this number to 227, using a world-wide supply office and early sourcing. The suppliers that participated were chosen through a global search. Ford itself used the term global-capable suppliers to illustrate its requirements. The suppliers were either chosen on their past performance or on a surrogate part. Mr. Dick Fite, who was the CDW27 supply director at the time, says: "The basic management challenge was to bring the two regional supply bases in North America and Europe together to find the best of all worlds in terms of technology, quality, cost, and logistic efficiency, so we could rationalize down to the fewest number of suppliers of best-of-class components on a worldwide scale". One way of achieving this reduction that Ford used was the tiering of suppliers. At Ford in Basildon (U.K.), Alan Draper, exterior purchasing agent, said (back in 1993): "We have used tiering in areas like instrument panels for several years and are looking to extend the concept to other areas". The suppliers were approached long in advance of actual production. Most of the contracts were agreed upon for a longer period of time. Many suppliers committed themselves to the project around 1989-1990. This allowed Ford enough time to discuss the car and its components extensively with the suppliers.

Just-In-Time is a central element of the production of the world car, although the intercontinental suppliers could, of course, not deliver JIT. For the other supplies, there was a great perseverance in pressing suppliers to set up plants in the proximity of Genk, in the case

of the European Mondeo. Ford itself did not hold any stock of components and parts in the plant as part of the JIT system. This is why many new sites were established within 30 km of Genk, delivering within the hour. They included Kautexwerke (gas tanks) and Lin Pac Ekco (interior front door trim panels), who both started production in Belgium, in the towns of Tessenderlo and Overpelt. A second group started production a little further away, such as Ryobi Aluminium Casting. The Japanese parent of this company was asked by Ford to produce transmission and clutch cases for the Mondeo. A new and successful plant was established in Carrickfergus, County Antrim, Northern Ireland. In 1994 it was heralded as the 'best factory in Northern Ireland'. A third track followed, was by suppliers that were already located near Genk. Rehau, from Rehau in Germany entered into a co-operative agreement with Arrow Molded Plastics of Circleville, Ohio. Together they developed interior scuff plates, which Rehau then produced for the Genk factory and Arrow for North American production. Finally, some European producers moved to North America to establish joint ventures there, as well as Americans coming over to Europe.

The ever-present cost issue played an important role in the sourcing network of Ford. Economies of scale were an important reason to develop a world car. Ford estimated that through the higher volumes, it was able to reduce the cost of supplies by $150 a car. Since some 700,000 cars were made annually, this saved the company up to $100 million a year. The following statement by Mr. Draper neatly illustrates the cost pressure that Ford puts on its suppliers: "we are asking our suppliers to absorb all future cost increases resulting from more expensive labour, materials, and overhead". Thus these buyer-supplier relationships were not just co-operative, but contained elements of conflict too.

To what extent was this sourcing network international? It involved mainly suppliers that produce in North America and Europe, although some of these suppliers originated from Japan. Of the aforementioned $2.5 Billion, $140 Million involved exports from Europe to North America and $260 Million exports from North America to Europe. The North American share in the components of the European Mondeo was somewhere around 15%. This figure used to be in the range of 1-2% for older models, so this was a really remarkable change. This project also revealed some clear differences between supplier processes in Ford Europe and Ford North America, which created serious problems in the project: achieving maximum component commonality and quality were made much harder. On the other hand it also allowed Ford to gain insight in the peculiarities of the two parts of its organisation. These two different practices provided the firm with a possibility for learning.

Information Technology

The Mondeo project posed two different kinds of demands on Ford's information systems. First there was a need for IT to support or replace existing manual labour in the design and engineering area. This is simply a requirement in all modern production, particularly production of automobiles. Because of the increased complexity of cars, the ever-increasing technical demands and cost pressures all carmakers have introduced IT in these processes. Second, Ford was looking at ways to rapidly exchange data between different parts of the world and to support long-distance communication between its employees and with its suppliers. This was specific to the world car project because it put demands on international information exchange that were not there in a regular European or North American project.

Chapter 7

The global scale of production allowed Ford to reduce the number of times certain operations had to be performed. Two prime examples of IT of the first kind of IT application mentioned above are structure calculations and design improvements. Ford invested in networked computers for problem solving in the body structure design. To calculate the optimal body structure the finite element method is used nowadays. Basically the finite element method calculates what happens when pressure is put on small squares. Up to 70,000 small squares combine to form the body structure of the car. In order to make such calculations Ford had to use a large and powerful computer. Therefore it bought a new Cray 4MP super-computer during the Mondeo project, which was located at Ford's headquarters in Dearborn, Michigan. This computer served both the European and U.S. versions and ran for almost a year to complete all calculations. Obviously, this kind of application completely relies on computers like the Cray 4MP. The design of the car poses other problems. Fritz Mayhew, chief of North American design of Ford suggested: "An internationalism has taken over in designs and products, making it much more possible to do a global car". In order to do that, Ford's engineering people had to rely on standardised programs like Computer Aided Design and Computer Aided Manufacturing (CAD/CAM). In 1991 an international engineering team was installed in the Genk plant to prepare for the production launch of the Mondeo. This team exchanged data and pictures with other Ford engineering centres globally. CAD/CAM was the key tool used to reduce development times.

The second kind of IT application mentioned above does not deal with the technical capabilities of computers, but with the ability of IT to support communication processes over longer distances and to integrate geographically remote parts of the Ford organisation and its suppliers. During the Mondeo project Ford installed real-time multi-site simultaneous engineering and information transfer as well as a global e-mail system. Many up front investments in facilities were made by Ford to allow for supplier involvement in product development, supply and manufacturing. This included telecommunications and computer equipment. From the earlier adventures with the Escort model, Ford had learned that real integration would be important. To achieve such integration Ford relied more heavily than in the past on information technology, like a complex video conferencing system. Prior to the launch of Mondeo production video conferencing was already used in communications between Ford's technical centres in Dunton, U.K. and Metternich, Germany. Later a transatlantic link was established. The video conferencing rooms Dunton are booked up to 16 hours a day. John Oldfield, head of the world car program said about the transatlantic video link: "Without video conferencing, the amount of travelling involved and the time differences would make a project like CDW27 near impossible". To make the global engineering project viable a world-wide communication infrastructure was needed particularly one that would allow for sufficient communication with external suppliers. However, not everything could be solved by long-distance communication. It was necessary for the project to physically move people. John Oldfield, the project leader, travelled back and forth across the ocean about once a month for six years. Throughout the project there were a minimum of 35 Americans working in the European organisation, mostly engineers, purchasing people and finance people. At one point the engineering team consisted of some 800 people. Ford flew hundreds of technicians back and forth across the ocean. Just before production started in Genk, Ford temporarily airlifted some 150 engineers from England and Germany to big, trailer-like mobile offices outside the Genk plant (at an estimated cost of $4 million to $6 million). Their goal

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was troubleshooting and solving production problems. However, Ford believed it was getting more for its money than the three new models. This includes an improved global communications network. Alex Trotman suggested in 1994 that: "But our investment is in much more than hardware. We've been learning a new way of doing business for the long term. I have envisaged Ford with a global organisation since the late 1960s. It's a natural evolution. Now is the right time for such a change. The tools are there – computers and communications – and we have a strong balance sheet. If you make big changes when times are difficult, expediency often takes precedence."

Analysis

The advantages of going global were demonstrably there. Ford saved money by ordering larger supply quantities. Furthermore it could use the same internally produced parts, such as submissions, for the three cars on both sides of the Atlantic. The case also shows that *Ford has struggled to find the balance between global integration and local activities*. While the benefits of going global appeared obvious to the firm's managers, Ford was unable to avoid duplicating structures and adapting its cars to local demand. Local regulation was one reason for adapting the cars: North America and Europe obviously differ in some respects. Different consumer tastes also contributed to the adaptations. Europeans and North Americans sometimes tend to use their cars in different ways. For example parking space is limited in most of the (older) European cities and streets can be rather narrow. North Americans often drive longer distances, thus preferring cruise control. Many Europeans prefer manual transmissions because it fits their driving style better than an automatic transmission. Thus some of the barriers to going global could not be overcome by Ford.

Was new IT the key enabler in establishing this global production and supply structure? From the case description two arguments stand out. One is that Ford could not have made the transition required for the world car without new means of information technology and communication technology. Second, these new technologies helped to overcome some of Ford's problems, but failed to remove all of its concerns. It was still necessary to move around large numbers of people in order to deal with local production problems for example. Ford seems to have done a good job in integrating some of the technical functions involved in the project, particularly engineering and design. It is also obvious that most, if not all, of the sales efforts were localised. In fact, most consumers may not have noticed that they were buying a world car! As far as external suppliers are concerned, there is not much information on the use of IT. In historical perspective it seems that what occurred at Ford during the Mondeo project was a change of two kinds when compared with earlier experiences. First, there was information technology to allow for communication across borders, or perhaps we should say across oceans. Second, there was a conscious effort to have employees on both continents communicate with one another about the main design but also about all the details involved in getting the car produced.

Was the performance of the world car project good enough to call this car a new model T? Ford itself reported to be quite satisfied with the results of the world car project. Sales of the Mondeo model in Europe were quite good from the beginning, 470,000 units over the first 15 months, and it was also chosen as the European car of the year in 1994 right after it was launched. It must be admitted that the first remake of the model came rather quick

though, in 1996. Table 2 provides the units sales of the Mondeo in Europe and its market share.

1993	1994	1995	1996	1997	1998	1999
317,765	380,083	353,769	323,727	331,003	317,843	231,943
10.1%	13.3%	13.0%	11.3%	10.8%	9.7%	7.4%

Table 7.2: number of units sold by the original Mondeo model
and its European market share in the medium-sized car segment.

In the North American market the sales were reasonable too, although the model targeted a smaller segment from the beginning. In North America there were questions surrounding the high pricing, which caused some problems in marketing the product. Ford itself cited the learning effects, both internally and towards suppliers, as a very positive outcome. According to Mr. Parry-Jones, the vice-president who was in charge of the only Europe-based vehicle centre in the new Ford 2000 structure: Ford "is now a lot more comfortable with the idea of working across the major regional borders between Ford and its supply bases and between the various organisational elements within Ford". This implies that Ford has increased its ability to conduct such global projects. As such, the company appeared to be quite satisfied with the outcomes of the projects. Although it may not have constructed a new model T, it did set out in a new strategic direction by becoming a more global firm.

External critics of the project have centred on two issues. The first is whether it is really possible to build a global car and use global suppliers. The problem is that while cost savings drive the need for a global car, there is a danger of the result being too compromised to appeal to any specific market. In other words, consumers in different countries do want special features. Ford encountered this problem for example with the cup holder, that is a standard item in the U.S., but not so in Europe. As has been mentioned before, because of local tastes and regulations, the two versions only have 90% of the elements in common. Some industry watchers have also doubted whether consumers really want a global car. They suggested that an excellent car is what consumers want. Both the Honda Accord and Toyota Camry models have been sold across continents in roughly the same versions as well. But this was not because they had been made with the idea of a global car in mind, but rather because they were built to be excellent cars. These critics suggested that an excellent car can sell globally, but a global car cannot sell without some form of excellence. On a more basic level one can also wonder whether a car that is produced in only two regions is really global and whether sourcing almost 100% from the same two regions is really global sourcing.

The second issue of criticism concerned the development time of the car. The standard that was set by most Japanese producers is 2 to 3 years. It took Ford some 7 to 8 years to develop the car, and even 4 years after outside suppliers were first involved. The $150 savings per car that were reported earlier by sourcing in larger quantities, were more than offset by a $200 extra investment per car that Ford had to make in the car, following an improved standard that Nissan introduced in the European market in 1991 (including improvements in the suspension and the engine mounts). So the long development time cost Ford dearly.

Ford beyond the Mondeo introduction

After the introduction of the first world car, Ford decided to take the integration of regional organisations further. As part of the Ford 2000 program, it announced in 1994 that the European and North American car businesses would be merged into the division Ford Automotive Operations. The Asian and South American/Rest of World organisations were being left out for the time being. Since January 1, 1995, Ford was organised along product lines, in so-called vehicle program centres. Of these centres, four were based in the United States, whereas one was based in Europe. Each centre was responsible for the world-wide design, operations and sales of a single product category. Ford was truly trying to introduce this method of global sourcing in all of its operations. A key statement of the Ford 2000 program was that Ford has 'a preference for suppliers with world-wide presence and resources to support global product development and manufacturing strategies'. The Ford 2000 program also included centralising key managerial talent. Finally, it was unclear whether the organisation along products in the program vehicle centres according to Ford 2000 would be beneficial. It was reported in the Financial Times in 1996 that many motor industry bosses said "Ford has failed to take account of the risks involved in convulsive change and will suffer as a result. Others, however, argue that hesitation today will only make the inevitable task of restructuring more difficult tomorrow". Four years later, in late 2000, reports emerged that the Ford 2000 vehicle program had resulted in a strong centralisation of activities in North America. As a result, Ford was thought to have lost touch with its European consumer base, which caused a loss of market share. It was suggested (Muller, Welch, Green, Woellert and St. Pierre, 2000) that the Ford 2000 program led to an overly centralised organisation and leaving Ford without leadership in Europe, South America and Asia. As a remedy the new Ford CEO, Jacques Nasser reinstalled executives for various regions in 1999. The strong point of the whole Ford 2000 operation and Nasser's subsequent moves appears to be that development times have come down dramatically, towards the level of Ford's main competitors.

The Internet

As far as using information technology is concerned Ford also took major steps in introducing new tools. The explosive growth of the Internet after the introduction of the Mondeo, triggered new opportunities to improve information exchange between Ford and its suppliers. Ford says that its top priorities are currently customer satisfaction and E-business. A much-publicised example is Covisint, a co-operation started by GM, Ford and DaimlerChrysler which aims to be a marketplace for the automobile industry. Much of the data infrastructure of Covisint and other initiatives is taken care of by ANX, the Auto Network Exchange. Ford participates in ANX since 1998. ANX is a private, virtual network that connects major carmakers in North America and over 280 of their suppliers. It is used amongst others for design drawings, secure routing of product specifications and EDI transmissions. The advantage of ANX is that it removes existing proprietary connections between buyers and suppliers and thereby improves interchangeability. ANX is much faster than existing communication lines, reducing turnover times by 50 to 75%. This can generate large cost savings, while maintaining or improving the security of data exchange. ANX is able to cope with a large variety of data sources. While exclusive Intranets or Extranets induce only more connections and a larger burden of work, an open Extranet like ANX decreases the number

of electronic links. As the number of network members rises, so do the benefits of ANX. Ford's usage of ANX includes CAD / CAM applications, client server applications, interactive mainframe applications and TCP/IP file transfer[79]. ANX and its members have been pursuing expansion outside of North America. As Joe Boyd, telecommunications analyst of Ford in Dearborn said: "There's the issue of international suppliers needing to get access to applications on servers back here in North America, where we need the flexibility to support ones on other continents. An international ANX would be very desirable to us".

Conclusions

To what extent is Ford's experience in trying to achieve global integration by using information technology applicable for other firms and industries? It appears that all firms that internationalise their operations at one time or the other are confronted with conflicting demands. When McDonalds, the icon of global capitalism, internationalised its operations it soon found out that it was usually necessary to adapt its menu to local demand. Furthermore some countries had regulation that prohibited some of the practices the firm developed in the United States. The benefits of global integration are often taken for granted by internationalising firms or industry observers. However, there is no such thing as a uniform process of globalisation. One may suggest that only 10% of the European Ford Mondeo was different from the North American Ford Contour and Mercury Mystique. However, precisely this 10% raised the cost level of the car to $6 billion and delayed its introduction in North America (Smith, 1994). *Even in the Internet age there is a friction between global integration and local responsiveness.*

As for Ford itself it may well be concluded that the Mondeo / Mystique / Contour was a turning point in its history. The world car has fundamentally altered Ford's approach to building cars, which used to be two different approaches, depending on where the car was built. The world car induced an organisational change, in the Ford 2000 program, aimed at globalisation. *While it is not said that the outcomes of this program are positive, it is an important step in redefining the car industry.* Mondeo may not be a new model T. Then again: will there ever again be a car that bears the significance for mankind that this one model did, with its 15 million units of sales? Perhaps we should forget about the capital T and simply refer to Mondeo as Ford's 'new model t'.

Year	Event	Outcome
1960	First attempt to build a world car	American version is never produced
1981	Second attempt, Ford Escort	Two versions differ completely
1986	Third attempt is started	One U.S.-European engineering team
1989	Supplier involvement starts	Many components developed together
1993	Production and sales in Europe	
1994	Production and sales in U.S.	
1995	Ford 2000 program	European and U.S. operations integrated
1999	Ford 2000 program fails	Regional executives re-appointed
2000	New Mondeo launched	

Table 7.3: short summary of events and their outcome.

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[79] For details see: http://www.anx.com/downloads/ford.pdf

7.2   Internationalisation of the supply base

Similar to Ford, manufacturing firms in the Netherlands have been internationalising their supply chains. The term global sourcing, which has never been translated into a Dutch equivalent, is widely used by Dutch sourcing managers[80]. However, little research has been undertaken to either assess the extent of internationalisation of the supply base of manufacturing firms in the Netherlands or to investigate the impact of this internationalisation on firm performance. In this section an overview will be given of the extent of internationalisation of the supply base of manufacturing firms in the Netherlands as well as how this is related to their performance. The survey will be the basis of this analysis.

The survey asked firms where their external suppliers were located in terms of volumes sourced from a particular country or region[81]. An overview of the average geographical spread of the supply bases of all firms is given in table 4. On the basis of this table one would tend to conclude that internationalisation of the supply base is mainly limited to other EU countries, with the exception of a few firms or industries[82]. More than half of all sourcing is from within the Netherlands. In fact 19 firms sourced exclusively from the Netherlands, although another 13 did not source anything from the Netherlands. Among foreign countries the Germanic countries are most popular. This is unsurprising given the larger annual trade volume between Germany and the Netherlands. Germany has been the most important trade partner of Netherlands since what seems like forever. Among the other EU countries there is more or less an even spread, although Belgium as the only other directly neighbouring country also accounts for a significant volume of sourcing. *Beyond the EU there is not much sourcing activity going on*. Most of that activity is concentrated in Anglo-Saxon countries and to some extent in Central and Eastern Europe and Asia.

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[80] For instance Stork's corporate purchasing department installed a global sourcing manager in the late 1990s to promote international sourcing among its business units. This manager initiated various trips to countries like the Czech republic and Portugal. The department has now undergone organisational changes, a consequence of which is that the global sourcing function is no longer supported at the corporate level.

[81] When combining the sourcing volumes of all countries, the total that should emerge is 100%. For around 10 firms this total did not add to 100%. Most of the firms were close to 100%, suggesting that rounding off in one direction or the other led to these differences. A few firms were further off the mark. In order to be able to compare the firms, it was necessary to standardise all values such that the total was indeed 100%. All the values that are reported and used here are standardised values.

[82] Both Norway and Switzerland are seen as part of the European Union although they are not EU members. Both countries are members of the European Economic Area (EEA) implying they are actually a part of the same market. Furthermore the physical distance of these countries to EU countries is limited, with Switzerland actually being very close to the geographical centre of the EU. And in terms of country cultures Norway is usually seen as quite similar to other Scandinavian countries while Switzerland draws many comparisons to other Germanic countries. This is especially true for Swiss manufacturing firms that are mostly located in the German-speaking area of the country.

	Netherlands	Belgium Luxem-bourg	Denmark Finland Norway Sweden	Germany Austria Switzerland	France Spain Portugal Italy	U.K. Ireland	Greece	EU total
Mean	55.4%	5.7%	3.9%	17.4%	4.3%	2.6%	0.02%	89.3%
St. dev.	31.5	12.7	12.1	21.1	10.8	8.58	0.28	20.0
Minimum	0%	0%	0%	0%	0%	0%	0%	2%
Maximum	100%	100%	100%	100%	100%	75%	4%	100%
	Central & Eastern Europe	U.S. Canada Australia	Japan	Rest of Asia	Other countries			Grand total
Mean	2.5%	3.6%	1.6%	1.9%	1.1%			100%
St. dev.	8.36	12.0	6.42	8.06	5.65			0
Minimum	.00	.00	.00	.00	.00			100%
Maximum	60%	98%	50%	80%	60%			100%

Table 7.4: average spread of supply base among countries and regions of the world. Valid listwise N = 199.

The results above are not weighted according to size of the firm. However, one can argue that size of the firm is a key factor in determining the extent of internationalisation of sourcing. Larger firms are less likely to find suppliers of the appropriate size in the Netherlands. Larger firms are more international because a larger part of their size is formed by exports. So they are more likely to be exposed to international competition and international suppliers. And given their size they may be more eligible to receive price reductions when sourcing from one supplier world-wide. Smaller firms source internationally when they are highly specialised players requiring goods that are not produced everywhere. But it is likely that this is only a small group of smaller firms. To investigate these size effects, a weighed average was calculated that incorporated the total sourcing volume of the firm. The results of this can be found in table 5.

These results indicate that incorporating the sourced volume induces a number of significant changes. The main findings are still that most sourcing, 84%, occurs within the European Union and that a substantial part of sourcing, 37%, is from within the Netherlands. However, also notice that several foreign sources are used more heavily than the previous table predicted. More than one fourth of all sourcing is from the Germanic countries. The European Union is by far the largest supply source for manufacturing firms in the Netherlands. This also confirms what is generally accepted by now: for firms like these the EU should be thought of as the local market. Looking only at the Netherlands as the local market is incorrect in several ways. First the EU is officially a single market. Then the regulatory and institutional frameworks apply equally across Europe and most of the trading occurs within the EU. But there is sourcing from outside the EU as well. Some 6% of all sourcing is from Anglo-Saxon countries outside Europe while 4% is from Japan and 3% from the rest of Asia. These are not very high numbers but they do indicate that *there is some global sourcing activity* going on by manufacturing firms in the Netherlands. In general the findings confirm the literature discussed in previous chapters: much sourcing occurs locally and only a limited amount of sourcing, 16% in this case, occurs outside of the home region.

	Netherlands	Belgium Luxem-bourg	Denmark Finland Norway Sweden	Germany Austria Switzerland	France Spain Portugal Italy	U.K. Ireland	Greece	EU total
Mean	37.3%	4.4%	5.0%	26.6%	6.0%	4.6%	0.02%	84.0%
Minimum	0%	0%	0%	0%	0%	0%	0%	2%
Maximum	100%	100%	100%	100%	100%	75%	4%	100%
	Central & Eastern Europe	U.S. Canada Australia	Japan	Rest of Asia	Other countries			Grand total
Mean	1.9%	6.0%	4.1%	2.7%	1.2%			100%
Minimum	.00	.00	.00	.00	.00			100%
Maximum	60%	98%	50%	80%	60%			100%

Table 7.5: weighed average spread of external supply base among countries and regions of the world incorporating sourced volumes[83]. Valid listwise N = 199.

Another finding from the literature is that those firms most likely to source non-locally are in fact host (foreign) firms. Some additional analyses were performed to look at the effect of foreignness on the sourcing pattern, see table 6. Obviously statistical significance of these findings is severely hampered by the small number of foreign firms and the even smaller number of non-EU firms. Keeping this restriction in mind the general pattern seems to confirm the expectations raised in chapters 1 and 2, in particular tables 1.2 and 1.5.

	Netherlands	Belgium Luxem-bourg	Denmark Finland Norway Sweden	Germany Austria Switzer-land	France Spain Portugal Italy	U.K. Ireland	Greece	EU total
Belgium	80%	10%	0%	10%	0%	0%	0%	100%
Finland	57.5%	5%	27.5%	10%	0%	0%	0%	100%
France	87.5%	0%	5%	7.5%	0%	0%	0%	100%
Germany	49.7%	1.9%	3.2%	20.2%	3.3%	1.9%	0%	80.1%
Ireland	55%	5%	0%	35%	5%	0%	0%	100%
Israel	0%	0%	0%	0%	2%	0%	0%	2%
Japan	55%	2.5%	2.5%	10%	10%	10%	0%	90%
Luxembourg	90%	0%	5%	0%	0%	0%	0%	95%
Netherlands	57.7%	6.3%	4.0%	16.6%	3.7%	2.2%	0%	90.5%
Sweden	54%	7%	3.4%	21.6%	9%	.6%	0%	95.6%
Switzerland	43.3%	0%	0%	26.7%	5%	16.7%	0%	76.7%
U.K.	35.3%	6%	7.5%	20.3%	7.5%	21.3	10%	98.8%
U.S.	29%	3.5%	.1%	26.7%	12%	4.4%	0%	75.7%

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[83] Obviously a standard deviation can now not be calculated because the averages presented here emerge by dividing sourced volumes in one country or region by total sourced volumes. Minimum and maximum values are simply retained from the previous table.

	Central & Eastern Europe	U.S. Canada Australia	Japan	Rest of Asia	Other countries			Grand total
Belgium	0%	0%	0%	0%	0%			100%
Finland	0%	0%	0%	0%	0%			100%
France	0%	0%	0%	0%	0%			100%
Germany	6.4%	10.4%	1.3%	1.6%	.2%			100%
Ireland	0%	0%	0%	0%	0%			100%
Israel	0%	98%	0%	0%	0%			100%
Japan	0%	5%	5%	0%	0%			100%
Luxembourg	0%	0%	0%	0%	5%			100%
Netherlands	2.6%	2.5%	1.8%	1.6%	.9%			100%
Sweden	0%	0%	0%	4%	.4%			100%
Switzerland	1.7%	0%	6.7%	0%	15%			100%
U.K.	0%	0%	1.3%	0%	0%			100%
U.S.	2.7%	11.3%	0%	9%	1.3%			100%

Table 7.6: average spread of external supply base among countries and regions of the world by country of origin. Valid listwise N = 199.

Dutch firms obtain an above average percentage of sourcing from the Netherlands while foreign firms are more likely to use foreign sources, although they use Dutch sources substantially. Furthermore EU firms (excluding Dutch firms) use more EU sourcing while non-EU firms, which are mostly U.S. firms in this sample, use more non-EU sourcing, in particular sourcing from the United States. Among the EU firms only German firms are represented by a somewhat larger group of firms (9). They again use Germany more often as a supply source. This provides some evidence for both the effects of foreignness and home country effects.

Having established the extent of international sourcing, the next question relates to hypotheses 5 and 6 from chapter 3. Does international sourcing improve firm performance? To answer this question regression analyses were performed again. The *variables that are employed in this section are the same variables applied in chapter 5.3 with the addition of foreign sourcing (FOREISOU) and foreign experience (FOREXPER).* An overview of all variables can be found in table 4.37. First, correlations between variables were assessed. These can be found in table 7 in appendix C. Direct correlations between internationalisation and performance are virtually non-existent. There is a positive link between total EU sourcing and sourcing from the Netherlands. This was expected since total EU sourcing is to a large extent sourcing from the Netherlands. Foreign firms source more from outside the Netherlands and outside the EU, which confirms the results of the descriptive analysis above. And there is a negative relation between domestic / EU sourcing and extent of external sourcing as measured by the total production cost measure (totproco). This implies that firms that have a high percentage of their production costs supplied externally are more likely to source internationally. This relation does not show up for the other measure of external sourcing (purratsu).

Economic performance

Like in chapters 5 and 6 mathematical models will be formulated that represent the theoretical model in chapter 3. Then statistical analysis will take place based on the measures that are categorised in table 4.37. The regression analyses are based on the models used in chapter 5. The model applied to sourcing strategy before will now be extended to include effects of international sourcing and foreignness. The following equation describes the model:

$$(1) \; ECONPERF = \beta_0 + \beta_1 * logpursu + \beta_2 * respjob + \beta_3 * respexp + \beta_4 * industry + \beta_5 * purinteg + \beta_6 * percstan + \beta_7 * firmstra + \beta_8 * external \; sourcing + \beta_9 * foreign \; sourcing + \varepsilon$$

The model that emerges in table 7 is very similar to the model presented in chapter 5, table 13. This implies that inclusion of internationalisation of the supply base does not add to the explanatory value of the model. Foreign sourcing (all sourcing from outside the Netherlands) is among the weakest variables in the model, which suggests that it is not really related to economic performance at the firm level. It is not useful to re-run the model in an effort to improve it, since the same model will emerge that was shown in table 13 of chapter 5. A similar model was tested where foreign sourcing was replaced by EU level sourcing[84]. This model did not come up with anything close to a significant link either. Similarly a country-by-country explanation was not a useful explanation.

	Stand. β	t-value	Sig.
(Constant)		6.348	.000
LOGPUR	-.187	-2.264	.025
TOPMAN	-.135	-1.531	.128
PURCHSPE	-.016	-.176	.861
ANALYZER	.400	2.094	.038
PROSPECT	.378	1.882	.062
REACTOR	.120	.808	.420
PROCINDU	.026	.204	.839
PRODINDU	-.140	-1.041	.299
RESPEXP	.038	.499	.618
PURINTEG	.024	.319	.750
PERCSTAN	-.126	-1.625	.106
TOTPROCO	.156	1.995	.048
PURRATSU	-.075	-.973	.332
FOREISOU	.010	.126	.900
	F-test: 1.629		.076
	R^2: .120		
	Adj. R^2: .046		

Table 7.7: extended model for explaining economic performance
with survey data including foreign sourcing. N = 182 / 182.

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[84] This is of course equivalent to running a model on non-EU sourcing except that the sign of the variable will be opposite.

Although there is no direct effect of international sourcing on performance, it is still possible that there are interaction effects. Hypotheses 15 and 16 in chapter 3 predicted positive interaction effects due to foreign experience and foreignness. Table 8 in appendix C provides the correlations between the interaction variables, the moderating variables, and the independent variable. These effects were tested using the following expression:

(2) ECONPERF = β_0 + β_1 * logpursu + β_2 * respjob + β_3 * respexp + β_4 * industry + β_5 * purinteg + β_6 * percstan + β_7 * firmstra + β_8 * external sourcing + β_9 * foreign sourcing + β_{10} * moderator + β_{11} * foreign sourcing * moderator + ε

As before separate estimations were made for the moderating variables and the interactions. The results of including both moderating variables, foreignness and foreign experience, are shown in the first table, table 8. Interestingly foreign experience, in the sense of the firm being a multinational, has a marginally significant positive effect on performance. This effect is maintained in the improved model on the right hand side. Thus, although being a foreign firm or sourcing abroad are not of significant influence on economic performance, being a multinational is of importance. Otherwise, the analysis confirms the results of chapter 5.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		5.995	.000		7.960	.000
LOGPUR	-.215	-2.499	.013	-.225	-2.959	.004
TOPMAN	-.121	-1.363	.175	-.121	-1.627	.105
PURCHSPE	-.010	-.111	.912			
ANALYZER	.348	1.816	.071	.261	2.576	.011
PROSPECT	.317	1.563	.120	.234	2.354	.020
REACTOR	.091	.609	.544			
PROCINDU	-.005	-.037	.971			
PRODINDU	-.159	-1.187	.237	-.145	-1.883	.061
RESPEXP	.033	.431	.667			
PURINTEG	.044	.576	.565			
PERCSTAN	-.126	-1.639	.103	-.118	-1.590	.114
TOTPROCO	.163	2.075	.040	.144	1.954	.052
PURRATSU	-.037	-.468	.641			
FOREIGN	-.011	-.135	.893			
FOREISOU	-.033	-.398	.691			
FOREXPER	.161	1.947	.053	.142	1.915	.057
	F-test: 1.680		.055	F-test: 3.087		.003
	R^2: .140			R^2: .124		
	Adj. R^2: .057			Adj. R^2: .084		

Table 7.8: extended model for explaining economic performance with survey data including foreign sourcing and moderating variables. N = 182 / 182.

In table 9 the interactions between foreignness and foreign sourcing and between foreign experience and foreign sourcing are tested. Unlike in previous chapters the correlations among the moderators and interaction variables are not very high. Tolerance values are 0.13 and

upward. Therefore it is possible to include both the moderating variables and the interaction effects. The analyses show that the interaction between foreignness and international sourcing does not come into play when explaining performance. It is positive as expected but not significant. Similarly the interaction between foreign experience and foreign sourcing does not perform as expected in hypothesis 16. It is negative and very insignificant. The direct effect of foreign experience (being a multinational) still holds. Thus there is evidence to conclude that *having previous foreign experience is beneficial for firms that source internationally but does not affect their ability to leverage international sourcing for economic performance.*

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		6.238	.000		6.305	.000
LOGPUR	-.183	-2.151	.033	-.212	-2.518	.013
TOPMAN	-.140	-1.571	.118	-.114	-1.282	.201
PURCHSPE	-.028	-.303	.762	-.010	-.116	.908
ANALYZER	.401	2.093	.038	.347	1.812	.072
PROSPECT	.386	1.906	.058	.317	1.566	.119
REACTOR	.126	.842	.401	.092	.622	.535
PROCINDU	.027	.209	.834	.000	-.002	.998
PRODINDU	-.133	-.984	.326	-.159	-1.184	.238
RESPEXP	.038	.490	.625	.030	.402	.688
PURINTEG	.024	.310	.757	.045	.591	.556
PERCSTAN	-.119	-1.524	.129	-.132	-1.699	.091
TOTPROCO	.166	2.088	.038	.159	2.035	.043
PURRATSU	-.083	-1.057	.292	-.033	-.408	.684
FOREISOU	-.026	-.283	.777	.038	.249	.804
FOREIGN	-.117	-.824	.411			
FOREIGN X FOREISOU	.132	.871	.385			
FOREXPER				.217	1.681	.095
FOREXPER X FOREISOU				-.113	-.562	.575
	F-test: 1.465		.118	F-test: 1.702		.051
	R^2: .124			R^2: .142		
	Adj. R^2: .039			Adj. R^2: .058		

Table 7.9: extended model for explaining economic performance with survey data including foreign sourcing, moderators and interaction effects. N = 182 / 182.

Strategic performance

The same analyses were also performed on strategic performance on the basis of this equation:

(3) STRATPERF = β_0 + β_1 * logpursu + β_2 * respjob + β_3 * respexp + β_4 * industry + β_5 * purinteg + β_6 * percstan + β_7 * firmstra + β_8 * external sourcing + β_9 * foreign sourcing + ϵ

The results can be found in table 10. Similar to the findings on economic performance, international sourcing does not appear to be a strong explanation for strategic performance. There is no significant direct relation and the model does not improve as a consequence of including the variables on international sourcing. Again, using EU level sourcing or single countries as alternative explanations does not change these findings. There is no evidence here for a connection between international sourcing and strategic performance.

	Stand. β	t-value	Sig.
(Constant)		4.291	.000
LOGPUR	-.007	-.091	.927
TOPMAN	-.015	-.172	.863
PURCHSPE	.149	1.678	.095
ANALYZER	-.070	-.420	.675
PROSPECT	-.036	-.206	.837
REACTOR	-.164	-1.250	.213
PROCINDU	.016	.124	.901
PRODINDU	-.116	-.874	.383
RESPEXP	-.024	-.318	.751
PURINTEG	-.038	-.501	.617
PERCSTAN	.094	1.243	.216
TOTPROCO	.080	1.042	.299
PURRATSU	.016	.220	.826
FOREISOU	.069	.882	.379
	F-test: 1.526		.106
	R^2: .109		
	Adj. R^2: .038		

Table 7.10: extended model for explaining strategic performance with survey data including foreign sourcing. N = 190.

The model is extended to include moderating variables and interaction effects, giving:

(4) STRATPERF = β_0 + β_1 * logpursu + β_2 * respjob + β_3 * respexp + β_4 * industry + β_5 * purinteg + β_6 * percstan + β_7 * firmstra + β_8 * external sourcing + β_9 * foreign sourcing + β_{10} * moderator + β_{11} * foreign sourcing * moderator + ε

The results of the analysis including the moderating variables are described in table 11. Both being a foreign firm and having foreign experience are very minimally related to strategic performance. As in the previous model foreign sourcing has some positive impact but it is far from significant. If the model is optimised all three variables are dropped from the model and the model originally presented in chapter 5 re-emerges. Thus *no evidence for a relation between having an international supply base and strategic performance at the firm level could be established.*

Table 7.11: extended model for explaining strategic performance with survey data including foreign sourcing and moderating variables. N = 190.

Glob,region,local sourcing

	Stand. β	t-value	Sig.
(Constant)		4.162	.000
LOGPUR	-.003	-.041	.967
TOPMAN	-.016	-.185	.853
PURCHSPE	.148	1.664	.098
ANALYZER	-.070	-.412	.681
PROSPECT	-.037	-.209	.835
REACTOR	-.164	-1.239	.217
PROCINDU	.016	.126	.900
PRODINDU	-.117	-.872	.384
RESPEXP	-.020	-.262	.794
PURINTEG	-.039	-.510	.611
PERCSTAN	.094	1.235	.219
TOTPROCO	.081	1.050	.295
PURRATSU	.014	.185	.854
FOREIGN	.070	.857	.393
FOREISOU	-.016	-.201	.841
FOREXPER	-.002	-.021	.983
	F-test: 1.323		.188
	R^2: .109		
	Adj. R^2: .027		

In table 12 the interactions are included.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		4.178	.000		4.189	.000
LOGPUR	-.004	-.046	.964	-.008	-.097	.923
TOPMAN	-.015	-.170	.865	-.016	-.185	.853
PURCHSPE	.152	1.689	.093	.148	1.662	.098
ANALYZER	-.072	-.428	.669	-.070	-.412	.681
PROSPECT	-.041	-.233	.816	-.035	-.199	.842
REACTOR	-.166	-1.260	.209	-.164	-1.241	.216
PROCINDU	.015	.121	.904	.015	.114	.909
PRODINDU	-.120	-.891	.374	-.117	-.867	.387
RESPEXP	-.020	-.256	.799	-.024	-.312	.755
PURINTEG	-.038	-.508	.612	-.038	-.494	.622
PERCSTAN	.092	1.205	.230	.095	1.241	.216
TOTPROCO	.079	1.009	.314	.081	1.042	.299
PURRATSU	.017	.218	.827	.015	.197	.844
FOREISOU	.080	.908	.365	.054	.352	.725
FOREIGN	.015	.110	.913			
FOREIGN X FOREISOU	-.040	-.265	.791			
FOREXPER				-.013	-.104	.917
FOREXPER X FOREISOU				.025	.124	.901
	F-test: 1.328		.185	F-test: 1.321		.189
	R^2: .109			R^2: .109		
	Adj. R^2: .027			Adj. R^2: .026		

Table 7.12: extended model for explaining strategic performance with survey
data including foreign sourcing, moderators and interaction effects. N = 190 / 190.

The story is similar to previous analyses: no interaction effects can be detected. Neither being a foreign firm nor having previous foreign experience lead to an increased ability to leverage international sourcing to obtain strategic performance. The effects of the independent variable, international sourcing, remain minimal as before.

7.3   Dealing with international suppliers

The data at the firm level are now complemented by data at the relationship level. The survey also investigated the location of the largest supplier. This location will now be related to how well a supplier performs according to the buyer. The key question in this section is whether having a largest supplier from abroad matters in explaining satisfaction about this supplier.

First an overview of the countries in which the largest supplier is located is given in table 13. As expected most firms (121) indicated that their largest supplier is located in the Netherlands, but there are also 79 firms with largest suppliers abroad. Of these firms, many indicated Germany was home to their largest supplier. The number of largest suppliers located in non-OECD countries is quite limited at 7 out of 200. If the largest supplier was located in the Netherlands, firms were also asked to provide the physical distance between themselves and their supplier. This was done to make an estimate of the importance to the respondents of just-in-time deliveries and local clustering. Perhaps surprisingly there was not so much local clustering occurring. Only 17 out of 121 firms had their main supplier within less than 20 kilometres. Most suppliers (73) were located anywhere in between 20 and 100 kilometres from the buying firm.

Country	# of firms	Country	# of firms
Netherlands	121	Argentina	1
Germany	33	Denmark	1
Belgium	8	Norway	1
France	5	Italy	1
United States	5	Poland	1
Japan	4	Hungary	1
Sweden	4	Spain	1
Canada	2	Czech Republic	1
Switzerland	2	Ireland	1
Finland	2	South Korea	1
United Kingdom	2	Slovakia	1
Indonesia	1		

Table 7.13: location of the largest suppliers of the firms in the sample (N = 200).

Does it matter for its performance whether a supplier is located abroad? This is the next point of analysis. One would tend to think that firms that go abroad for finding their largest supplier do so for a reason. To test whether this is true, the models from chapter 6 were applied again. The *variables that are employed in this section are the same variables applied in chapter 6.1 with the addition of foreign supplier (FOREISUP), being a foreign firm*

(FOREIGN) and foreign experience (FOREXPER). An overview of all variables can be found in table 4.37. First the correlations involving these variables were calculated, see table 8 in appendix C. There is only one strong correlation: between having a Dutch supplier and the other variables. Sourcing managers perceive that having a Dutch supplier means that the supplier has less power: foreign suppliers are more powerful. Perhaps an explanation is that Dutch suppliers are more expandable or replaceable than foreign suppliers, because if there is a Dutch supplier for a good there will probably be a much wider range of potential suppliers for that good globally. If firms have to go abroad to find a supplier, there are probably fewer suppliers available globally. There are no significant linkages between being a foreign firm and any of the other variables.

Economic performance

Next the economic performance impact was assessed using the basic model including voice relations from chapter 6. This model was then supplemented by a dummy variable for having a foreign supplier. It is represented by the following equation:

(5) $ECONPERF = \beta_0 + \beta_1 *$ log purchasing $+ \beta_2 *$ respexp $+ \beta_3 *$ respjob $+ \beta_4 *$ industry $+ \beta_5 *$ rellength $+ \beta_6 *$ reldevel $+ \beta_7 *$ trust $+ \beta_8 *$ voicerel $+ \beta_9 *$ foreisup $+ \varepsilon$

Table 14 demonstrates the outcomes of the analysis. Adding the foreignness of a supplier to the model hardly increases the explanatory power of the model. The relation between having a foreign supplier and performance is slightly positive but not significant. If the model is improved by excluding the least significant variables, the resulting model is the same model presented in chapter 6, table 4, which implies foreignness of the supplier is not among the important variables. Thus there is *no evidence for any impact of having an international supplier on economic supplier satisfaction.*

	Stand. β	t-value	Sig.
(Constant)		2.792	.006
TOPMAN	.109	1.677	.095
PURCHSPE	.152	2.297	.023
RESPEXP	.017	.297	.766
PRODINDU	-.128	-1.345	.180
PROCINDU	.064	.666	.506
LOGPUR	-.047	-.827	.409
TRUST	.366	5.000	.000
RELGROWT	.017	.259	.796
RELLENGTH	-.065	-1.149	.252
VOICEREL	.324	4.504	.000
FOREISUP	-.040	-.697	.487
	F-test: 13.911		.000
	R^2: .453		
	Adj. R^2: .420		

Table 7.14: basic model for explaining economic performance of supplier relations including voice relations and having a foreign supplier. N = 197.

Now the interactions are tested according to the following equation:

$$(6)\ \text{ECONPERF} = \beta_0 + \beta_1 * \log \text{purchasing} + \beta_2 * \text{respexp} + \beta_3 * \text{respjob} + \beta_4 * \text{industry} + \beta_5 * \text{rellength} + \beta_6 * \text{reldevel} + \beta_7 * \text{trust} + \beta_8 * \text{voicerel} + \beta_9 * \text{foreisup} + \beta_{10} * \text{moderator} + \beta_{11} * \text{foreisup} * \text{moderator} + \varepsilon$$

The correlations among the independent variable and the interaction variables are displayed in table 8 in appendix C. The tolerance values on analyses (0.17 and upward) do not reach such low levels as in some of the analyses in chapters 5 and 6. Therefore it is possible to include both the interaction variables and the moderators in the analysis. Table 15 presents the results of these models. There are no significant effects either directly or through the interaction. This implies that being a foreign firm or having previous foreign experience do not really make a firm better at managing an international supplier in the sense that no higher supplier performance is obtained this way.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		2.736	.007		2.963	.003
TOPMAN	.106	1.632	.104	.114	1.726	.086
PURCHSPE	.152	2.280	.024	.158	2.380	.018
RESPEXP	.014	.238	.812	.013	.233	.816
PRODINDU	-.130	-1.350	.179	-.134	-1.400	.163
PROCINDU	.060	.623	.534	.052	.537	.592
LOGPUR	-.048	-.813	.417	-.062	-1.082	.281
TRUST	.372	4.999	.000	.369	5.031	.000
RELGROWT	.015	.231	.818	.014	.215	.830
RELLENGTH	-.068	-1.185	.237	-.064	-1.102	.272
VOICEREL	.326	4.482	.000	.325	4.515	.000
FOREISUP	-.057	-.900	.369	-.150	-1.247	.214
FOREIGN	-.031	-.406	.686			
FOREIGN X FOREISUP	.051	.634	.527			
FOREXP				.029	.423	.673
FOREXP X FOREISUP				.119	.888	.376
	F-test: 11.700		.000	F-test: 11.897		.000
	R²: .454			R²: .458		
	Adj. R²: .415			Adj. R²: .420		

Table 7.15: hierarchical regression models for explaining economic performance of supplier relations including voice relations, having a foreign supplier, being foreign, having foreign experience and interactions. N = 197 / 197.

Strategic performance

This analysis was repeated for strategic supplier performance yielding the following equation:

(7) STRATPERF = $\beta_0 + \beta_1$ * log purchasing + β_2 * respexp + β_3 * respjob + β_4 * industry + β_5 * rellength + β_6 * reldevel + β_7 * trust + β_8 * voicerel + β_9 * foreisup + ε

The results of this analysis are provided in the following table, table 16. Similar to the previous analyses, there is not a strong relation between having a foreign supplier and strategic performance. Thus there is *no evidence for any effects of having an international supplier on strategic supplier satisfaction.*

	Stand. β	t-value	Sig.
(Constant)		1.424	.156
TOPMAN	.048	.685	.494
PURCHSPE	.084	1.177	.241
RESPEXP	-.024	-.393	.695
PRODINDU	-.071	-.690	.491
PROCINDU	-.109	-1.057	.292
LOGPUR	-.060	-.988	.324
TRUST	.298	3.802	.000
RELGROWT	.184	2.724	.007
RELLENGTH	-.008	-.123	.902
VOICEREL	.278	3.659	.000
FOREISUP	.035	.565	.573
F-test: 10.479			.000
R^2: .394			
Adj. R^2: .357			

Table 7.16: basic model for explaining strategic performance of supplier relations including voice relations and having a foreign supplier. N = 189.

For the relation between international sourcing and strategic performance the interactions were tested as well:

(8) STRATPERF = $\beta_0 + \beta_1$ * log purchasing + β_2 * respexp + β_3 * respjob + β_4 * industry + β_5 * rellength + β_6 * reldevel + β_7 * trust + β_8 * voicerel + β_9 * foreisup + β_{10} * moderator + β_{11} * foreisup * moderator + ε

Table 17 gives the results of the models. There are no significant interaction effects nor are there any direct effects of the moderators. This implies that strategic supplier performance is not impacted by being a multinational firm or being a foreign firm. And it also means that being a foreign firm or being a multinational firm does not help a firm to leverage its relations with an international supplier for strategic performance purposes.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		1.399	.164		1.691	.093
TOPMAN	.048	.688	.493	.060	.855	.393
PURCHSPE	.084	1.168	.245	.093	1.302	.195
RESPEXP	-.025	-.394	.694	-.029	-.470	.639
PRODINDU	-.070	-.678	.499	-.084	-.811	.418
PROCINDU	-.108	-1.043	.298	-.128	-1.244	.215
LOGPUR	-.062	-.970	.334	-.087	-1.387	.167
TRUST	.296	3.715	.000	.299	3.829	.000
RELGROWT	.185	2.711	.007	.182	2.704	.008
RELLENGTH	-.007	-.114	.909	-.011	-.180	.857
VOICEREL	.279	3.628	.000	.281	3.703	.000
FOREISUP	.038	.555	.580	-.065	-.508	.612
FOREIGN	.012	.149	.882			
FOREIGN X FOREISUP	-.009	-.100	.921			
FOREXP				.078	1.041	.300
FOREXP X FOREISUP				.095	.666	.506
	F-test: 8.770		.000	F-test: 9.146		.000
	R^2: .394			R^2: .405		
	Adj. R^2: .349			Adj. R^2: .360		

Table 7.18: hierarchical regression models for explaining economic performance of supplier relations including voice relations, having a foreign supplier, and interactions. N = 189 / 189.

Few econometric problems

Since these analyses are extensions of the models used in previous chapters, any problems with the analyses presented here are directly linked to problems discussed in either chapter 5 or chapter 6. The inclusion of the foreignness variable and the domestic versus foreign supplier variable does not lead to any new problems of multicollinearity as the analysis of the tolerance values showed. Given the very low correlations between these variables and all other variables this is as expected.

Little support for hypotheses

Neither hypotheses 5 nor hypothesis 6 were supported. There is *no evidence for a direct performance effect of international sourcing*. Sometimes there was a positive effect associated with international sourcing and sometimes there was a negative effect but all the effects were negligible in size. This finding holds across both the firm level and the relationship level. Firms are unable to increase performance through building a portfolio of international supply relations. And firms are unable to obtain superior supplier satisfaction by choosing an international supplier as their largest supplier.

There was very limited support for hypothesis 15 that foreign experience is a positive moderator on the relation between international sourcing and performance. The expected interaction effect was not found but there was a direct effect of the moderating variable. Multinational firms obtain higher economic performance at the firm level as expected. Hypothesis 16 was not supported. Foreignness does not affect performance nor does it matter

whether the firm is foreign in terms of the international sourcing – performance relation. Table 19 provides an overview of the findings.

	Economic performance	Strategic performance
Independent variable	• No relation (either level)	• No relation (either level)
Moderators	• None found (either level)	• None found (either level)
Other effects	• Foreign experience positively related (firm)	• None found (either level)

Table 7.19: Summary of findings on internationalisation from the survey.

7.4   Discussion

This chapter described international sourcing by manufacturing firms located in the Netherlands and tested the hypotheses that international sourcing improves economic and strategic performance. Several interesting findings emerged from both the classification of international sourcing strategies and the tests of the impact of international sourcing strategies on performance.

The data on international sourcing strategy largely confirmed patterns that were found in earlier studies on international sourcing, which were described in chapter 1. In table 1.2 a model was developed to describe and categorise the various international sourcing strategies that firms have available. In terms of this model, many firms appear to be located in the upper cells (with much domestic and intra-EU sourcing) and on the left hand (meaning there are no integrated international sourcing networks in operation in most firms). Most sourcing comes from within the economic region in which the firm is located, in this case the European Union. In fact only 16% of sourcing stems from others areas of the world. Of all EU sourcing, domestic sourcing from within the Netherlands is the largest contributor at around 37% of all sourcing. Germanic countries also contribute significantly at 27%. This is in line with longstanding and intensive trade relations between the nations as well as the relative strength of Germanic countries in manufacturing. Furthermore some 61% of the firms in the sample have their largest supplier located in the Netherlands and about 17% in Germany. The fact that largest suppliers are even more concentrated in the Netherlands than the supply base is on average, implies that firms are particularly unwilling to source their key products from foreign suppliers. The largest supplier was defined as the supplier with the largest supply volume to the firm. The Ford case also showed a limited extent of cross-continental sourcing, although there was substantial cross-continental sourcing compared to earlier efforts. Apparently there are core products these manufacturing firms source, which the firms themselves believe are best sourced from nearby places (JIT issues obviously play an important part here). For peripheral products this may be different as they contribute less to the total costs of the final product and can therefore perhaps be sourced at a higher risk. The barriers to international sourcing that were described in table 1.5 still very much remain alive.

These findings *contradict predictions and statements by some authors that geographical borders and location no longer matter* (Cairncross, 1998; Ohmae, 1990). They provide support for an alternative view, which suggests that there is no across the board globalisation and that *most of the processes of internationalisation currently occurring are regional in nature* (Rugman, 2000; Ruigrok & Van Tulder, 1995; Van Tulder et al,

2001). As an ever-increasing range of studies show, competition is a process occurring mainly within regions of the world. Although large multinational companies also invest in other regions of the world, their overall dependence on their home regions is often still large. Furthermore most trade takes place within economic regions and not between them. While there is some global sourcing by manufacturing firms in the Netherlands, its size is relatively small in comparison to domestic and regional sourcing. Of course there are always some exceptions and some firms do indeed source much from abroad. The *firms that source more from outside of the EU are especially the larger firms and foreign firms*. Foreign firms have a tendency to source more from their respective home countries since they already have a strong supply base there. Furthermore they may have problems to adapt to local circumstances and constructing a local supply base may be costly in terms of both the costs involved to find local suppliers as well as the costs involved in building up relationships with these suppliers. Larger firms will require larger volumes from suppliers, making the range of possible suppliers smaller. Furthermore it may be more beneficial to source larger volumes from abroad due to scale economies in transportation and distribution.

In the analyses that were undertaken to assess the impact of internationalisation of sourcing on performance no effects were found. Thus one may be tempted to conclude that internationalisation of sourcing does not lead to the expected performance increase, nor does it lead to any performance decrease. However, it could also be the case that there are errors in measurement of variables. Is there any reason to believe these measurement errors exist? To some extent the dependent variables of performance at the firm level, which were used in chapter 5 and used again in this chapter are not entirely reliable. The Cronbach Alpha values on these variables were rather low and it was noted that there was not so much variance in these variables. This could also affect the relation between internationalisation and performance. However, in chapter 5 some other expected relations were either found to be significant or to be almost significant and at a minimum to show the right sign. In this chapter there is almost no relation between the independent variable, internationalisation, and the dependent variable, performance. This confirms what some earlier empirical studies have shown. For example Kotabe and Omura (1989) and Kotabe (1992: 47) also concluded that the sourcing location may not matter very much. They suggest that it matters far more to assess whether certain key items are sourced internally or externally than to look at where these items are sourced from. To the extent that there was a relation between internationalisation and performance at the firm level this relation was negative. Although several firms did not complete the internationalisation variable as intended upon construction of the survey, these differences were standardised out of the data. The measurement of internationalisation of suppliers and of supplier performance did not produce any suspicions as was already concluded in chapter 6. For the largest supplier there was no positive relation between having an international supplier and supplier satisfaction measures. For economic performance there was a small positive effect while there was a small negative effect for strategic performance. Thus there is sufficient reason to believe that while there may be some kind of relation between having an international supply base or an international supplier and performance this relation is at best very weak. Internationalisation of the supply base does not seem to lead to enhanced firm performance for this cross-section of firms.

What could be the reasons for these findings? The most radical explanation would be that although firms may gain from internationalisation of sales, assets and manufacturing, as most of the literature on internationalisation suggests, they do not gain from internationalisation of sourcing. Perhaps internationalisation of sourcing is not a strategic choice but an imperative dictated by industry competitors. If this is the case a firm that sources internationally may not outperform competitors because they mimic each other's behaviour. The decision to source from a particular location is relatively easy to imitate. In fact, some industries like clothing or automobiles are known to shift sourcing to certain countries in industry-wide waves. This is also a function of scale effects due to clustering. If a certain number of suppliers of an industry are located in a country, the conditions are favourable for buyers to select one from a multitude of suppliers. Competition among suppliers in a location will increase efficiency across the industry. A more moderate version of the 'lack of strategic choice' argument would be that in many instances firms that choose to internationalise their sourcing do so because no adequate domestic sources are available. Thus these firms are forced to source internationally, even though they know international sourcing may not bring any advantages.

It could also be that there are advantages to be gained from international sourcing by lower production costs but that increased transaction and logistics costs connected to international sourcing offset these advantages. Firms may find it difficult to govern international supply relations effectively because of language, cultural and institutional differences or simply because of large distances. The Ford case also showed that substantial efforts may be needed to duplicate supply sources elsewhere in the world. This may be necessary to lower the risks associated with international sourcing. This finding would make the extent to which firms can leverage international supply relations highly dependent on their ability to manage far away partners. Firms are then balancing transaction costs and production costs across borders. While there are lower production costs associated with international sourcing, there are also higher transaction costs because of the difficulty of governing relations across borders.

Another possibility is that it takes time for international supply relations to deliver. Perhaps there are positive performance effects but they only occur after a certain time period. Because the survey was cross-sectional this possibility can not be ruled out entirely. However, the fact that there was no effect on supplier satisfaction measures provides some evidence this was not the case. As was discussed in chapter 6 most firms have a relation with their largest supplier for over 2 years. In fact many have a relation for over 5 years. Still no performance effects could be found for these long relations. This suggests that internationalisation of the supply base may not matter much in terms of obtaining superior results. Obviously this is not the same as saying that internationalisation does not matter in terms of a firm's overall structure and strategy.

Two interaction effects were investigated. The interaction between foreignness and international sourcing did not yield any significant outcomes. Foreign firms are not significantly better at managing international supply relations. Perhaps they, like Dutch firms, are faced with similar kinds of difficulties in managing the logistics and communication of international supply relations. They could also have difficulty integrating foreign supplies into local production activities. And because international sourcing hardly has an impact on a

firm's performance it is plausible that even foreign firms can not manage international sourcing to their advantage. Furthermore foreign firms in the survey do not obtain superior performance, either economically or strategically. This contradicts the earlier finding in chapter 5. However, since only a limited number of foreign firms (39) responded to the survey and measurement of performance in the survey could not be as detailed as measurement in the database was, it appears that statistical limitations could cause this lack of a finding.

The interaction between foreign experience and international sourcing did not generate any findings. This implies that being a multinational does not make a firm better at using international sourcing as a tool for performance improvement. Again this seems mostly related to the fact that in the context of this study international sourcing is simply not a contributor to a firm's performance. Perhaps foreign firms are superior in international sourcing but this does not translate into significant overall performance improvements. Three out of four regressions that were tested did show this positive pattern but nowhere was it significant.

However, there was one direct effect of foreign experience. *Foreign experience is positively related to economic performance at the firm level.* This implies that multinational firms are better than completely domestic firms are in terms of their financial performance (ROS / ROI). The data confirm that multinational firms can leverage differences between operations in various countries, thereby obtaining financial benefits (Dunning, 1993). If production costs rise in one country they can shift production activities to another country. Furthermore, multinational companies may also be able to charge a premium for their products given a more widely known brand name and the ability to deliver goods to multiple countries. Both of these effects help explain the superior performance of MNCs.

Chapter summary

Chapter 7 looks at the internationalisation of the supply base using the survey and a case. This case, of Ford Motor Company, revealed that major manufacturing firms that are in the process of internationalising their supply bases meet conflicting demands. On the one hand they intend to globalise activities to obtain scale benefits. On the other hand they need to take into account various local demands. The survey showed that this leads to a situation in which there is some international sourcing but its extent is limited. Most of the sourcing by firms in the sample occurs in the economic home region, the EU, and particularly the Netherlands. Those firms that diverge most from the pattern of local sourcing are large firms and foreign firms. The largest suppliers of the firms in the sample are mostly concentrated in the Netherlands and Germany.

The performance effects of international sourcing were tested and appeared to be extremely limited. Neither at the firm level nor at the supplier level were any direct effects of internationalisation on performance detected. It appears that international sourcing is not a means to increase firm performance or at least that firms are not yet able to fully realise the potential of international sourcing. While firms can often lower production costs by sourcing internationally, transaction costs arise in similar quantities. Two moderating effects were tested. For being foreign there was no performance effect. For foreign experience (being a

Glob,region,loc~~all~~ sourcing

multinational) there was a positive economic performance effect at the firm level. This implies multinational firms can achieve a higher profitability by cross-fertilisation of activities in multiple countries.

Chapter 8: Solving the Chinese puzzle?

The focus of chapters 5 through 7 was on solving pieces of the puzzle. In each chapter one of three dimensions was investigated. However, the entire puzzle not only consists of three separate dimensions but also of the relations and interactions between them. In this chapter the three dimensions of sourcing discussed in chapters 5, 6 and 7 will be re-examined as three parts of the same puzzle. The key question of this chapter is how the three dimensions relate to each other in terms of the performance impact of combining various sourcing strategies. In reality managerial decision-makers are unlikely to have in mind only one dimension of sourcing strategy at a time, in fact they will usually be concerned with all dimensions simultaneously.

So in this chapter the attention is once again on the whole conceptual model as discussed in chapter 3 and not on its pieces. Therefore the graphical presentation of this chapter follows figure 3.1, which is shown below in figure 8.1. The first section focuses on the extent to which the three dimensions can be translated into the same concept, firm level performance. This section contains quantitative analyses based on combined survey and database data. The second section features a conceptual discussion of the interactions between the three dimensions of sourcing. The third section discusses the findings of this chapter.
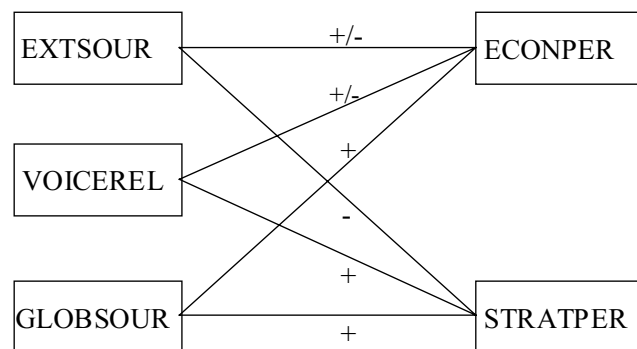
Figure 8.1: basic research model.

8.1 Comparing dimensions of sourcing

The previous chapters all focused on one element of international sourcing strategy. In chapter 5 outsourcing was linked to firm performance based on both survey and CBS data. In chapter 6 the impact of voice relations on supplier satisfaction measures was assessed using the survey. Similarly the impact of international sourcing was discussed in chapter 7 based on survey data. These chapters generated interesting findings, sometimes because surprising significant effects were found, sometimes because the expected effects were not present.

But what was not taken into consideration in chapter 6 is whether supplier satisfaction measures translate into performance at the firm level. Perhaps satisfaction about suppliers is simply an artefact of the manager's thinking. It could also be that supplier

satisfaction does lead to improved performance. In chapter 7 the dependent variable was a perception measure with relatively low Alphas, which may have caused problems similar to those in chapter 5. To further improve the value of both of these chapters an analysis is needed, in which hard performance measures at the firm level are used, like the data from CBS used in chapter 5. Furthermore the basic research model presented in chapter 3 suggests that *the three dimensions of sourcing are alternative means to the same end*: achieving firm performance. If this is true, then they should also be tested as alternatives, implying that all three dimensions should be used in one and the same analysis. Thus there is both a pressing methodological and a pressing theoretical reason to conduct an integrated analysis. In this section this is precisely what is attempted. This section will *use the CBS performance data as dependent variables while introducing some survey data as independent variables* in an attempt to look at the effects of buyer-supplier relations and international sourcing as strategies to increase performance[85]. This implies that both sources of data will be used. The performance data that are used in chapter 5.1 as well as the survey data that are used throughout chapters 5, 6 and 7. In this chapter the models used in chapter 5.1 will be replicated and extended by parts of the models in chapters 5, 6 and 7.

Methodological weaknesses of this analysis

Any analysis that combines multiple sources of data has to be confronted with scepticism. Are the two measurements focused on the same unit? Are data compatible? Is there a time lag between the data sources? An attempt will now be made to answer these questions. Because surveys were sent to firms for which there was an exact match between CBS data and NEVI members, there are 180 out of 200 firms for which some kind of CBS data are available. For the other 20 firms there is a match but no CBS data are available for a variety of reasons. Since only firms with an exact match were chosen there is little concern over whether the units measured are the same units. Some further evidence for this was found by correlating the 1998 CBS data and the 2000 survey data on the amount of industrial purchasing (external sourcing), expressed in Dutch guilders. This generated a very high .961 correlation for 179 firms. Concerning compatibility of data there is no reason to assume that the two sources can not be merged since *the units are the same*. Also, there is nothing per se against merging perception data and hard data. In fact the survey used in this study like most other surveys combines hard data and perception data.

   The key problem is in the time lag between the two data sources. The CBS data were collected over the year 1998 while the survey data were collected over the year 2000. This makes establishing a relation more difficult and less reliable. A firm may have changed course over the 2-year time period. The problem can not be avoided though, since the survey could not be conducted retrospectively at a sufficient level of detail and the CBS data are not yet available for the year 2000[86]. However, there is some indirect evidence to conclude that overall the firms have not changed much over this time period. In chapter 5 reference was

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[85] Note that this is technically feasible given the filtering procedure that was described in chapter 4: CBS data were matched with NEVI data.

[86] Conducting a survey with questions on trust, power of a supplier and other kinds of perception measures retrospectively can not be advised (Fowler, 1993). This will create recollection problems and introduce a great deal of bias in the answers. It would be somewhat similar to asking a person: 'how did you feel about going to work three years ago from this very day?'

made to the high correlations between the degree of external sourcing in various years, see table 10 in appendix C. Year-to-year correlations for the larger sample were close to .9. This implies that the sourcing strategy of most firms does not change radically over the years. Furthermore it was noted that most firms had a relation with their major supplier of three years or more, providing yet another indication that sourcing strategy does not change rapidly over the years.

Table 2 below provides correlations for the most recent years of CBS-based ROS measures of the respondent firms. This shows that there is a strongly positive relation between ROS figures from one year to another. This correlation is particularly high in view of the fact that these are percentages, not absolute values. This provides evidence to believe that the 1998 ROS figure provides at least an approximation of ROS in 2000, which would be the desired variable.

However, it is obvious that *no causal relation can be established* using performance data that lie back in time. This is a problem in the sense that causality is a desired attribute. It is also *a problem in terms of the strength of statistical relations*. Because of the time difference, statistical relations will tend to get weaker or much weaker. However, in light of the fact that all of the previous analyses showed that sourcing relations largely hold over time the sign of the relation would still be expected to keep its predicted direction. In this sense *this section probably provides a conservative test*: if a statistical relation is found it is likely that this relation will be stronger when properly aligned data are used. So it is obvious that ideally dependent data for the year 2000 or perhaps even 2001 would be used. However, the 2000 data will not become available until late 2002 at the earliest. Therefore the methodological solution that is chosen is the best solution currently available.

	ROS96	ROS97	ROS98
ROS96	1.000 . 174	.747 .000 174	.658 .000 174
ROS97	.747 .000 174	1.000 . 179	.802 .000 179
ROS98	.658 .000 174	.802 .000 179	1.000 . 180

Table 8.2: Correlations between ROS figures of firms in the sample for 1996, 1997 and 1998.

For the market shares of firms this data lag is less of a problem. As suggested in earlier chapters, a firm's strategic performance (market position) usually holds much more steady over time than its profitability. *Firms' market shares do fluctuate but only over a longer period of time.* Evidence to support this statement was sought and found. As table 3 shows correlations between various years are very high, implying that market shares do not change much between the years. This again means that 1998 market share is a strong predictor of 2000 market share. As in chapter 5 the logarithm of the market shares of the firms was calculated because the market shares are exponentially distributed. In order for OLS regressions to work properly a logarithm has to be calculated to normalise the distribution of the dependent variable. Again, these are the best currently available data.

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	LOGMARSHA96	LOGMARSHA97	LOGMARSHA98
LOGMARSHA96	1.000 . 174	.981 .000 174	.970 .000 174
LOGMARSHA97	.981 .000 174	1.000 . 179	.987 .000 179
LOGMARSHA98	.970 .000 174	.987 .000 179	1.000 . 180

Table 8.3: Correlations between logarithms of market
shares of firms in the sample for 1996, 1997 and 1998.

Thus the assumption can now be made that relations that are found in this chapter between sourcing and performance partly hold over time although it is not known how well they hold and how the causal relations run. In particular profitability is a variable that changes. A further assumption that needs to be made is that the type of relation with the largest supplier is characteristic of its relations with suppliers in general or at least has an impact on firm performance. *Support for this assumption is found both theoretically and empirically.* We can think of the relation with the largest supplier as a reflection of a firm's ability to manage external relations. If a firm is unable to manage its relation with a supplier so important to its overall product it is unlikely to be able to manage relations with other parties any better. Similarly firms that manage relations with the largest supplier well, can probably manage relations with other parties decently. Therefore the relation with the largest supplier is an approximation of all relations with external suppliers. Empirically it was shown at the start of chapter 6 that relations with the largest supplier take up a substantial part of all sourcing for most firms in the sample. This implies that in this sample relations with the largest supplier are indeed often indicative of all supplier relations a firm maintains. Under these assumptions it is possible to regress several dimensions of sourcing strategy on the 1998 ROS variable (economic performance) and the logarithm of 1998 market share (strategic performance).

Economic performance
First, the correlations among the dependent and independent variables were calculated. They can be found in table 11 of appendix C. These correlations provide a range of interesting first takes on the outcomes. As chapter 5 revealed there is a negative relation between external sourcing and ROS. Furthermore there is the expected positive relation between voice and ROS. However, this relation is significant only at the 10% level, which is not a very good significance level for correlations. The positive effect is found but it is not very strong. Then there is also a positive relation between international sourcing and ROS. This relation, however, is completely insignificant. Furthermore three performance measures from the survey were included in the correlations table. As expected economic performance at the firm level, measuring ROS and ROI, is significantly positively related to 1998 ROS. However, this relation is not as strong as one would expect. This is probably again due to the lack of variance in the firm level economic performance measure. Furthermore both measures of supplier level performance are positively related to 1998 ROS. This means that being highly

satisfied with suppliers to some extent translates into firm profitability. Interestingly this relation is stronger for strategic performance at the supplier level than for economic performance.

Once more mathematical formulations will be presented of the theoretical relations described in chapter 3. Then the statistical results will be presented. As before an overview of all variables can be found in table 4.37. The *key variables of the analyses in this section are economic performance (ROS98), strategic performance (LOGMARSHA98), external sourcing (PURRAT98), voice relations (VOICEREL) and international sourcing (FOREISOU).*

The regression model for this analysis follows the basic research model for this study, as described in figure 1 in chapter 3. This basic model is an extended version of models applied in chapter 5 and is described by the following equation[87]:

$$(1) \ ROS98 = \beta_0 + \beta_1 * \log sales98 + \beta_2 * \log labint98 + \beta_3 * export \ ratio + \beta_4 * industry + \beta_5 * purinteg + \beta_6 * percstan + \beta_7 * firmstra + \beta_8 * trust + \beta_9 * rellength + \beta_{10} * reldevel + \beta_{11} * purrat98 + \beta_{12} * voicerel + \beta_{13} * foreisou + \varepsilon$$

Obviously this again raises the problem faced in chapters 5, 6, and 7. Because of the limited sample size the number of variables has to be limited. Since the sample size is around 180 for this analysis, the maximum number of variables in the model should be around 20, but preferably less for the final model. Therefore industry was once again split into three dummy variables instead of tens of variables[88]. Then it is important to check whether the model presented in chapter 5, table 3, holds for this sample. This sample is obviously much smaller than the one presented in chapter 5 with close to 5,000 firms. A replication of the earlier regressions for the limited sample of 180 firms confirmed the two strongest effects of a negative relation between external sourcing and ROS and a positive relation between productivity (log labint) and ROS[89]. Then the full equation was run, which generated the results in table 4.

In the first model, with the whole gamut of variables, only external sourcing, with a strongly negative relation, and productivity, with a moderately positive relation, hold as significant variables. However, this is partly due to the fact that with so many variables, the variables tend to 'cannibalise' each other's effects. Thus the model was improved along the same criteria as in previous chapters. The table displays two more models. The second model is an intermediate model in which several insignificant variables have already been removed. The third model is the final model, with the largest adjusted variance explained. In the second model foreign sourcing has been dropped since it was one of the least important explanations

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[87] Characteristics of the respondent are now dropped from the model as control variables because they were used to correct against bias in the dependent variable in the survey. Since the dependent variable is now an exact value from the database there is no reason to assume respondent characteristics of the survey matter much.

[88] Please note that this will decrease overall model fit as well as R^2 values of the model. In fact, industry accounted for around 8% of the variance in ROS, which is roughly one fourth of all explained variance in the analyses in section 6.1. Now the industry dummies account for only a small part of all variance.

[89] Results are available upon request.

of profitability, which confirms the analyses in chapter 7. In the third model voice relations have also been dropped because although the positive relation was confirmed, there was not a significant relation. The third model confirms what was already shown before. External sourcing is negatively related to performance, and labour productivity is positively related. Furthermore an innovative strategy (being a prospector) pays off and being in the product industry is negatively related to ROS.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		-.566	.572		-.920	.359		-.859	.391
LOGSAL98	-.084	-.881	.379	-.059	-.690	.491			
LOGLABIN	.211	2.169	.032	.225	2.486	.014	.197	2.739	.007
EXPRAT98	.040	.489	.626						
PROCINDU	-.022	-.166	.868						
PRODINDU	-.211	-1.557	.121	-.186	-2.573	.011	-.182	-2.563	.011
PURINTEG	.034	.456	.649						
PERCSTAN	-.004	-.053	.958						
ANALYZER	.067	.399	.691	.134	1.455	.148	.136	1.482	.140
PROSPECT	.137	.783	.435	.207	2.257	.025	.207	2.284	.024
REACTOR	-.039	-.284	.777						
TRUST	-.045	-.481	.631	-.046	-.535	.593			
RELLENGTH	.045	.602	.548						
RELGROWT	.043	.522	.602						
PURRAT98	-.318	-4.282	.000	-.315	-4.386	.000	-.320	-4.591	.000
VOICEREL	.075	.822	.412	.102	1.185	.238			
FOREISOU	.016	.209	.835						
	F-test: 2.949		.000	F-test: 6.192		.000	F-test: 9.635		.000
	R²: .230			R²: .226			R²: .217		
	Adj. R²: .152			Adj. R²: .189			Adj. R²: .194		

Table 8.4: regression models for explaining ROS98 incorporating external sourcing, voice relations and international sourcing. N = 175 / 179 / 180.

Thus no direct statistical evidence can be found that voice relations are positively related to financial performance. On the other hand it is well possible that the relation exists given the two-year time gap in the data. The correlations provided evidence for a positive relation. Additional indirect evidence can be gathered by looking at the impact of supplier performance on profitability. In chapter 6 it was established that voice is a crucial mechanism to improve supplier performance. If supplier performance is positively related to ROS then this implies that improving supplier performance is a way of increasing profitability and voice is an important mechanism to improve supplier performance.

This is what is attempted in the next analysis, in table 5, where supplier performance is tested as a possible explanation of firm performance. Thus the question is asked whether being satisfied with suppliers is positively related to profitability. For this analysis the basic model of table 3 in chapter 5 was extended with both types of supplier satisfaction measures. The analysis shows that while economic performance does not matter much, strategic performance of suppliers is marginally positively related to profitability. Again given the time lag it is likely that the real relation between supplier performance and firm performance is different, most probably stronger. This provides preliminary evidence that managing suppliers

well can indeed lead to increased profitability of firms. This effect, however, appears to be small in comparison to the performance effects of outsourcing and innovation inside the firm.

	Stand. β	t-value	Sig.
(Constant)		-.516	.607
LOGSAL98	-.032	-.343	.732
LOGLABIN	.186	1.907	.058
EXPRAT98	.029	.367	.714
PURRAT98	-.315	-4.331	.000
ECONPERF	-.048	-.561	.576
STRATPERF	.147	1.703	.090
PRODINDU	-.190	-1.470	.144
PROCINDU	.019	.146	.884
	F-test: 5.301		.000
	R^2: .206		
	Adj. R^2: .168		

Table 8.5: extended model for explaining ROS98
including supplier satisfaction measures. N = 172.

Strategic performance

Turning now to strategic performance the relation between supplier relations, internationalisation and 'real' market share will be investigated. The correlations among the independent variables, survey performance measures and market share can be found in table 10 in appendix C. The only significant correlation between the independent variables and the logarithm of 1998 market share is with international sourcing. Later regression analyses will have to show whether this is an independent effect or a consequence of the fact that larger firms source more from abroad, which was apparent in chapter 7. There is a limited positive correlation between economic and strategic supplier performance and market share.

Finally there is also a positive, but very small correlation between strategic performance at the firm level and the 1998 market share. Since these are similar measures, this raises questions. There are four possible explanations for the lack of correlation. First, the time lag between 1998 and 2000 was mentioned before but that does not seem to play a big part. Second, the lack of variance in scale measures can also cause a lack of correlation with other variables as witnessed in previous chapters. The third reason could be that strategic performance at the firm level is measured as both market share and sales growth in the survey. The inclusion of sales growth is likely to cause the relation to become weaker because it is clearly imperfectly correlated with market share. Fourth, and most importantly, while 1998 market share in the database is measured in terms of a 3-digit industry, strategic performance in the survey is measured compared against direct competitors. The 3-digit industry in which a firm operates obviously not only contains direct competitors. Consider a business unit in the chemicals industry. When asked to compare its performance against its three largest competitors (as in the survey) it will compare itself to three other producers of the same product, say polypropylene. It is in fact quite unlikely that these competitors are located in the Netherlands. However, in the database a comparison is made against firms that are all located in the Netherlands and may be operating in a slightly different segment of the market or produce a different product. In fact, competition between business units is perhaps more

likely to occur at the 4 or 5-digit level. For practical reasons, especially because the number of firms in each 4 and 5-digit level industry is limited, data are not available. The latter two reasons appear to be the major reasons for the apparent lack of a correlation.

The regression model applied to assess the impact on market share is similar to equation 1 presented above, but also accounts for the different needs of regressions on market share provided in chapter 5. The dependent variable has of course been altered:

(2) $LOGMARSH98 = \beta_0 + \beta_1 * \log labint98 + \beta_2 * \log indcon + \beta_3 * export ratio + \beta_4 * industry + \beta_5 * purinteg + \beta_6 * percstan + \beta_7 * firmstra + \beta_8 * trust + \beta_9 * rellength + \beta_{10} * reldevel + \beta_{11} * purrat98 + \beta_{12} * voicerel + \beta_{13} * foreisou + \varepsilon$

First it was assessed whether the basic model found in chapter 5 (table 7) is more or less valid for the firms in the sample as well. It is a valid model, although it is not as strong a model as in chapter 5. The effects of exports become less significant in this model. The model can be used as a good basis for expanding the model by incorporating other variables. Table 6 shows the results for this model, the right hand model being an improved version of the left-hand model. There are quite surprising results here. As noted in chapter 5 the relation between external sourcing and market share is quite weak. However, the relation between voice relations and market share is weak as well, which is somewhat unexpected. Both variables are quite insignificant, meaning that even without the 2-year time lag there probably would not be any relation. Even more unexpected is the strongly positive relation between foreign sourcing and market share, which does not seem in line with earlier findings. Additional analyses showed that the effects could be explained as 'size effects'. One of the findings from chapter 7 was that larger firms source more from abroad. Since market share is of course a combination of size and industry, this explains partially what is going on here[90]. Some additional effects were found. As expected industry plays an important role in explaining market share. Interestingly having an integrated purchasing department corresponds with lower market shares. And the length of the relation with suppliers as well as whether this relation has improved over time are additional positive factors of influence here.

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[90] The correlation between foreign sourcing and logged sales is just as strong as the correlation between foreign sourcing and logged market share. This suggests that the effect that was found in this regression has little to do with market share per se but is an artefact of sales (firm size). If it were an effect really related to market share, the correlation with market share should have been stronger than with sales because market share is a mix of industry and sales. Apparently adding the industry to the mix (market share) does not alter the strength of the correlation with foreign sourcing.

	Stand. β	t-value	Sig.	Stand. β	t-value	Sig.
(Constant)		-3.630	.000		-3.627	.000
LOGLABIN	.298	4.272	.000	.298	4.424	.000
LOGINCON	.318	4.710	.000	.320	4.815	.000
EXPRAT	.086	1.241	.216	.088	1.267	.207
PROCINDU	-.399	-3.588	.000	-.402	-3.635	.000
PRODINDU	-.189	-1.616	.108	-.192	-1.661	.099
PURINTEG	-.228	-3.474	.001	-.229	-3.502	.001
PERCSTAN	-.087	-1.373	.172	-.091	-1.445	.150
ANALYZER	-.167	-1.158	.249	-.166	-1.159	.248
PROSPECT	-.158	-1.043	.299	-.159	-1.059	.291
REACTOR	-.199	-1.693	.092	-.199	-1.702	.091
TRUST	-.091	-1.133	.259	-.067	-.979	.329
RELLENGTH	.160	2.519	.013	.163	2.578	.011
RELGROWT	.150	2.093	.038	.160	2.297	.023
PURRAT	-.003	-.041	.967			
VOICEREL	.045	.571	.569			
FOREISOU	.172	2.642	.009	.171	2.646	.009
	F-test: 7.460		.000	F-test: 8.591		.000
	R^2: .430			R^2: .429		
	Adj. R^2: .373			Adj. R^2: .379		

Table 8.6: regression models for explaining logged 1998 market share incorporating external sourcing, voice relations and international sourcing. N = 175 / 175.

Findings

The findings put forward in this chapter have to be looked upon very critically. Lack of fitting data implied that all effects that were found may be surrogate effects or may indeed turn out to be opposite to what they were found to be here. Given those severe limitations table 9 summarises the findings.

Evidence was again found for hypothesis 1b, of a negative relation between outsourcing and economic performance. This implies hypothesis 1a is rejected. No evidence was found in this chapter for a relation between outsourcing and strategic performance (hypothesis 2). There was some weak evidence for hypothesis 3b, a positive relation between voice relations and economic performance, meaning hypothesis 3a of a negative relation was rejected. No evidence was found for hypothesis 4, a positive relation between voice relations and strategic performance. Similarly there was no evidence for hypothesis 5, a positive relation between international sourcing and economic performance. There was evidence of hypothesis 6, a positive relation between international sourcing and strategic performance. Furthermore the positive relation between innovation and economic performance was replicated, this time with measures on firm strategy. And long relations with suppliers as well as relations that improve over time are associated with higher strategic performance.

	Economic performance (ROS)	Strategic performance (marsha)
Independent variables	• Outsourcing is strongly negatively related • Voice relations are weakly positively related	• Foreign sourcing is positively related
Other effects	• Innovative strategies are positively related • Industry effects	• Long relations with suppliers are positively related • Improved relations with suppliers are positively related • Industry effects

Table 8.9: Summary of significant findings from the combined database and survey.

8.2   Linking dimensions of sourcing

Although outsourcing, supplier relations and internationalisation may have been separated in much of the academic literature these three dimensions of sourcing do not exist independently in managerial thinking. In fact sourcing managers are constantly weighing various dimensions of sourcing strategy: "If I outsource more, will I still be able to devote enough attention to all of my suppliers? How do I set up effective co-operation with an international supplier?"

Thus it may well be worthwhile to look into interaction effects between various dimensions of sourcing. Is there an interaction between various dimensions of sourcing? If so, what are the directions of such interaction effects? For future research purposes this section presents a conceptual model to think about interactions between dimensions of sourcing. First the three separate interactions are discussed and then the model is shown graphically.

Outsourcing – voice relation*s*

Firms that source externally transfer a part of their rent-generating potential to outside parties. If an item is sourced internally firms can improve the item themselves. Once it is sourced externally, it is an outside supplier that carries primary responsibility for the quality, price, innovation, marketability and so forth of the item. Thus the competitiveness of the firm is co-determined by outside suppliers.

(1) Firms that outsource more will be more dependent on outside suppliers for success.

The performance effects of voice relations were investigated conceptually in chapter 3 and empirically in chapter 5. The analyses revealed that voice relations have a positive effect on relational performance. Firms that set up voice relations with suppliers report higher supplier satisfaction. In section 8.1 this analysis was extended to show that voice relations can also have a positive effect on a firm's profitability, meaning not its perceived performance but its real performance.

(2) Voice relations lead to increased relation performance and can lead to increased firm performance.

Demands posed upon management change over time. Previously, managers had to be able to steer internal production activities (operations management), now they increasingly have to

deal with the management of their suppliers (relationship management). As a firm increases its dependence on outside relations, it will become more experienced in dealing with these outside suppliers. Thus, the ability to manage these suppliers increases over time. On the other hand the number of external suppliers, or at least their importance, increases as well. Thus managers are required to increase their *external span of control*. They need to manage more suppliers within the same time frame.

(3) Contradiction: firms that outsource more, will have more experience in dealing with outside suppliers. However, they will also need to manage a wider range of suppliers.

Given this wider range of external suppliers to be managed under conditions of heavy outsourcing the question becomes what qualities are needed to manage outsourcing in such a way as to increase performance. This is where voice relations again come in. Only those firms that are able to manage outside suppliers well, are able to use outsourcing as a performance enhancing mechanism. Firms that are good at setting up voice relations can create advantage from external sourcing. This coincides with what was discussed in chapter 5: choosing to outsource as a response to not being well organised internally, is usually a wrong choice.

(4) Firms that are better in creating voice relations, and thereby improving performance, can outsource more activities.

Outsourcing – international sourcing
As noted above, firms that outsource many activities are in need of more suppliers or larger suppliers. The volumes they source increase, implying they need suppliers with a large production capacity. Furthermore they will also need all kinds of different and specialised suppliers.

(1) As firms outsource more they are in need of more suppliers to deliver their wider range of needs and larger sourced volumes.

To find these additional suppliers, firms have to increase their pool of potential suppliers. They often have to look beyond their established base of suppliers. That is, they need to search beyond the confines of existing social networks. Such open searches are more likely to lead to international suppliers. These international suppliers often possess one of two advantages. Either they are highly specialised in terms of knowledge, offering products that can not be found locally or they are highly specialised in terms of production capacities and the ability to produce large quantities at low prices.

(2) Additional suppliers, particularly suppliers of specialised goods and large volumes, are often found abroad.

When firms do internationalise their searches, this implies that they can increase their range of potential suppliers. This increased potential has obvious advantages. It also carries a

disadvantage in that the costs of evaluating such foreign suppliers will be higher than the evaluation costs for well-known domestic suppliers.

(3) Including international suppliers in a search increases the range of potential suppliers but also induces higher evaluation costs.

Voice relations – international sourcing
Again drawing on the evidence in chapters 6 and 8.1, voice relations are a successful means to lower the total costs of producing and transacting. They form an effective means of governance in situations where long-term commitments and the ability to co-operate are important properties.

(1) Voice relations with external suppliers, when successful, lower the total costs of producing and transacting.

Chapter 3 mostly introduced the advantages of international sourcing when hypotheses 5 and 6 were discussed. While there are these advantages, there are also important drawbacks, which were revealed in chapter 7. International sourcing may be an effective way of finding low-cost or high quality producers. But it is also more difficult to maintain relations with an international supplier. Thus, there is a production cost advantage associated with international sourcing but also a transaction cost disadvantage.

(2) International sourcing relations suffer from particularly high transaction costs.

These high transaction costs are caused by geographic separation, unfamiliarity between the partners and differences in institutional environments. These conditions also make it more difficult to construct voice relations. While value may be created for both partners through voice relations, establishing the necessary trust is hard.

(3) Setting up voice relations with international suppliers is difficult due to different geographic, relational and institutional characteristics of the buyer and supplier.

However, given the possibility of voice relations to lower these transaction costs associated with international sourcing, voice relations can be effective in the international context. With much more changing relationships, of the exit type, international sourcing is often not productive given the many investments in logistics and other activities needed up front. Creating a voice relation with an international partner may be a very useful route to sustainable competitive advantage.

(4) Voice relations with international suppliers can be a particularly effective means to lower the transaction costs associated with international sourcing.

Combining these notions leads to an understanding of how the three dimensions of sourcing interact: a new model is obtained. A graphical version of this model is summarised in figure 1 below.
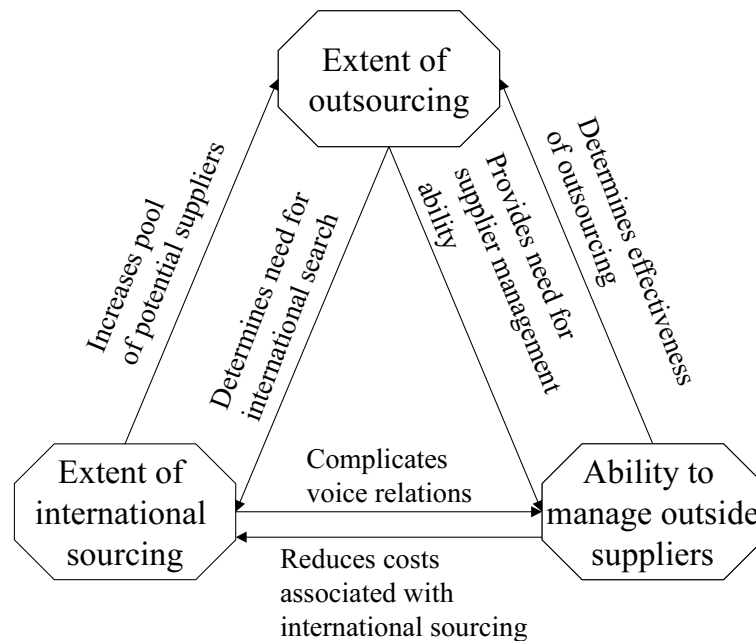
Figure 8.1: An integral picture of sourcing strategy.

8.3   Discussion

In this chapter an attempt was made to draw comparisons between three dimensions of sourcing in terms of their performance impact. Furthermore some interactions between these three dimensions were posited. Several interesting effects were found. First the direct effects will be discussed and then the interaction model.

External sourcing relates negatively to economic performance and is hardly related to strategic performance. This effect was discussed at length in chapter 5 and this discussion will not be repeated here. The strength of the effect is confirmed by the fact that the highest possible significance levels are maintained for the much smaller sample of 180 firms used in this chapter. When a positive effect between external sourcing and strategic performance was found in chapter 5, it was already suggested this was a marginal effect. This is confirmed by the fact that this effect disappears for the smaller sample in this chapter.

Effects were also found when performance of the largest supplier was related to firm performance. Having a well performing supplier in terms of innovation, competence development and networking is positively related to ROS. Since these are long term objectives, it is reasonable to suggest that this effect holds over time. Economic supplier performance is different in this respect in the sense that it may fluctuate more over time. Satisfaction with reliability and quality may even differ per batch of products. This could help explain the lack of a finding, since there is a two-year time gap in between the measurements.

Chapter 8

As demonstrated at length in chapter 5 innovation matters when explaining a firm's financial performance. Chapter 8 found additional evidence for this point of view because innovative firm strategies (prospectors) outperformed non-innovative strategies. It appears that the positive relation between long term supplier goals and financial performance of the firm shows that innovation and competence effects coming from a relation with suppliers may also help the firm. This is consistent with the relational rent argument (Dyer and Singh, 1998).

Then there is a positive link between voice relations and economic performance. This relation was found in the survey data in chapter 6 and confirmed in this chapter, although quite marginally. If a firm is able to construct co-operative relations with suppliers, it obtains higher economic performance. Co-operative relations with suppliers are an expression of a firm's ability to manage external relations. Firms that are good at managing suppliers may also be good at managing relations with customers, governments or other stakeholders. Again, as this relation was discussed at length in chapter 6, no further discussion is necessary now. The relation between voice relations and strategic performance could not be replicated in this chapter. This relation does have the appropriate sign though. This suggests the smaller sample size may be the cause for the lack of a finding.

Furthermore there is a positive link between foreign sourcing and market share in the tests conducted in this chapter. This link, however, appears to be a size effect more than anything else, as additional analyses showed. Larger firms source more from abroad for a variety of reasons, which were mentioned in chapter 7. Thus the question of causality is raised. It seems that reversed causality is the key explanation of this finding and not the fact that there is a large difference between the perception and hard data in this respect. No effect was found for the relation between foreign sourcing and economic performance, like in chapter 7. The probable causes were established in the discussion in chapter 7. This provides additional evidence that the shift from perception to hard data probably does not lie at the heart of the different finding between foreign sourcing and strategic performance. If this were the case the foreign sourcing – economic performance relation would probably change too.

In section 8.2 attention was shifted to the interactions between the three dimensions. No formal theoretical model was developed yet but the section sketched the outlines of such a model. The data currently used do not allow for any formal tests of these interactions, nor were hypotheses formed on the basis of which this could be done. However, the conceptual discussion confirmed two important points. The first point is that in reality and in the manager's mind sourcing decisions contain multiple dimensions, which should not be seen as isolated issues. Again, as noted in chapters 1 and 2, most of the sourcing literature focuses exclusively on one dimension or the other, although there have been exceptions fairly recently. For example Takeishi (2001) explicitly links the importance of creating valuable supplier relations to the phenomenon of outsourcing because it is a current consideration among firms. An important step forward for the sourcing literature would be to think more holistically and to explicitly consider comparisons and links between dimensions of sourcing.
The second point is that there do exist important interactions between the three dimensions. As firms outsource more, the importance of supplier management to their success in the marketplace increases (Takeishi, 2001). Firms that are better at supplier management are able to outsource more before damaging core functions. Voice relations are hard to form with foreign suppliers. On the other hand, if a voice relation with a foreign supplier can be

established this can lead to a competitive edge. Outsourcing firms may have to turn to foreign sources to obtain specialised goods or benefit from large-scale operations. On the other hand including such foreign suppliers in a supplier search increases the range of suppliers and promotes further competition among suppliers.

Chapter summary

Chapter 8 attempted to integrate the three dimensions of sourcing. It featured regressions that built upon a combination of survey and database data as well as a conceptual discussion of the interactions between dimensions. The empirical analysis in this chapter was fraught with methodological difficulties, which were discussed. The combined analysis upheld the negative effect of external sourcing on profitability as it was discussed in chapter 5 despite the smaller numbers in this analysis. However, the positive relation between external sourcing and market share disappeared. Furthermore there was an indication of a positive relation between voice relations and 'hard' performance of the firm in the form of return on sales, although there was no significant evidence, which appears connected to the methodological difficulties described. Supplier satisfaction rates were shown to be a significant positive contributor to profitability. A final effect was the positive relation between international sourcing and market share. However, it was established that this was likely a surrogate of larger firms sourcing more internationally.

The discussion of interactions between the three dimensions of sourcing strategy generated some insights for further research. The interaction between external sourcing and voice is the most important one. Firms that are good at developing voice relations with external suppliers benefit more from outsourcing. That is, they can outsource more without facing negative consequences. Those firms that outsource more will also become fairly dependent on their ability to manage outside suppliers. A similar argument applies between internationalisation and voice relations. Constructing voice relations with international suppliers will be far more difficult than with local suppliers. But if a firm is able to construct such relations, the transaction costs attached to sourcing internationally can decrease substantially. Finally, firms that outsource much will be searching for suppliers internationally. They have a need for a larger pool of potential suppliers.

Chapter 9: Conclusions

The previous 8 chapters have dealt with the status of the literature on sourcing strategy, a conceptual model to look at some additional issues in sourcing, a description of methods and, over the last four chapters, an overview of empircal results. In this chapter the findings from these last four chapters will be placed in the perspective of the literature. The conclusions will particularly focus on what comes out of this study in terms of recommendations for the sourcing literature.

The conclusions contain only two separate sections. First, the limitations of the study are mentioned in section 9.1. Then in section 9.2 the academic implications of this study will be sketched along the three dimensions of sourcing and for sourcing strategy as a whole. Several future research extensions are also suggested in section 9.2.

9.1   Limitations

In the empirical chapters the methodological limitations of the study were already described. What follows now is an overview of these limitations as well as some general limitations of this research.

Methods

There are several methodological imperfections in this study. Most importantly the part of the survey dealing with internal versus external sourcing was not useful because of a measurement problem. This problem was identified and explained but could not be repaired. The conclusion drawn in chapter 5 was that the survey results on internal and external sourcing were not reliable. That is, they can not be used to draw entirely reliable conclusions with regards to performance. A smaller problem identified in the survey was the relatively low reliability values on some of the measures. These low reliabilities sometimes led to a lack of findings and at other points cast findings in doubt.

Besides these measurement problems, there are the usual limitations associated with the use of a certain data source. Case studies tend to be very thick in description but often lack the appropriate data to test a proposition. This is certainly true for the case studies presented in this study. Survey data have a solid level of detail but it is often not possible to go beyond perception measures for many variables, which is again true for the survey presented here. Perception measures have the disadvantage that the answers contain the respondent's bias, something which this study could only partially control for. Then there was a database that was used to study the results of a large set of firms. While such databases are often rich in terms of the number of observations they often lack detailed measures. The problems associated with the measure for asset specificity in this database are an illustration.

Further methodological problems were found in the execution of the regression analyses in chapters 5 through 8. These problems were especially related to issues of multicollinearity, perfect correlations and the normal distribution of the dependent variable. Solutions for these problems were searched and found within the chapters. In general there do not appear to be major limitations stemming from the resulting regression models.

Chapter 9

General

An obvious limitation of this study is its geographical delineation. Because the Netherlands was chosen as the empirical testing ground, not all results may be transferable to other places in the world. The best way to find out what findings are location specific is of course to replicate the research elsewhere. Since this study is already a replication of other studies, the main findings on voice relations do seem to hold across locations. This study further confirms some results of other studies on external sourcing, suggesting there may be some validity across boundaries there as well. The dimension of foreign sourcing and performance has not been researched much and here a replication elsewhere would definitely be desirable. Practical and time considerations prohibited sending out the survey to multiple countries. Such a cross-European survey would in itself be a desirable project and may be a future research activity.

Despite these limitations to this study, it seems fair to say that several theoretical and methodological shortcomings of other studies that were described in the literature review, have been overcome. In that sense this study presents a step forward in the domain of sourcing research. Several dimensions of sourcing were connected and Europe, in particular the Netherlands, proved to be a fruitful testing ground for ideas developed and researched elsewhere.

9.2   Implications and possible extensions

Several implications for research and interesting avenues for future extensions emerge from this study.

Internal versus external sourcing

Many academics and consultants have suggested outsourcing as a route to increasing firm performance pointing to arguments like increased focus on core competencies, more 'strategic' flexibility, lower fixed costs, the strength of the price mechanism, benefiting from best-in-world suppliers, the virtues of virtual organisations and more. Examples and best practice cases were found to support this point of view. However, most of these studies downplayed the advantages of being vertically integrated that were more prominent in the literature until the 1980s. These are arguments like internal synergies and interfaces, controlling opportunism through the authority mechanism, easier learning and innovation and others. Therefore *there is a lack of balance in the outsourcing literature in recent years*.

Furthermore *in the design of studies on outsourcing two important ingredients were missing*. The first missing ingredient is non-perception data that can be analysed statistically. Most studies rely on cases. If generalisation is attempted through statistical studies these studies used perception data as the dependent variable. Obviously both of these methods are useful in the overall research process but they should be complemented by statistical studies of hard data. The second ingredient concerns measurement over time. Most studies look at outsourcing results at one point in time only. This does not always lead to reliable results. It is well possible a firm is satisfied with an outsourcing operation in the short term to then encounter problems in the longer term.

Conclusions

In this study these problems were overcome. This study indeed shows that the balance between outsourcing and internalisation may also have gone missing in practice. *Firms in the sample have outsourced too much and therefore experience a lower performance*. Being as lean as possible is not necessarily good for a firm's competitiveness in the marketplace. For the outsourcing literature this has several implications. First it seems that *the balance between arguments for and against outsourcing should be restored*. While there is a case to be made for outsourcing under certain conditions, this does not mean outsourcing is a good option under almost any condition. Often-heard riddles like 'outsource everything that is non-core' are probably not a good piece of advice. There is not so much of a need for new theoretical arguments. Instead what the literature needs is a less lopsided focus. Second, *there is a need for more studies with multiple years of data* to examine whether relations hold over time. The studies examined in the literature rely on cross-sectional data and this poses limitations on their findings. In this study it could be established that the main patterns were consistent over the 1993-1998 time period. Third, it is useful to distinguish between different types of performance because *outsourcing is most directly related to financial measures*. Outsourcing does not seem to alter a firm's position in the market so much but seems to lead to decreased financial performance because firms have outsourced too much. Therefore it appears future studies, including those in other research settings, ought to concentrate in particular on this outsourcing-profitability relation. Fourth, *research that includes moderators on the outsourcing-performance relation remains the most interesting work*. Outsourcing decisions are heavily influenced by a set of firm, industry and nation specific factors and excluding those from the analysis limits the usefulness of any findings. While asset specificity and uncertainty have long been seen as key indicators of the outsourcing decision, the time has now come to also look into industries of different technology levels. Such studies comparing high-tech and low-tech industries, which would be possible on the basis of the data presented here, would increase the understanding of when an outsourcing strategy is beneficial. Obviously, it would also be interesting to look into the sourcing behaviour of so-called dot.com firms and assess whether their very disintegrated firm structures are in fact an effective means to improve performance or a reflection of a lack of internal capabilities.

Exit versus voice relations

Much has been written about the potential benefits of partnership or voice relations with suppliers. More recently some authors have pointed at the potential costs of such relations and the accompanying networks. Most authors writing on partnership relations do not distinguish between short term and long term goals of the firm. This study explicitly set out to look at both kinds of effects and search for variations in how relations contribute to these goals of firms. Furthermore it engaged in the discussion whether effective supplier relations translate into overall firm performance. This led to several interesting observations and some additions to the literature.

First, and unsurprisingly, *voice is a necessary condition for high supplier performance both in the short term and the long term*. A co-operative relation between the buyer and supplier is needed to increase relational rents. This confirms that assertions made by the literature on this topic are correct. If a firm wants to be satisfied with its main supplier, it needs to design relations in such a way as to maximise benefits. Second, and this does not

really come as a surprise either, *trust and voice are strongly interrelated phenomena*. This is another confirmation of previous literature on trust, partnership relations and performance. Parties are more likely to engage in co-operative behaviour if they trust each other. If there is mutual value creation through a relation besides the presence of trust, these parties will engage in voice relations. Third, as with the outsourcing issue, *it is useful to distinguish between short-term and long-term goals of a relation*. The characteristics necessary to obtain both types of goals differ. This is something the literature on this topic has not really addressed yet. In order to optimise short-term goals, related to efficient supply chain management, it is sufficient to have a voice relation and trust in the partner. And being relatively more powerful than suppliers helps a sourcing firm, because power is a mechanism to extract short-term performance from suppliers. In the long term a different picture emerges. First, power is not a useful moderator to extract rents, mostly because of asymmetric value to the partners. Second, voice is still a necessary but no longer a sufficient condition to obtain performance in the long run. Another necessary characteristic is a real commitment to a supplier. Without such loyalty, joint innovation, capability building and network formation are hard to achieve. The literature on supplier relations should take this distinction between short term and long term performance into account in forthcoming studies. The fourth observation is that *supplier performance and to some extent also voice relations translate into hard financial returns*. The literature on this topic is mostly limited to an analysis of perception or intermediary performance measures. Rarely has it been proven that handling supplier relations well leads to financial gains. This study provided indications that satisfaction with joint innovation, capabilities and network building pays off in terms of profitability. Although methodological issues warrant some concern over these findings, this is an addition to the supplier relations literature that helps strengthen the voice argument. Furthermore it proves that attempts to improve supplier performance are certainly not in vein. Designing supplier relations in an appropriate manner helps a firm to achieve its goals. A next step is to remove those methodological concerns or to replicate these results elsewhere.

Domestic versus international sourcing
The rise of international sourcing as a research theme and a trend among practitioners is often associated with the cost saving and performance improving nature of international sourcing. Much has been written about the possibilities of electronics firms to source from South East Asia or the production potential of the car industry in Central and Eastern Europe. So far the literature has had difficulties quantifying these results or even making them tangible. Direct tests of the performance effects of internationalising sourcing are missing. This study has attempted to fill this void and several points of interest emerged.

The earlier working title of this study was "Global sourcing: fad or fact". This leads to the first observation: *most sourcing is not global in nature*. Important patterns of intra-regional sourcing exist, for example from Germany to the Netherlands in this study. And foreign firms source more from their respective home countries. Larger firms are more likely to source internationally as well. But generally speaking the most common pattern of sourcing is from within a Triad or other economic region. For the literature on this topic this implies that global sourcing should be seen as the exception and not as the rule. Currently, global sourcing can not be established as a general fact. Second, *this study did not find any causal*

performance link between international sourcing and supplier performance or firm performance. Although there was one positive finding in chapter 8 to do with market share, this is best explained as an artefact of large firms sourcing more internationally. Otherwise no direct effects could be proven. International sourcing is perhaps best seen as a phenomenon that occurs within industries. As an industry discovers a new and improved source, all firms in that industry flock to that source, implying that this source is not a key to competitive advantage. Third, *the trend towards international sourcing inside the EU described in this study confirms Europe has become one marketplace for manufacturing goods.* There do not appear to be any major barriers limiting sourcing from within the European Union. In fact, almost all manufacturing firms in the Netherlands operate in the European market and not the Dutch market. This is obviously a change from earlier times, induced by both market and institutional developments.

Global sourcing strategy as a Chinese puzzle
To recapitulate from previous chapters one final point: *global sourcing strategy is a multidimensional problem that is best approached by comparing and linking various dimensions.* In this study, outsourcing, supplier relations and supplier internationalisation were presented as three dimensions of global sourcing strategy. By recognising that a variety of managerial sourcing decisions exists, which are taken interdependently, the sourcing literature can take one step further in understanding this Chinese puzzle and moves a step closer to a realistic view of the puzzle.

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Appendix A: Scales

This appendix describes the development of the measures in the survey. The original measures by other authors as they were used in English[91] are provided here as well as translations of the items that were designed during the course of survey development.

INDEPENDENT VARIABLES

SOURCING

A translation was made of the sourcing strategy measure of Murray, Kotabe and Wildt (1995a):

- The percent of the total value of non-standardized components in the product (in your purchase price) currently supplied by internal members of the parent system

In the light of this study it appeared better to reverse the question and ask for the percentage supplied by external suppliers. This was more consistent with the remainder of the survey.

INTERNATIONAL SOURCING

No directly applicable measures were available. Thus a question was developed to assess the extent of international sourcing. Respondents were asked:

- What percentage of the total purchasing value for the product is purchased in …..

Respondents were then given a total of 12 different possibilities. The cumulative value of these 12 possibilities had to be 100%. The 12 possibilities were Netherlands, Belgium / Luxembourg, Denmark / Finland / Sweden / Norway, Germany / Switzerland / Austria, France / Spain / Italy / Portugal, Great Britain / Ireland, Greece, Central and Eastern Europe, United States / Canada / Australia, Japan, rest of Asia, rest of world.

These 12 categories were chosen based on expected theoretical differences between a) the Netherlands and the rest of the world as domestic and foreign sources, b) different cultural blocs determining the extent of homogeneity ([Hofstede, 1980 #568]; Kogut & Singh, 1988) and c) different institutional environments in the form of the European and other trading and economic blocs.

ELECTRONIC SOURCING

No directly applicable measures for electronic web-based applications in sourcing relations were available in the literature. Thus a question was developed to assess the usage and extent of usage of four web-based applications.

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[91] Many authors do not explicitly provide measures. John (1984) for instance only provides examples of measures while Helper's (1991) measures can only be derived indirectly. Others provide questions that are out of context like Dyer, Cho and Chu's (1998) questions for suppliers.

- Do you use the following application ……
- If you use this application, then for what percentage of total purchasing for the product?

These questions were then applied to web-based catalogues, electronic auctions, (internet) EDI and electronic procurement solutions.

VOICE (VOICE)
A direct translation was made of the 'covariate for strategic partnership' measures of Mohr and Spekman (1994).

- In this relationship, the parties work together to solve problems (1 = strongly disagree, 5 = strongly agree)
- The manufacturer is flexible in response to questions we make (1 = strongly disagree, 5 = strongly agree)
- The manufacturer makes an effort to help us during emergencies (1 = strongly disagree, 5 = strongly agree)
- When an agreement is made, we can always rely on the manufacturer to fulfill all the requirements (1 = strongly disagree, 5 = strongly agree)

OTHER VARIABLES

EXPERIENCE
The following question was constructed to control for the experience of the respondent:
- When did you start in your current job?

JOB LEVEL
The following question was constructed to control for the job level of the respondent:
- How would you describe your job?

The possible answers were 'CEO', 'purchasing executive', 'purchasing manager', 'purchaser', 'purchasing advisor', and 'other, ….'.

PURCHASING BUDGET
The following question was constructed to control for the purchasing volume:
- What yearly purchasing budget in Dutch guilders are you responsible for?

PURCHASING INTEGRATION
The following question was constructed to control for purchasing integration:
- To what degree is the purchasing function integrated with other functions like marketing, production and research?

The possible answers were 'not at all', 'not really', 'average', 'strongly', and 'very strongly'.

FIRM SIZE
The following question was constructed to control for firm size:
- What is the total turnover of your firm including all its parts in Dutch guilders?

Appendices

BEING MULTINATIONAL
The following question was constructed to control for being multinational:
* Does your firm have foreign offices?

INTERNATIONAL INTEGRATION
The following question was constructed to control for international integration:
* If your firm has any foreign offices then how often are you in touch with fellow purchasers abroad?

The possible answers were 'daily', 'weekly', 'monthly', 'hardly ever', and 'never'.

GENERAL FIRM STRATEGY (GENSTRAT)
A translation was made of the 'strategic orientation self-typing' measures of Shortell and Zajac (1990)[92]:
* Hospital A maintains a niche within the health care system by offering a relatively stable set of services / facilities. General Hospital A is not at the forefront of new services or market developments in healthcare. It tends to ignore changes that have no direct impact on current areas of operation and concentrates instead on doing the best job possible in its existing arena.
* Hospital B maintains a relatively stable base of services while at the same time moving to meet selected, promising new service / market developments. The hospital is seldom 'first in' with new services or facilities. However, by carefully monitoring the actions of institutions like Hospital C (below), Hospital B attempts to follow with a more cost-efficient or well-conceived service.
* Hospital C makes relatively frequent changes in (especially additions to) its set of services / facilities. It consistently attempts to pioneer by being 'first in' in new areas of service or market activity, even if not all of these activities ultimately prove to be highly successful. Hospital C responds rapidly to early signals of market needs or opportunities.
* Hospital D cannot be clearly characterized in terms of its approach to changing its markets or services. It doesn't have a consistent pattern on this dimension. Sometimes the hospital will be an early entrant into new fields of opportunity, sometimes it will move into new fields only after considerable evidence of potential success, sometimes it will not make service / market changes unless forced to by external changes.

There are 6 possible answers to this question in the survey, namely 1 (A), 2 (A-B), 3 (B), 4 (B-C), 5 (C), and 6 (D)

UNCERTAINTY
The uncertainty a firm faces consists of two elements here, volume uncertainty and technological uncertainty. Together they determine the extent to which the environment of the firm is uncertain.

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[92] Please note that these measures were used in the United States. Contrary to mainland Europe, the U.S. has a system of competition between hospitals, making these measures fit for testing competitive strategies in the hospital industry. Obviously translations were made such that references to hospitals were removed entirely.

A direct translation was made of the 'volume uncertainty' measures of Walker and Weber (1984).

- Expected volume fluctuations: the extent to which significant fluctuations are expected in the daily or monthly volume requirement for the component (Likert-type scale of 1 to 5)
- Uncertain volume estimates: the extent to which volume estimates for the component are expected to be uncertain (Likert-type scale of 1 to 5)

A direct translation was made of the 'technological uncertainty' measures of Walker and Weber (1984).

- Changes in specifications: the frequency of expected changes in specifications for the component (Likert-type scale of 1 to 5)
- Technological improvements: the probability of future technological improvements of the component (Likert-type scale of 1 to 5)

ASSET SPECIFICITY (ASSPEC)

Asset specificity (Murray et al, 1995a):

- 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)

A direct translation was made of the 'asset specificity' measures of Walker and Poppo (1991). However, their measures featured the words 'relatively unique to the supplier', while the purpose of this survey was to measure the asset specificity of the entire product, product X. Therefore the supplier part was omitted from the measures.

- The extent to which the production of the part requires technical labor skills that are relatively unique (measured on a 7-point Likert-type scale)
- The extent to which the production of the part requires manufacturing equipment that is relatively unique (measured on a 7-point Likert-type scale)

However, the work on asset specificity by Williamson (1985) not only describes the importance of specific labour skills and manufacturing equipment but also discusses the importance of specific production locations. The shipbuilding industry is one example of site specific production: ships are always built next to a river, sea or connected lake, as it would be difficult to transport entire ships over land before letting them sail out. Williamson refers to this third component as site specificity. Particularly in the light of international sourcing strategy site specificity is an important dimension to add to the asset specificity measure.

- The extent to which the production of the part requires production locations that are relatively unique (measured on a 7-point Likert-type scale)

PROCESS INNOVATIONS (PROCINN)

A direct translation was made of the 'process innovations' measures of Murray et al (1995a).

- To your firm, the level of process innovation in the product (i.e., the set of innovative ideas involved in the manufacturing process) is (0 = zero, 5 = very high)
- Relative to your competitors, the level of process innovations in your product is (1 = very low, 5 = very high)
- The number of potential applications (or uses) of the process innovations in the product is (0 = zero, 5 = very high)

PRODUCT INNOVATIONS (PRODINN)

A direct translation was made of the 'product innovations' measures of Murray et al (1995a).

- 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)
- Relative to your competitors, the level of product innovations in your product is (1 = very low, 5 = very high)
- The number of potential applications (or uses) of the product innovations in the product is (0 = zero, 5 = very high)

LONGEVITY

The following question was constructed to control for longevity of the buyer-supplier relation:

- For how long have you had a relationship with this supplier?

STABILITY

A direct translation was made of the measures of Nooteboom, Berger and Noorderhaven (1997):

- The relation between our firm and this customer has continually improved in the course of time (1 = strongly disagree, 5 = strongly agree)
- Our supply to this customer has increased strongly in the course of time (1 = strongly disagree, 5 = strongly agree)

TRUST (TRUST)

A direct translation was made of the 'trust' measures of Mohr and Spekman (1994).

- We trust that the manufacturer's decisions will be beneficial to our business (1 = strongly disagree, 5 = strongly agree)
- We feel that we do not get a fair deal from this manufacturer (1 = strongly agree, 5 = strongly disagree)
- This relationship is marked by a high degree of harmony (1 = strongly disagree, 5 = strongly agree)

POWER (POWER)

A direct translation was made of the measure for bargaining power of suppliers of Murray et al (1995a):

- On average, the number of external suppliers capable of providing the non-standardized components in the product is (0 = zero, 5 = very many)

- 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, reverse coded)
- The number of substitutes for the non-standardized components in the product is (0 = zero, 5 = very many)

However, power is often a multi-dimensional construct (Cool & Henderson, 1998). In the case of a buyer-supplier relation one may think of power that is determined by variables exogenous to the relation like the number of potential suppliers or substitutes. Alternatively there are power aspects endogenous to the relation like the relative size of the two parties or the importance of the product the supplier supplies to the focal product. Thus it appeared necessary to add more items to measure power. A translation was made of the supplier power measures of Cool & Henderson (1998):

- Supplier bargaining power: the bargaining power of your principal suppliers, that is, their capacity to impose their pricing conditions, is (low, quite low, medium, quite high, high)
- Number of potential suppliers: the number of potential suppliers to your firm is (less than 10, less than 50, less than 100, more than 100)
- Supplier concentration: of your total purchasing, what percentage does your largest supplier represent (0-10-20-30-40-50-60-70-80-90-100)
- Impact on seller's differentiation: the impact of the products purchased from your suppliers on your product differentiation is (weak, quite weak, medium, quite important, important)
- Impact on seller's costs: the impact of the products purchased from your suppliers on your cost structure is (weak, quite weak, medium, quite important, important)
- Supplier's switching cost: for your principal suppliers, the loss of one supplier would have a ……. negative effect (low, quite low, medium, quite high, high)
- Forward integration: over the last 3 years, forward integration into your industry from your suppliers has been (rare, quite rare, a few, quite numerous, numerous)
- Cost to switch suppliers: the costs to switch suppliers are (low, quite low, medium, quite high, high)

These measures were adapted to the survey that focused only on the most important supplier and not the whole gamut of suppliers. Also the 'supplier switching cost' and 'supplier concentration' measures were measured by applying a precise percentage. Finally it can be noted that 'number of potential suppliers' and 'cost to switch suppliers' exist in both series of power measures and were as a consequence only used once. Thus a total of 9 possible power measures were used.

SUPPLIER LOCATION
The following questions were constructed to control for the location of the supplier:
- In what country is the largest supplier located?
- If the largest supplier is located in the Netherlands then how far from your firm?

BENCHMARKING

The following questions were constructed to control for benchmarking:

- How often does your firm measure the performance of the largest supplier?
- How often does your firm compare the performance of the largest supplier with that of its competitors?

The possible answers were 'never', 'on a yearly basis', 'every three months', 'monthly', and 'continuously'.

LOYALTY (LOYALTY)

A direct translation was made of the 'commitment' measures of Mohr and Spekman (1994).

- We'd like to discontinue carrying this manufacturer's product (1 = strongly agree, 5 = strongly disagree)
- We are very committed to carrying this manufacturer's products (1 = strongly disagree, 5 = strongly agree)
- We have a minimal commitment to this manufacturer (1 = strongly agree, 5 = strongly disagree)

DEPENDENT VARIABLES

ECONOMIC PERFORMANCE (ECONPERF)

For the general measure of economic performance of sourcing a direct translation was made of the 'financial performance' measures of Murray et al (1995a).

- Relative to the product's largest three competitors, the return on sales is (1 = much lower, 5 = much higher)
- Relative to the product's largest three competitors, the return on investment is (1 = much lower, 5 = much higher)

For the measure of economic performance of the largest supplier a direct translation was made of the 'exchange performance' measures of Poppo and Zenger (1998). These measures were applied to the deliveries by the largest supplier of product X.

- The level of satisfaction with the overall cost (1 = dissatisfied, 7 = satisfied)
- The level of satisfaction with the quality of the output or service (1 = dissatisfied, 7 = satisfied)
- The level of satisfaction with the responsiveness to problems or inquiries (1 = dissatisfied, 7 = satisfied)

However, it appeared that these measures did not cover all elements of supplier satisfaction within the context of manufacturing. Interviews with people in the field as well as discussions with academic experts revealed two other important dimensions of supplier satisfaction, namely the reliability of deliveries and the speed of deliveries. The reliability of deliveries is important because without a certain level of reliability the supply chain tends to become unstable and costs rises exponentially. The speed of deliveries increasingly matters in industrial exchanges because of Just-In-Time concerns as well as shorter product life cycles. Thus two more measures were added.

- The level of satisfaction with the reliability of deliveries (1 = dissatisfied, 7 = satisfied)
- The level of satisfaction with the speed of deliveries (1 = dissatisfied, 7 = satisfied)

STRATEGIC PERFORMANCE (STRATPER)

For the general measure of strategic performance of sourcing a direct translation was made of the 'strategic performance' measures of Murray et al (1995a).

- Relative to the product's largest three competitors, the market share is (1 = much lower, 5 = much higher)
- Relative to the product's largest three competitors, the sales growth rate is (1 = much lower, 5 = much higher)

For the measure of strategic performance of the largest supplier there was no measure readily available. However, exchange satisfaction measures had been used for economic performance. Their structure could easily be maintained. So the 'exchange performance' measures of Poppo and Zenger (1998) were employed and three measures were developed. These measures were built on recent literature on inter-firm relations that stresses the importance of relations with external partners, in this case suppliers, as a means of increasing the capabilities of a firm (Dyer & Singh, 1998), its innovative potential (Nooteboom 1999) and its ability to set up linkages (Burt, 1992). Interviews with people in the field as well as discussions with academic experts confirmed the importance of these three elements.

- The level of satisfaction with learning new capabilities from the supplier (1 = dissatisfied, 7 = satisfied)
- The level of satisfaction with joint innovation with the supplier (1 = dissatisfied, 7 = satisfied)
- The level of satisfaction with the supplier's ability to manage its network of subcontractors (1 = dissatisfied, 7 = satisfied)

Appendix B: Survey (in Dutch)[93]

Bedankt voor uw interesse in ons onderzoek. De vragenlijst bestaat uit meerdere onderdelen. Bij elk onderdeel staat een korte toelichting. Het invullen van de vragenlijst duurt ongeveer 20 minuten. Het is van belang dat u **alle vragen** invult, omdat we alleen dan uw antwoord kunnen gebruiken in het onderzoek. We verzoeken u telkens het juiste antwoord **te omcirkelen of aan te kruisen**.

Ook als u niet in staat bent deze vragenlijst in te vullen, horen we dit graag van u (liefst met korte vermelding van reden). Als u graag een kopie **van de resultaten (inclusief industrievergelijkingen**) **wilt ontvangen, vult u dan alstublieft het bijgesloten antwoordformulier in. U kunt de vragenlijst en het antwoordformulier opsturen door middel van de bijgevoegde retourenvelop. Een postzegel is niet nodig.**

Bij vragen kunt u contact opnemen met Michael Mol (mmol@fbk.eur.nl of telefonisch 010 - 408 11 68 / 06 - 166 08 373). Onze hartelijke dank voor uw medewerking.

Prof. dr. Rob van Tulder
Dr. Paul Beije
Drs. Michael J. Mol

Deel 1: Over u en uw onderneming
Hieronder staan enkele vragen over u en het bedrijf waar u voor werkt. Wilt u bij meerdere mogelijkheden telkens de *best kloppende* mogelijkheid omcirkelen of aankruisen?

1. In welk jaar bent u in uw huidige functie begonnen? …………………..

2. Hoe is uw functie het beste te omschrijven?
    ☐ Algemeen Directeur   ☐ Directeur inkoop
    ☐ Inkoopmanager   ☐ Inkoopfunctionaris
    ☐ Inkoopadviseur   ☐ Anders, nl. ………………….

3. Hoe hoog is het jaarlijkse inkoopbudget waar u verantwoordelijk voor bent in guldens? ... .

4. In hoeverre is de inkoopfunctie in uw bedrijf geïntegreerd met andere functies zoals marketing, productie en onderzoek?

niet	vrijwel niet	gemiddeld	sterk	zeer sterk

5. Wat is de totale omzet van uw onderneming, inclusief alle onderdelen, in guldens? ……….

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[93] Paper size and lay-out have been reformatted to fit the appendix. The original survey is a 16-page A5 booklet.

6. Heeft uw onderneming buitenlandse vestigingen?

ja	nee

7. Zo ja: hoe vaak heeft u contazct met collega-inkopers in buitenlandse vestigingen?

dagelijks	wekelijks	maandelijks	zelden	nooit

8. Deze vraag gaat over de algemene strategie van uw bedrijf. U kunt rechts de mogelijkheid omcirkelen die het *meest lijkt* op uw bedrijf:

A: De organisatie bevindt zich in een niche in de sector. Ze biedt een relatief vaste verzameling producten/diensten aan. In het algemeen is ze geen voorloper in nieuwe technologische of markt-ontwikkelingen in de sector. Ze heeft de neiging om veranderingen niet op te pakken wanneer deze geen directe invloed hebben op de huidige gang van zaken. In plaats daarvan concentreert ze zich op het zo goed mogelijk uitvoeren van haar taken in de bestaande omgeving.

B: De organisatie heeft een relatief stabiele basis van producten/diensten, terwijl ze tegelijkertijd bezig is om selectief bepaalde veelbelovende nieuwe ontwikkelingen in te passen. De organisatie is zelden de eerste met adoptie van nieuwe producten, diensten of technologieen. Echter, door zorgvuldig de acties van organisatie type C (zie hieronder) in de gaten te houden, probeert ze te volgen met een beter ontworpen of kosten-efficiëntere product/dienst.

C: De organisatie maakt relatief vaak aanpassingen op (en met name toevoegingen aan) haar verzameling van producten/diensten. Ze probeert consequent een pioniersrol te vervullen door als eerste nieuwe technologieën of markten te ontwikkelen, zelfs als uiteindelijk niet al deze activiteiten leiden tot succes. De organisatie reageert snel op vroege signalen over behoeften en kansen in de markt.

D: De organisatie kan niet eenduidig gekenschetst worden in termen van haar aanpak ten aanzien van nieuwe producten, diensten of markten. De organisatie vertoont geen consequent patroon op deze schaal. Soms is de organisatie een pionier in nieuwe gebieden, soms stapt ze pas in nieuwe gebieden na duidelijk bewijs van het mogelijk succes, soms negeert ze deze ontwikkelingen tenzij ze gedwongen wordt door externe veranderingen.

A
Zit tussen A en B
B
Zit tussen B en C
C
D

Deel 2: De uitbestedingsstrategie van uw onderneming
De vragen die nu volgen gaan over de uitbestedingsstrategie van uw bedrijf. Het gaat om het product waarmee u het meeste omzet. Bij de uitbesteding gaat het alleen om toeleveringen van

producten die een *deel* uitmaken van het uiteindelijke product. Het gaat dus niet om facilitaire inkoop of inkoop van diensten.

Product X
1. Wat is het product waarmee u het *meeste omzet*?
…………..………………………………………………………………..
Dit product zal vanaf hier *product X* heten.

Onzekerheid
De productie van product X kan onzeker zijn door *volumewijzigingen* of *specificatiewijzigingen*.

2. Wat is voor product X ………	Zeer laag				Zeer hoog
… de gemiddelde maandelijkse volumeschommeling	1	2	3	4	5
… de betrouwbaarheid van maandelijkse schattingen van het volume	1	2	3	4	5
… de frequentie van specificatieveranderingen	1	2	3	4	5
… de kans op toekomstige technologische veranderingen	1	2	3	4	5

Over product X
Product X bestaat uit *niet-gestandaardiseerde* componenten die speciaal voor product X gemaakt worden en *gestandaardiseerde* componenten ('van de plank').

3. Welk percentage van de productiekosten van product X komt van *gestandaardiseerde* componenten?   ……………..…….%

Bij de productie van niet-gestandaardiseerde componenten voor product X worden specifieke *productiemiddelen* gebruikt. Bijvoorbeeld machines, speciale grondstoffen en getrainde werknemers. Sommige productiemiddelen hebben alleen waarde voor de productie van componenten voor product X.

4. Wat is de hoeveelheid productiemiddelen die *weinig* of *geen* waarde hebben voor *andere* doelen dan de productie van componenten voor product X:

nul	zeer laag	laag	gemiddeld	hoog	zeer hoog

5. In hoeverre vereist de productie van **niet-gestandaardiseerde** componenten voor product X……	Niet						Zeer sterk
… unieke technische vaardigheden bij werknemers	1	2	3	4	5	6	7
… productieapparatuur die uniek is voor deze componenten	1	2	3	4	5	6	7
… speciale productielocaties	1	2	3	4	5	6	7

Nu volgen enkele vragen over het resultaat van product X. Deze zijn bedoeld om te kijken hoe goed het met het product gaat in vergelijking met concurrerende producten.

Marktresultaat product
Hier gaat het om de positie van het product in de *markt*.

6. Ten opzichte van de grootste 3 concurrenten is ………	Veel lager				Veel hoger
… het marktaandeel van product X	1	2	3	4	5
… de omzetgroei van product X	1	2	3	4	5

Financieel resultaat product

We willen graag weten wat de *winstmarge* van product X is vergeleken met de winstmarge van concurrerende producten.

Het rendement op verkopen is winst of verlies gedeeld door verkopen.
Het rendement op investeringen is winst of verlies gedeeld door alle investeringen samen.

7. Ten opzichte van de grootste 3 concurrenten is ………	Veel lager				Veel hoger
het rendement op verkopen van product X	1	2	3	4	5
het rendement op investeringen van product X	1	2	3	4	5

De nu volgende vragen gaan over (internationale) uitbesteding. Bij de uitbesteding gaat het alleen om toeleveringen van *producten* die een *deel* uitmaken van het uiteindelijke product. Het gaat dus niet om facilitaire inkoop of inkoop van diensten.

Uitbesteden

Van de totale productiekosten van product X wordt een deel extern ingekocht.

8. Welk percentage van de totale productiekosten van product X wordt momenteel door externe leveranciers geleverd ……………..…….%

Internationaal uitbesteden

Deze vraag is bedoeld om inzicht te krijgen in waar uw leveranciers zitten. Hier gaat het om de inkoopwaarde (*totale externe inkoop*) voor product X.

9. Het totaal voor deze vraag moet optellen tot *100%*. Welk percentage van de totale inkoopwaarde van product X wordt ingekocht in:

Nederland	.……%
België en Luxemburg	.……%
Denemarken, Finland, Zweden en Noorwegen	…… %
Duitsland, Zwitserland en Oostenrijk	…… %
Frankrijk, Spanje, Italië en Portugal	…… %
Groot-Brittanië en Ierland	…… %
Griekenland	…… %
Centraal en Oost-Europa	…… %
Verenigde Staten, Canada en Australië	…… %
Japan	…… %
Overig Azië	…… %
Overige landen	…… %
Totaal	100%

De volgende vragen betreffen innovatie. Daarbij staat centraal hoeveel vernieuwing er in het productieproces zit en in hoeverre product X zelf een vernieuwend product is.

Procesinnovatie

Met procesinnovatie bedoelen we het aanbrengen van verbeteringen in een bestaand productieproces of het introduceren van een beter productieproces.

11. Voor product X is …	Nul	Zeer laag			Zeer hoog	
… het niveau van procesinnovatie vergeleken met andere producten in uw bedrijf	0	1	2	3	4	5
… het niveau van procesinnovatie in vergelijking met concurrerende producten	0	1	2	3	4	5
… aantal mogelijke toepassingen van deze procesinnovaties in uw andere producten	0	1	2	3	4	5

Productinnovatie

Met productinnovatie bedoelen we het verbeteren van een bestaand product of het ontwikkelen van een nieuw product.

12. Voor product X is …	Nul	Zeer laag			Zeer hoog	
… het niveau van productinnovatie vergeleken met andere producten in uw bedrijf	0	1	2	3	4	5
… het niveau van productinnovaties in vergelijking met concurrerende producten	0	1	2	3	4	5
.. aantal mogelijke toepassingen van deze productinnovaties in uw andere producten	0	1	2	3	4	5

Gebruik van E-commerce

Electronic commerce wordt steeds vaker toegepast in inkoop. Hieronder noemen we enkele belangrijke *E-commerce toepassingen* met daarbij de vraag of uw onderneming deze toepassingen gebruikt.

13. Welke van de volgende toepassingen worden gebruikt bij *product X* en zo ja voor hoeveel *procent* van de inkoop van product X?

Toelichting:
- Internet EDI is Electronic Data Interchange via het internet (dus niet via een directe lijn). Dit is een manier om gegevens uit te wisselen met uw leveranciers.
- Procurement solution is een electronische toepassing voor bestelling, logistiek en levering, gebaseerd op intranet of internet technologie. Dit is een manier om uw orderproces te stroomlijnen.
- Webcatalogus is een catalogus van uw leveranciers op het internet. Dit is een electronische winkel van een leverancier.
- Elektronische veiling is een internet site waar u meerdere leveranciers laat bieden op uw order. Dit is een manier om de leverancier met de laagste prijs te selecteren.

	Wordt gebruikt		Zo ja: hoeveel procent van de inkoop van product X
Internet EDI	Nee	Ja	…….....………..%
Procurement solution	Nee	Ja	…….....………..%
Webcatalogus	Nee	Ja	…….....………..%
Elektronische veiling	Nee	Ja	…….....………..%

Deel 3: De grootste leverancier

Het laatste deel van de vragenlijst gaat over uw *grootste* leverancier voor product X. Hiermee wordt bedoeld de externe leverancier die in *guldens* het meeste toelevert voor de productie van product X.

Relatie met de grootste leverancier

1. Hoe lang heeft u al een relatie met deze leverancier?   ……………… jaar

2.   Reageer op de volgende stellingen

	Sterk oneens				Sterk eens
De relatie tussen ons bedrijf en de grootste leverancier is door de tijd heen voortdurend verbeterd	1	2	3	4	5
Onze inkoop bij de grootste leveranciers is door de tijd heen voortdurend toegenomen	1	2	3	4	5

3. Welk percentage van de totale inkoop voor product X wordt door de *grootste* leverancier geleverd?   ……………%

Uw grootste leverancier heeft waarschijnlijk *meerdere* klanten.

4. Welk percentage van de omzet van uw grootste leverancier komt *van u*? ………………%

Over de grootste leverancier

De vragen op deze pagina gaan over de relatie met de grootste leverancier.

5. Reageer op de volgende stellingen. Het gaat het erom of de leverancier met u samenwerkt en meedenkt.

	Sterk oneens				Sterk eens
In deze relatie werken partijen samen om problemen op te lossen	1	2	3	4	5
Deze leverancier is flexibel in het beantwoorden van onze vragen	1	2	3	4	5
Deze leverancier helpt ons in noodsituaties	1	2	3	4	5

6. Reageer op de volgende stellingen. De vraag gaat in op het vertrouwen dat uw bedrijf in de leverancier heeft.

	Sterk oneens				Sterk eens
Als er een overeenkomst is, kunnen we er altijd op vertrouwen dat deze leverancier alle voorwaarden nakomt	1	2	3	4	5

We vertrouwen er op dat de leverancier beslissingen neemt die goed zijn voor ons	1	2	3	4	5
We vertrouwen erop dat we een goede deal krijgen van deze leverancier	1	2	3	4	5
Deze relatie wordt gekenmerkt door een hoge mate van harmonie	1	2	3	4	5

De macht van de leverancier

De nu volgende vragen gaan over de mate waarin uw onderneming ofwel uw grootste leverancier de *machtigere partij* is in de relatie.

7. Over het door de grootste leverancier geleverde product

	Nul	Zeer weinig			Zeer veel	
Hoeveel andere leveranciers kunnen dit product leveren	0	1	2	3	4	5
Hoeveel vervangende producten zijn er voor dit product	0	1	2	3	4	5

8. De onderhandelingsmacht van de grootste leverancier is

laag	vrij laag	gemiddeld	vrij hoog	hoog

9. Het door de grootste leverancier geleverde product heeft invloed op zowel de kostprijs van product X als ook op de eigenschappen.

Welke invloed heeft het product van de grootste leverancier op uw	Gering				Groot
… totale kosten	1	2	3	4	5
… mogelijkheden om product X onderscheidend te maken van concurrenten	1	2	3	4	5

10. Gedurende de laatste 3 jaren is het aantal keren dat uw leveranciers met u zijn gaan concurreren, dus soortgelijke producten zijn gaan produceren,

gering	vrij gering	Gemiddeld	vrij groot	groot

De locatie van de leverancier

Deze vragen gaan over de vestigingsplaats van de leverancier.

11. In welk land is de grootste leverancier gevestigd?

……………..

12. Indien in Nederland, hoeveel kilometer van u verwijderd?

.……………

Prestatiemeting en vergelijking

Om te kijken hoe goed een leverancier het doet, kunnen de leverprestaties van de leverancier gemeten en vergeleken worden.

13. Hoe regelmatig meet u de prestaties van de grootste leverancier?

nooit	jaarlijks	elk kwartaal	elke maand	continu

14. Hoe regelmatig vergelijkt u de prestaties van de grootste leverancier met die van zijn concurrenten ('benchmarking')?

nooit	jaarlijks	elk kwartaal	elke maand	continu

Wisselen van leverancier

Het kan voorkomen dat u van leverancier wilt wisselen. Daarover gaan de volgende vragen.

15. Als uw onderneming de grootste leverancier van product X zou vervangen, dan zouden de eenmalige kosten om naar een andere leverancier over te schakelen …… zijn

nul	zeer laag	laag	gemiddeld	hoog	zeer hoog

16. De volgende stellingen gaan over loyaliteit richting de grootste leverancier.

	Sterk eens			Sterk oneens	
We willen graag stoppen de producten van deze leverancier te kopen	1	2	3	4	5
We zijn niet erg gecommitteerd aan het kopen van de producten van deze leverancier	1	2	3	4	5
We hebben een minimale betrokkenheid richting deze leverancier	1	2	3	4	5

17. Hoe makkelijk zou het voor uw onderneming zijn om de producten van de grootste leverancier van product X zelf te gaan produceren ('inbesteden')?

onmogelijk	zeer makkelijk	makkelijk	gemiddeld	moeilijk	zeer moeilijk

Deze pagina gaat over uw tevredenheid met de grootste leverancier.

De korte termijn resultaten van de grootste leverancier

Hier gaat het om de tevredenheid over de leveringen van uw grootste leverancier.

18. *Hoe tevreden bent u bij uw grootste leverancier met …*	Zeer ontevreden					Zeer tevreden	
… kwaliteit van de leveringen	1	2	3	4	5	6	7
… reactievermogen bij problemen of vragen	1	2	3	4	5	6	7
… kosten van de leveringen	1	2	3	4	5	6	7
… betrouwbaarheid van leveringen	1	2	3	4	5	6	7
… snelheid van leveringen	1	2	3	4	5	6	7

De lange termijn resultaten van de grootste leverancier

Hier gaat het om de tevredenheid over de totale bijdrage die uw grootste leverancier levert aan het resultaat van uw onderneming.

19. *Hoe tevreden bent u bij uw grootste leverancier met …*	Zeer ontevreden					Zeer tevreden	
… het leren van nieuwe vaardigheden van leverancier	1	2	3	4	5	6	7
… gezamenlijke innovatie met leverancier	1	2	3	4	5	6	7

… zijn vermogen om zelf het netwerk van zijn sub-leveranciers aan te sturen	1	2	3	4	5	6	7

Ten slotte:
Controleert u alstublieft nogmaals of u alle vragen heeft ingevuld.

We willen u hartelijk bedanken voor het invullen van deze vragenlijst. Uw bijdrage is voor het slagen van ons onderzoek van groot belang. Hieronder staat een vrije ruimte. Die kunt u gebruiken als u nog iets kwijt wilt over wat de inkoop van uw bedrijf afwijkend maakt van andere bedrijven. Ook kunt u hier eventueel ander commentaar kwijt.

………………………………………………………………………………

Appendix C: Correlation tables

	LOGSAL98	LOGLABINT	FIRMUNCE	PURRAT98	EXPRAT98	ASSPEC98	RNDINT98	MARINT98	NETROS98	MARSHA98	FOREIGN
LOGSAL98	1.000 . 4640	.710 .000 4640	-.134 .000 4640	.396 .000 4640	.432 .000 4640	.030 .052 4208	.220 .000 3383	.106 .000 3383	.137 .000 4640	.449 .000 4640	.207 .000 1591
LOGLABINT	.710 .000 4640	1.000 . 4640	-.129 .000 4640	.542 .000 4640	.301 .000 4640	-.046 .003 4208	.115 .000 3383	.034 .045 3383	.152 .000 4640	.230 .000 4640	.085 .001 1591
FIRMUNCE	-.134 .000 4640	-.129 .000 4640	1.000 . 4787	-.062 .000 4640	.048 .001 4640	-.020 .194 4342	.046 .007 3486	.015 .377 3486	-.090 .000 4640	-.046 .002 4640	.019 .449 1650
PURRAT98	.396 .000 4640	.542 .000 4640	-.062 .000 4640	1.000 . 4640	.192 .000 4640	-.281 .000 4208	.016 .364 3383	-.018 .302 3383	-.291 .000 4640	.100 .000 4640	-.070 .005 1591
EXPRAT98	.432 .000 4640	.301 .000 4640	.048 .001 4640	.192 .000 4640	1.000 . 4640	-.059 .000 4208	.325 .000 3383	.058 .001 3383	.034 .020 4640	.231 .000 4640	.298 .000 1591
ASSPEC98	.030 .052 4208	-.046 .003 4208	-.020 .194 4342	-.281 .000 4208	-.059 .000 4208	1.000 . 4342	-.049 .006 3218	-.030 .088 3218	.162 .000 4208	-.040 .010 4208	.042 .107 1505
RNDINT98	.220 .000 3383	.115 .000 3383	.046 .007 3486	.016 .364 3383	.325 .000 3383	-.049 .006 3218	1.000 . 3486	.194 .000 3486	.072 .000 3383	.053 .002 3383	.207 .000 1139
MARINT98	.106 .033 3383	.034 .045 3383	.015 .377 3486	-.018 .302 3383	.058 .001 3383	-.030 .088 3218	.194 .000 3486	1.000 . 3486	.053 .002 3383	.069 .000 3383	-.013 .666 1139
NETROS98	.137 .000 4640	.152 .000 4640	-.090 .000 4640	-.291 .000 4640	.034 .020 4640	.162 .000 4208	.072 .000 3383	.053 .002 3383	1.000 . 4640	.068 .000 4640	.128 .000 1591
MARSHA98	.449 .000 4640	.230 .000 4640	-.046 .002 4640	.100 .000 4640	.231 .000 4640	-.040 .010 4208	.053 .002 3383	.069 .000 3383	.068 .000 4640	1.000 . 4640	.119 .000 1591
FOREIGN	.207 .000 1591	.085 .001 1591	.019 .449 1650	-.070 .005 1591	.298 .000 1591	.042 .107 1505	.207 .000 1139	-.013 .666 1139	.128 .000 1591	.119 .000 1591	1.000 . 1650

Table C1: correlations between key variables in the database. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	PURRAT93	PURRAT94	PURRAT95	PURRAT96	PURRAT97	PURRAT98
PURRAT93	1.000 4491	.852 4438	.827 4448	.795 4483	.764 4481	.750 4344
PURRAT94	.852 4438	1.000 4734	.867 4690	.816 4726	.784 4724	.776 4587
PURRAT95	.827 4448	.867 4690	1.000 4743	.860 4735	.825 4733	.805 4596
PURRAT96	.795 4483	.816 4726	.860 4735	1.000 4779	.858 4769	.821 4632
PURRAT97	.764 4481	.784 4724	.825 4733	.858 4769	1.000 4777	.862 4630
PURRAT98	.750 4344	.776 4587	.805 4596	.821 4632	.862 4630	1.000 4640

Table C2: correlations between purchasing rates in the database in various years. Presented are the correlations and number of firms that were correlated (all 2-tailed significance levels are .000).

	PURXRND	RNDINT	PURXASSP	ASSPE	PURXUNC	FIRMUNCE	PURXFORE	FOREIGN	PURRAT
PURXRND	1.000 . 3.378	.904 .000 3.378	.199 .000 3114	-.076 .000 3.117	.124 .000 3372	.037 .033 3378	.249 .000 1.091	.193 .000 1091	.275 .000 3372
RNDINT	.904 .000 3.378	1.000 . 3.475	.025 .156 3114	-.049 .005 3.207	.066 .000 3372	.047 .005 3475	.186 .000 1.116	.211 .000 1132	.017 .332 3372
PURXASSP	.199 .000 3.114	.025 .156 3.114	1.000 . 4193	.611 .000 4.193	.090 .000 4193	-.050 .001 4193	.167 .000 1.442	.035 .189 1442	.519 .000 4193
ASSPEC	-.076 .000 3.117	-.049 .005 3.207	.611 .000 4193	1.000 . 4.327	-.060 .000 4193	-.017 .260 4327	.009 .717 1.477	.041 .110 1497	-.280 .000 4193
PURXUNC	.124 .000 3.372	.066 .000 3.372	.090 .000 4193	-.060 .000 4.193	1.000 . 4625	.872 .000 4625	.040 .109 1.583	-.004 .865 1583	.179 .000 4625
FIRMUNCE	.037 .033 3.378	.047 .005 3.475	-.050 .001 4193	-.017 .260 4.327	.872 .000 4625	1.000 . 4772	-.004 .883 1.620	.012 .623 1642	-.064 .000 4625
PURXFORE	.249 .000 1.091	.186 .000 1.116	.167 .000 1442	.009 .717 1.477	.040 .109 1583	-.004 .883 1620	1.000 . 1.620	.922 .000 1620	.149 .000 1583
FOREIGN	.193 .000 1.091	.211 .000 1.132	.035 .189 1442	.041 .110 1.497	-.004 .865 1583	.012 .623 1642	.922 .000 1.620	1.000 . 1642	-.069 .006 1583
PURRAT	.275 .000 3.372	.017 .332 3.372	.519 .000 4193	-.280 .000 4.193	.179 .000 4625	-.064 .000 4625	.149 .000 1.583	-.069 .006 1583	1.000 . 4625

Table C3: correlations between moderating variables, interaction variables and external sourcing from the database (with 1998 data). Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	MARKPERF	FINAPERF	FIRMPERF	PROCINNO	PRODINNO	PURRATSU	ASSETSPE	UNCERTAI	RESPJOB	PERCSTAN	RESPEXP	PURBUDGE	FIRMSTRA	MIXSTRAT	TOTPROCO
MARKPERF	1.000 . 197	.386 .000 189	.859 .000 189	.178 .015 187	.228 .002 190	-.005 .945 194	.027 .710 194	-.008 .909 195	.143 .045 197	.140 .051 194	.003 .969 197	-.017 .809 196	.063 .415 170	-.167 .019 197	.074 .306 195
FINAPERF	.386 .000 189	1.000 . 189	.804 .000 189	.116 .120 181	.147 .047 183	-.100 .175 186	.006 .939 187	.007 .924 187	-.002 .974 189	-.052 .477 186	-.023 .749 189	-.076 .302 188	.106 .181 162	-.127 .081 189	.088 .229 187
FIRMPERF	.859 .000 189	.804 .000 189	1.000 . 189	.211 .004 181	.277 .000 183	-.071 .336 186	.035 .635 187	.017 .812 187	.093 .204 189	.059 .427 186	-.020 .780 189	.008 .913 188	.130 .098 162	-.180 .013 189	.114 .119 187
PROCINNO	.178 .015 187	.116 .120 181	.211 .004 181	1.000 . 190	.762 .000 189	.090 .221 187	.186 .010 189	.253 .000 189	.007 .925 190	-.011 .876 188	.066 .368 190	-.053 .466 189	.149 .058 162	-.197 .006 190	.060 .415 189
PRODINNO	.228 .002 190	.147 .047 183	.277 .000 183	.762 .000 189	1.000 . 193	.098 .179 190	.134 .063 192	.262 .000 192	.000 .997 193	.006 .929 192	.115 .110 193	.034 .635 192	.156 .046 165	-.164 .023 193	.078 .280 192
PURRATSU	-.005 .945 194	-.100 .175 186	-.071 .336 186	.090 .221 187	.098 .179 190	1.000 . 197	-.061 .402 194	.124 .085 195	.059 .412 197	-.039 .586 194	-.058 .416 197	-.039 .588 197	.127 .098 171	.065 .364 197	.062 .386 195
ASSETSPE	.027 .710 194	.006 .939 187	.035 .635 187	.186 .010 189	.134 .063 192	-.061 .402 194	1.000 . 197	.045 .527 196	.092 .201 197	-.188 .008 196	-.120 .092 197	-.076 .290 196	-.028 .720 169	-.135 .059 197	.088 .221 196
UNCERTAI	-.008 .909 195	.007 .924 187	.017 .812 187	.253 .000 189	.262 .000 192	.124 .085 195	.045 .527 196	1.000 . 198	-.077 .280 198	-.080 .265 196	.043 .544 198	.028 .694 197	.272 .000 170	.044 .536 198	.029 .691 196
RESPJOB	.143 .045 197	-.002 .974 189	.093 .204 189	.007 .925 190	.000 .997 193	.059 .412 197	.092 .201 197	-.077 .280 198	1.000 . 200	.020 .777 197	-.237 .001 200	-.021 .772 199	.090 .240 172	-.140 .048 200	.086 .227 198
PERCSTAN	.140 .051 194	-.052 .477 186	.059 .427 186	-.011 .876 188	.006 .929 192	-.039 .586 194	-.188 .008 196	-.080 .265 196	.020 .777 197	1.000 . 197	.131 .066 197	.075 .294 196	-.051 .506 169	-.057 .423 197	.004 .961 196
RESPEXP	.003 .969 197	-.023 .749 189	-.020 .780 189	.066 .368 190	.115 .110 193	-.058 .416 197	-.120 .092 197	.043 .544 198	-.237 .001 200	.131 .066 197	1.000 . 200	.061 .392 199	-.057 .458 172	-.004 .955 200	.002 .974 198
PURBUDGE	-.017 .809 196	-.076 .302 188	.008 .913 188	-.053 .466 189	.034 .635 192	-.039 .588 197	-.076 .290 196	.028 .694 197	-.021 .772 199	.075 .294 196	.061 .392 199	1.000 . 199	.044 .567 172	-.062 .386 199	.121 .089 197
FIRMSTRA	.063 .415 170	.106 .181 162	.130 .098 162	.149 .058 162	.156 .046 165	.127 .098 171	-.028 .720 169	.272 .000 170	.090 .240 172	-.051 .506 169	-.057 .458 172	.044 .567 172	1.000 . 172	.[94] . 172	.218 .004 171
MIXSTRAT	-.167 .019 197	-.127 .081 189	-.180 .013 189	-.197 .006 190	-.164 .023 193	.065 .364 197	-.135 .059 197	.044 .536 198	-.140 .048 200	-.057 .423 197	-.004 .955 200	-.062 .386 199	. . 172	1.000 . 200	.024 .733 198
TOTPROCO	.074 .306 195	.088 .229 187	.114 .119 187	.060 .415 189	.078 .280 192	.062 .386 195	.088 .221 196	.029 .691 196	.086 .227 198	.004 .961 196	.002 .974 198	.121 .089 197	.218 .004 171	.024 .733 198	1.000 . 198

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[94] These variables can not be correlated since all firms that have value 1 for the mix strategy dummy, have no value for general firm strategy.

Table C4: correlations between key variables on external sourcing in the survey: Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	ECONPERF	STRATPERF	VOICEREL	RELGROWT	TRUST	LOYALTY	POWER	BUYERDEP	SUPPLDEP	RELLENGTH
ECONPERF	1.000 . 200	.562 .000 191	.550 .000 200	.300 .000 199	.577 .000 199	.417 .000 199	-.230 .001 198	-.158 .038 172	.100 .159 199	.004 .959 200
STRATPERF	.562 .000 191	1.000 . 191	.521 .000 191	.420 .000 190	.543 .000 191	.466 .000 191	-.175 .016 190	.001 .995 165	.041 .570 190	-.008 .910 191
VOICEREL	.550 .000 200	.521 .000 191	1.000 . 200	.399 .000 199	.611 .000 199	.439 .000 199	-.157 .028 198	-.038 .621 172	.034 .636 199	.066 .351 200
RELGROWT	.300 .000 199	.420 .000 190	.399 .000 199	1.000 . 199	.467 .000 198	.297 .000 198	.040 .573 197	.182 .017 172	.054 .447 198	-.008 .907 199
TRUST	.577 .000 199	.543 .000 191	.611 .000 199	.467 .000 198	1.000 . 199	.440 .000 198	-.176 .013 198	.016 .836 171	.135 .058 198	.062 .382 199
LOYALTY	.417 .000 199	.466 .000 191	.439 .000 199	.297 .000 198	.440 .000 198	1.000 . 199	-.036 .614 197	.179 .019 172	.181 .011 198	.053 .456 199
POWER	-.230 .001 198	-.175 .016 190	-.157 .028 198	.040 .573 197	-.176 .013 198	-.036 .614 197	1.000 . 198	.080 .298 171	.049 .490 197	.038 .594 198
BUYERDEP	-.158 .038 172	.001 .995 165	-.038 .621 172	.182 .017 172	.016 .836 171	.179 .019 172	.080 .298 171	1.000 . 172	.081 .293 172	-.020 .792 172
SUPPLDEP	.100 .159 199	.041 .570 190	.034 .636 199	.054 .447 198	.135 .058 198	.181 .011 198	.049 .490 197	.081 .293 172	1.000 . 199	-.062 .386 199
RELLENGTH	.004 .959 200	-.008 .910 191	.066 .351 200	-.008 .907 199	.062 .382 199	.053 .456 199	.038 .594 198	-.020 .792 172	-.062 .386 199	1.000 . 200

Table C5: correlations between key variables on supplier relations in the survey: Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	VOICE	VOIXPOW	VOIXLOY	VOIXBUY	VOIXSUPD	BUYERDEP	SUPPLDEP	POWER	LOYALTY
VOICE	1.000 . 200	.502 .000 198	.842 .000 199	.134 .079 172	.276 .000 199	-.038 .621 172	.034 .636 199	-.157 .028 198	.439 .000 199
VOIXPOW	.502 .000 198	1.000 . 198	.442 .000 197	.098 .204 171	.205 .004 197	.029 .705 171	.077 .283 197	.753 .000 198	.253 .000 197
VOIXLOY	.842 .000 199	.442 .000 197	1.000 . 199	.220 .004 172	.336 .000 198	.080 .298 172	.141 .048 198	-.113 .115 197	.839 .000 199
VOIXBUYD	.134 .079 172	.098 .204 171	.220 .004 172	1.000 . 172	.111 .147 172	.966 .000 172	.076 .324 172	.026 .738 171	.234 .002 172
VOIXSUPD	.276 .000 199	.205 .004 197	.336 .000 198	.111 .147 172	1.000 . 199	.069 .366 172	.953 .000 199	.021 .771 197	.272 .000 198
BUYERDEP	-.038 .621 172	.029 .705 171	.080 .298 172	.966 .000 172	.069 .366 172	1.000 . 172	.081 .293 172	.080 .298 171	.179 .019 172
SUPPLDEP	.034 .636 199	.077 .283 197	.141 .048 198	.076 .324 172	.953 .000 199	.081 .293 172	1.000 . 199	.049 .490 197	.181 .011 198
POWER	-.157 .028 198	.753 .000 198	-.113 .115 197	.026 .738 171	.021 .771 197	.080 .298 171	.049 .490 197	1.000 . 198	-.036 .614 197
LOYALTY	.439 .000 199	.253 .000 197	.839 .000 199	.234 .002 172	.272 .000 198	.179 .019 172	.181 .011 198	-.036 .614 197	1.000 . 199

Table C6: correlations between moderating variables, interaction variables and voice relations from the survey. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	FOREISUP	FOREIGN	ECONPERF	STRATPERF	LOYALTY	POWER	TRUST	VOICE	RELLENGTH
FOREISUP	1.000 . 200	.035 .619 200	-.027 .707 200	-.007 .924 191	.060 .396 199	.178 .012 198	-.018 .806 199	-.089 .211 200	-.081 .256 200
FOREIGN	.035 .619 200	1.000 . 200	.023 .743 200	.004 .956 191	.001 .990 199	-.010 .894 198	.027 .703 199	-.014 .843 200	.013 .860 200
ECONPERF	-.027 .707 200	.023 .743 200	1.000 . 200	.562 .000 191	.417 .000 199	-.230 .001 198	.577 .000 199	.550 .000 200	.004 .959 200
STRATPERF	-.007 .924 191	.004 .956 191	.562 .000 191	1.000 . 191	.466 .000 191	-.175 .016 190	.543 .000 191	.521 .000 191	-.008 .910 191
LOYALTY	.060 .396 199	.001 .990 199	.417 .000 199	.466 .000 191	1.000 . 199	-.036 .614 197	.440 .000 198	.439 .000 199	.053 .456 199
POWER	.178 .012 198	-.010 .894 198	-.230 .001 198	-.175 .016 190	-.036 .614 197	1.000 . 198	-.176 .013 198	-.157 .028 198	.038 .594 198
TRUST	-.018 .806 199	.027 .703 199	.577 .000 199	.543 .000 191	.440 .000 198	-.176 .013 198	1.000 . 199	.611 .000 199	.062 .382 199
VOICEL	-.089 .211 200	-.014 .843 200	.550 .000 200	.521 .000 191	.439 .000 199	-.157 .028 198	.611 .000 199	1.000 . 200	.066 .351 200
RELLENGTH	-.081 .256 200	.013 .860 200	.004 .959 200	-.008 .910 191	.053 .456 199	.038 .594 198	.062 .382 199	.066 .351 200	1.000 . 200

Table C7: correlations between having a foreign supplier (foreisup), being foreign, supplier performance, loyalty, voice, power, trust and length of the relation. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	FOREIGN X FOREISUP	FOREXPE X FOREISUP	FOREXPER	FOREIGN	FOREISUP
FOREIGN X FOREISUP	1.000 . 200	.406 .000 200	.186 .008 200	.610 .000 200	.389 .000 200
FOREXPE X FOREISUP	.406 .000 200	1.000 . 200	.504 .000 200	.076 .283 200	.878 .000 200
FOREXPER	.186 .008 200	.504 .000 200	1.000 . 200	.106 .136 200	.313 .000 200
FOREIGN	.610 .000 200	.076 .283 200	.106 .136 200	1.000 . 200	.035 .619 200
FOREISUP	.389 .000 200	.878 .000 200	.313 .000 200	.035 .619 200	1.000 . 200

Table C8: correlations between having a foreign supplier (foreisup), being foreign, foreign experience and interaction effects. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	PURRAT98	VOICEREL	FOREISOU	ROS98	ECONPERF (RELATION)	STRATPERF (RELATION	FINAPERF (FIRM)
PURRAT98	1.000 . 180	-.126 .092 180	-.021 .784 179	-.313 .000 180	-.154 .039 180	-.019 .807 172	-.143 .063 170
VOICEREL	-.126 .092 180	1.000 . 200	.044 .536 199	.135 .071 180	.550 .000 200	.521 .000 191	.111 .127 189
FOREISOU	-.021 .784 179	.044 .536 199	1.000 . 199	.100 .181 179	-.021 .766 199	-.002 .975 190	-.035 .637 188
ROS98	-.313 .000 180	.135 .071 180	.100 .181 179	1.000 . 180	.119 .111 180	.155 .043 172	.231 .002 170
ECONPERF (RELATION)	-.154 .039 180	.550 .000 200	-.021 .766 199	.119 .111 180	1.000 . 200	.562 .000 191	.080 .273 189
STRATPERF (RELATION)	-.019 .807 172	.521 .000 191	-.002 .975 190	.155 .043 172	.562 .000 191	1.000 . 191	.109 .143 183
FINAPERF (FIRM)	-.143 .063 170	.111 .127 189	-.035 .637 188	.231 .002 170	.080 .273 189	.109 .143 183	1.000 . 189

Table C9: correlations between three independent variables, 1998 ROS and survey performance measures. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

	PURRAT98	VOICE	FOREISOU	LOGMAR98	ECONPERF (SUPPLIER)	STRATPERF (SUPPLIER)	STRATPERF (FIRM)	MARSHA98
PURRAT98	1.000 . 180	-.126 .092 180	-.021 .784 179	.044 .561 180	-.154 .039 180	-.019 .807 172	-.024 .752 177	-.078 .299 180
VOICE	-.126 .092 180	1.000 . 200	.044 .536 199	.084 .263 180	.550 .000 200	.521 .000 191	.139 .052 197	.085 .259 180
FOREISOU	-.021 .784 179	.044 .536 199	1.000 . 199	.240 .001 179	-.021 .766 199	-.002 .975 190	.107 .136 196	.131 .080 179
LOGMAR98	.044 .561 180	.084 .263 180	.240 .001 179	1.000 . 180	-.024 .747 180	.071 .355 172	.032 .669 177	.707 .000 180
ECONPERF (SUPPLIER)	-.154 .039 180	.550 .000 200	-.021 .766 199	-.024 .747 180	1.000 . 200	.562 .000 191	.214 .002 197	.014 .856 180
STRATPERF (SUPPLIER)	-.019 .807 172	.521 .000 191	-.002 .975 190	.071 .355 172	.562 .000 191	1.000 . 191	.203 .005 190	.087 .259 172
STRATPERF (FIRM)	-.024 .752 177	.139 .052 197	.107 .136 196	.032 .669 177	.214 .002 197	.203 .005 190	1.000 . 197	.017 .824 177
MARSHA98	-.078 .299 180	.085 .259 180	.131 .080 179	.707 .000 180	.014 .856 180	.087 .259 172	.017 .824 177	1.000 . 180

Table C10: correlations between three independent variables, 1998 market share, log of 1998 market share and survey performance measures. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

Appendix D: The Internet in sourcing[95]

As stated before, the Internet is an important driver of change in sourcing strategy. What is interesting is how this change process occurs. Does the Internet fundamentally alter the nature of existing relationships? Does it tend to favour particular kinds of relationships in the long run thus eliminating others? In order to look at buyer-supplier relations as they evolve it is necessary to obtain a basic understanding of this change process. In this appendix a model will be developed and illustrated that helps to deal with this question.

Different tools, different purposes
Companies now have available a wider range of tools to execute their sourcing strategies. Some of these tools are Internet catalogues, Intranet catalogues, Internet EDI, electronic (or Internet) auctions, search tools, procurement solutions on an Intranet, electronic (Extranet) networks and web portals (marketplaces). These tools serve different purposes.

An Internet catalogue is an online shop where buyers can investigate a firm's product offerings and purchase products. The most famous example of an Internet catalogue, Amazon, operates in business-to-consumer markets. A very wide range of firms in both business-to-business (B2B) markets and business-to-consumer (B2C) markets is now operating Internet catalogues. Intranet catalogues are normally limited to B2B markets and usually only applicable to larger firms. Firms gather information from a variety of suppliers and combine that information in an internal catalogue, which is subsequently published on the Intranet. Employees are provided with authority to order from the catalogue up till a maximum amount. Novartis is one organisation that has implemented an Intranet catalogue (Koppius et al, 1999). Internet EDI (Threlkel and Kavan, 1999) is based on regular EDI. The difference is that the Internet (or an Intranet or Extranet) is used as the medium to transport EDI messages. This allows for a greater degree of standardisation because TCP/IP based forms can be used. This is a major advantage in EDI messaging where a lack of standardisation has been a constant problem. Manufacturing and distribution firms have been implementing Internet EDI. Electronic auctions are auctions conducted over the Internet with the aim of having multiple bidders compete with each other for the best offer. While the auctioning technique has been around for much longer, using the Internet allows auctioneers to conduct real-time auctions across multiple places. Thus the possibility to conduct an auction is available at a much lower cost. Freemarkets is a firm that has pioneered the use of auctions in the B2B context (Koppius et al, 1999). Search tools include general search engines over the Internet, such as Google, but also more specific forms like the online version of the yellow pages. They are used in both B2B and B2C contexts to gather and then reduce information. By drawing upon the extremely wide range of information available and then filtering that information these tools allow users to search for specific needs. Procurement solutions, like those of Ariba, extend Intranet catalogues one step further by also integrating other functions such as inventory control and shipping and automating the entire process from the order to the actual delivery of a product. Electronic networks are means to connect a

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[95] Some of the concepts, though none of the content, in this section have been drawn from a paper on electronic sourcing (Koppius, Mol, Van Heck & Van Tulder, 1999).

large number of parties to each other electronically. In a sense they are 'communities' of firms. A well-known example in this category is the supplier network of Cisco that helps Cisco suppliers connect to Cisco but also to each other. Web portals or marketplaces really are communities of firms in the sense that they bring together a large number of buyers and suppliers. While most marketplaces started by merging a number of catalogues of suppliers and offering this combined catalogue to potential buyers, many are now also seeking extensions towards trading options through auctions or message boards (for example VerticalNet Exchange). In order to illustrate the role of these new tools in buyer-supplier relations a case study is now presented of an electronic auction that changed a buyer-supplier relation.

Case study electronic auction
Electronic auctions are one new and important tool for buying firms to manage relations with their suppliers. This case study attempts to illustrate the auctioning process and the consequences of electronic auctions on buyer-supplier relations. The case study is based on three interviews with both the buyer and supplier at locations in Eindhoven, Best and Hamburg, a public roundtable discussion and secondary materials. All these materials were gathered in late 2000.

Background
Philips Medical Systems (PMS) is a division of the Dutch electronics giant Philips NV. Philips is officially based in Amsterdam, but the core of its activities is found in Eindhoven, a city in the south of the Netherlands. The turnover of PMS in 1999 was 2.5 billion Euro. In that same year PMS employed some 11,800 employees. The 1999 earnings before taxes amounted to 225 million Euro. PMS is a very research intensive firm. In 1999 it spent 7.9% of its sales on R & D expenditures. In 2000 PMS completed three major acquisitions in the U.S. by buying Medquist, Agilent Technologies and ADAC Laboratories. This further strengthened its position globally and particularly in North America. PMS has plants in four sites: Best (near Eindhoven) and Heerlen in the Netherlands, Seattle in the United States and Hamburg in Germany. PMS products include Ultrasound, MR, CT, IT and X-ray machines. PMS is the world's number 3 player in medical systems behind General Electric of the U.S. and Germany's Siemens. In Europe only Siemens has a larger market share than Philips. The total size of the markets PMS operates in globally is an estimated 17.5 billion Euro, of which modalities (the main PMS products) make up 10 billion Euro.

The X-ray products, which will be the focus of attention here, are produced in both Best and Hamburg. The case being discussed deals with three types of X-ray machines produced in the Hamburg plant. The electronic X-ray equipment is stored in 19-inch cabinets. In itself 19 inch is a fairly standardised size for these cabinets, which will also be found in many offices. PMS uses a tailor-made variant of the 19-inch cabinet, which has fewer features than the standard, universal 19-inch cabinet and is therefore usually cheaper than the universal cabinet. Cabinets have not changed much in appearance or materials use over the last few decades. However, there have been changes of the production process, with the increased use of CAD/CAM machines, automated cutting and other new process technologies. The three major steps in the production process are cutting steel plates, painting and varnishing them and then final assembly. Specifications of the cabinets PMS buys change every year or so.

Furthermore the specifications are slightly different for each of the three types of X-ray machines.

Since the early 1980s PMS had been buying the cabinets from the same supplier, Stork Industrial Modules (SIM), a business unit of Stork. Stork is a large Dutch industrial conglomerate with a range of business units that are engaged in a wide range of engineering activities and production activities, including machine building. The turnover of Stork in 1999 was 2.4 billion Euro. The firm's stock is traded on the Amsterdam Stock Exchange. SIM is a part of the Aerospace group, which had a total turnover of 364 million Euro in 1999. SIM has the explicit goal of being a first-tier supplier and attempts to manage the supply chain for its customers. Its three main areas of production include electronic cabinets & covering, mechatronic modules & machines and outdoor products, including for example telephone boots. SIM has two sites in the Netherlands, in Eindhoven (SIM headquarters) and Helmond, as well as a production facility in Poland. Furthermore it often collaborates with another Stork business unit, Stork Electronics, to produce joint products. Throughout the almost twenty years that SIM produced this product the relationship between PMS and SIM can be characterised as positive and collaborative. This can partly be traced back to the fact that the two major Dutch industrial firms Philips and Stork meet regularly to discuss all kinds of topics and often have joint interests in public or government affairs. To some extent there is also a historical connection because parts of Philips had been sold to Stork. However, the relation between PMS and SIM was not very intensive because almost no product innovation appeared during the period. So there was little or no exchange of engineering capability or joint problem solving.

Description

PMS was first confronted with an electronic auction when it participated in a workshop organised by the Technical University of Munich together with a number of large German firms, including banks. Having seen the savings one bank made on its electricity bills, due to an auction, PMS got interested and decided to scan its product portfolio for possibilities to conduct its own electronic auction. Several items were seen as potential targets for an auction but some were not possible for practical reasons, like long-running contracts, and for others the purchasing value was simply too low to organise an auction. Outside of Bill-of-Materials purchasing Philips uses quite a lot of centralised, company-wide contracts and for those PMS could of course not hold its own auctions. PMS had decided that the minimum annual purchasing value would have to be around 0.5 Million DM. The 19-inch cabinets appeared to be one of the few items for which both the purchasing value (several million Euro) and buying conditions were fitting. PMS decided to give the electronic auction a try and obtained two auction slots from TU Munich, which acted as the auctioneer. One of these slots was never used due to technical problems. Mr. Ludwig Binder, purchasing manager of PMS Hamburg admitted the auction was something of an experiment but suggested that the outcomes proved PMS was right.

As PMS was planning to source this type of cabinet for another 2 years, it decided to hold an auction for 3,700 units over a 2-year period. To this end 10 suppliers were selected. Nine of these were suppliers were known to PMS, through earlier purchases or RFQs by PMS Hamburg or Best. PMS people visited all of these 9 suppliers within 2 years prior to the auction. One was a Rumanian supplier that PMS met at a trade fair. PMS was not aware of its

capabilities but decided to include it to obtain a benchmark price. It never intended to actually choose that supplier. In retrospect it turned out that this firm was a supplier to other large multinational firms, including Siemens (although not to its medical division). The final list of 10 participants was agreed upon by the purchasing department and the development department. None of these 10 suppliers had any previous experience with electronic auctions. The suppliers were fully informed two weeks prior to the auction. Suppliers were not allowed to communicate during the auction and bids were anonymous to PMS. All suppliers were under the obligation to make at least one bid in the auction, which would last for a minimum of one hour with a maximum one hour prolongation.

At SIM there was no such things as a warm welcome for this initiative. To SIM the announcement came as a shock because it was not previously informed about PMS plans in this area. Hans Büthker, general manager of SIM responded in the following way:

> "Well, you can imagine that if you have been supplying a product for 20 years and feel that you have a certain kind of relation with your customer, this comes as a surprise. You're somewhat shocked. When we received these materials two weeks in advance, our first response was: if it's going to be like this, we best quit now."

However, SIM decided to participate nonetheless in order to "obtain some experience with this new tool" but also to show that it classifies the medical industry as a strategic industry for its business. SIM made some calculations and decided it could take another 7% off the price in order to remain profitable. SIM did not expect anyone to go much lower than 7% below the current price level, which was consistent with PMS expectations, which were a price reduction in the range from 10 to 12%. In fact, PMS set a 10% minimum price reduction before it would change its source.

Outcomes

Apart from Stork and the Rumanian firm described earlier the participants in the auction were a Danish firm, a Spanish firm, a Czech firm, a Slovakian firm, two German firms and another Dutch firm? The Slovakian firm had informed PMS in advance that it did not believe in the auction tool and could only reluctantly be convinced to participate. The Slovakian and Rumanian firm strongly influenced the auction pattern. The Slovakian firm had decided before the auction to what price level it was willing to bid and subsequently advanced to that level directly. Only the fact that there was a 5% threshold level for every 5 minutes slowed down the price drops. As described above SIM had decided in advance that it would go no further than 7% below its old price level. Some of the other firms also had their own reasons to limit their bids. In the end only the Slovakian firm, the Rumanian firm, a Danish firm, and a German firm competed for the lowest bid. Just when the price seemed to stabilise towards the end of the auction, the Rumanian firm made another price drop that made it win the auction. However, it could never have won the order in the first place, which was rewarded to the second highest bidder, a German firm. Given the general price level of the other Northern European bidders, this German firm appears to be somewhat out of range. Its bid can be explained by specific circumstances. This firm owns a plant in Hungary that was not utilised to its capacity before the auction. Since the firm had capacity to spare, it decided to make a

lower bid than it could normally have made given its cost levels. The firm was satisfied to regain only part of the fixed costs it was incurring.

After the auction ended there was brief contact between PMS and SIM when Mr. Binder visited SIM in Eindhoven. SIM was provided with a final opportunity to cut its price level, but declined to do so. PMS maintains that if SIM would have gone down to 15% below the original price, there may have been a lot of discussion on whether or not to switch suppliers. Another disagreement between the two parties centres on the final order for cabinets that PMS placed with SIM. A rather large quantity of cabinets was ordered from SIM after the auction was finished and the decision to switch suppliers had been made. While PMS maintains that it had been offered the opportunity to order more cabinets by SIM, SIM said that PMS had demanded the extra load to build up inventory in case the new supplier would be unable to deliver the cabinets at the right time and quality.

The relation between SIM and PMS was terminated after the auction. Although the two parties still meet regularly, if only for being located so close to one another, there is no ongoing co-operation anymore. SIM has phased out the product.

Implications from the case study

The relation between PMS and SIM was terminated because both parties did not foresee any future improvements to make it worthwhile to continue the commitment. This appears to be a major departure from the situation as it was. However, several interesting things emerge on both sides of the relation. PMS conducted a previous audit that signalled SIM's product offering might not be competitive anymore. Furthermore the electronic auctioning process forced PMS to review its entire product portfolio in a structured manner with the explicit objective of identifying candidates for the auction in terms of potentially realisable savings. The cabinets came out as the prime candidate. Both of these seem to suggest that PMS, rather than introducing a major change now, was perhaps several years late in considering a change of suppliers. If PMS would have more closely monitored market developments in cabinets it might have been tempted to consider switching at an earlier point. Obviously achieving the lowest possible costs in purchasing these cabinets was not a high priority at PMS in previous years.

From the perspective of SIM this cabinet was a product at the low end of its technology range. Compared to relations with other buyers, including high tech firm ASML, this was a relatively static relation. In fact, nothing much had changed over the course of 20 years. The fact that SIM has now decided to phase out the product entirely, instead of trying to improve its competitiveness with this product, is also telling in this respect. It is also interesting to note that moving production to the plant in Poland was never considered, not before the auction, not during the auction and not after the auction. This is indicative of the low management priority given to retaining the product and also of the unwillingness to move any production activities from the Netherlands to Poland. The latter would probably cause internal resistance. The conclusion is that the product was simply not considered a core product of SIM.

Both parties have witnessed changes in the outside world over the 20-year time period during which SIM delivered the cabinets to PMS. Sourcing became more international and many new technologies and products were introduced. After 1989 Central and Eastern

Europe increasingly became a part of the European economic space. Customer demands for medical products altered and the nature of competition in the market changed too. Buyer-supplier relations were increasingly seen as a potential source of competitive advantage. Both buyers and suppliers increasingly pursued co-operative buyer-supplier relations. But this relation hardly changed. Perhaps the most intriguing question coming out of this case study is why nothing changed for so long. The changes that occurred as a consequence of the auction could have come at a much earlier time. Viewed this way, the primary function of the electronic auction is to speed up processes that were somehow inevitable. The electronic auction is more a carrier or catalyst of changes then an engine for change. This is not to say the role and impact of the auction is marginal, because this auction did have a significant impact on both firms. This impact is perhaps mostly related to the way these firms think about using electronic auctions in buyer-supplier relations. Their awareness of electronic commerce and electronic auctions in particular has increased dramatically.

A model

The Internet induces change in buyer-supplier relations. However, it appears that this is not a change of direction in these relations, but mostly a way of speeding up ongoing developments. The Internet is an enabler of what firms want to achieve in their inter-organisational relations. In order to get a broader understanding of how to interpret various Internet-based solutions, a model is presented in figure 1. The model in figure 1 explicitly builds upon earlier work that included four other cases (Koppius et al, 1999). This model utilises two dimensions of buyer-supplier relations to categorise the variety of solutions available, a process dimension and an outcomes dimension. The model categorises the solutions in terms of the circumstances under which they are most useful. Sometimes they may also be useful under different circumstances, sometimes they may not be useful or even completely dysfunctional.

The first dimension, displayed in the vertical axis, is the length of the economic exchange varying between a single transaction and a long-term relation. This is the process dimension of the model. This amounts to something similar to exit and voice perspectives, which also require different time horizons. Both ends of this continuum present very different demands on Internet-based solutions. Given that two firms will engage in a single transaction with no clear commitment to further transactions, it is most useful to use an infrastructure that is efficient for a single transaction. Auctions or Internet catalogues are good models for such situations. They allow firms to obtain the appropriate information or the right bargaining model to solve their current needs. On the other hand setting up an infrastructure that allows ongoing interaction like an electronic network is probably a case of investing too much. These are unnecessary investments that might harm the effectiveness of the transaction, for example because the price mechanism can not be applied to the full extent.

The horizontal the second dimension, the performance criteria to be obtained, varies between very clear criteria and highly diffuse criteria. This is the outcomes dimension. A clear criterion is minimum price or a pre-defined quality level. Such criteria can be measured very well and can usually be quantified. A diffuse criterion could be joint learning or finding a range of potential suppliers for a new component. Such criteria are often defined 'on the fly' with contracts being incomplete by nature. As managers go along they decide what it is they want. These criteria are more often than not difficult or impossible to measure. For example a

buyer and several suppliers might decide to form an electronic discussion group to discuss a potential product innovation. This is best done in an electronic network setting. Using an auction seems a less appropriate and potentially very disturbing mechanism. In cases like this the auctioning mechanism may well cause mistrust and disrupt the innovation process. The 'clear' versus 'diffuse' criteria fit in with the economic versus strategic performance distinction made earlier. Clear criteria are similar to economic supplier performance while diffuse criteria are similar to strategic supplier performance.
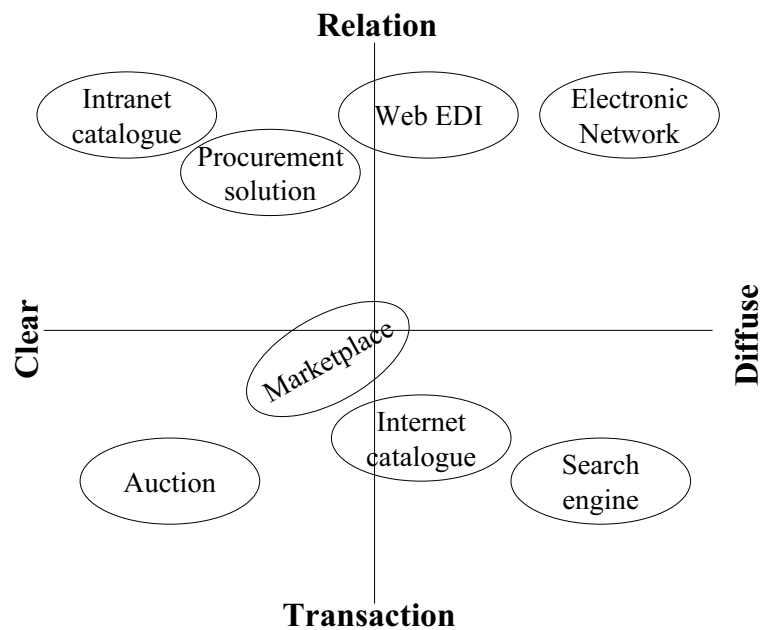

Figure 6.1: A model of various E-commerce applications and when they are most usefully applied. The X-axis portrays the nature of performance criteria. The Y-axis presents the length of the exchange.

Evidence from the survey

In the survey firms were asked to identify the extent to which they use four Internet-based solutions. These four solutions are Internet EDI, procurement solutions, web or Internet catalogues and electronic auctions. In table 11 correlations are presented between usage of each of these solutions and firm size, the relation with the largest supplier and supplier performance. This analysis has to be interpreted with the largest possible caution. First, usage of the solutions was measured at the firm level, as obviously is firm size, while only the relations with and performance of the largest supplier were measured. Thus a comparison is made between firm level variables and relation level variables. Obviously since this relation concerns the largest supplier, there is some reason to assume it is important to the firm and somewhat representative of its ability to manage supplier relations. Furthermore the number of firms responding positively to using an electronic solution is limited to 44 (Internet EDI),

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31 (procurement solution), 46 (web catalogue) and 8 (electronic auction). This strongly limits the statistical reliability of the analyses, making it not advisable to use regressions here. Particularly in the case of auctions, no statements can be derived whatsoever. Inclusion of whether or not the firm uses a particular solution as a dummy variable is not very useful either with these numbers and given the high fluctuations among firms as to how intensive their use is. There are also questions surrounding the completion of the survey. It does not seem unlikely that some firms that use regular EDI have entered this as Internet EDI. And the term procurement solution may have been understood too broadly too. In any case, the use of Internet-based solutions by manufacturing firms in the Netherlands is still rather limited[96].

Nonetheless the correlations in the table may be a first piece of evidence for the model presented earlier. There is the expected positive correlation among different solutions, implying that firms that are active in EDI, are also more likely to be active in web catalogues or procurement solutions. This reflects a higher awareness of and interest in the role of the Internet in sourcing by these companies. Or more simply, it means some firms are frontrunners while others lag behind in the adoption of the Internet. Also larger firms are more active in using E-Commerce, except for using web catalogues. This also makes sense given the high initial investments needed to set up these systems as well as the fact that larger firms are probably more exposed to these developments. That web catalogues are an exception to the size effect is not surprising: investments in web catalogues are made by the supplier, not by the buyer. Using a web catalogue may in fact be an easy way for small firms to obtain some of the potential advantages of using the Internet. The only significant positive link to performance is that between procurement solutions and strategic performance. This is unexpected since procurement solutions were expected to be linked mostly to economic performance. It could be that procurement solutions have more of a strategic element in them than expected because investments in them require efforts by both buyers and suppliers and thus a long-term commitment. Or perhaps there is a measurement error given that only 31 firms use a procurement solution. Finally there is some evidence that Internet EDI and particularly procurement solutions are positively related to voice relations and trust. This would be an indication that these solutions indeed require the long-term perspective ascribed to them in the model. But again this is at best seen as a piece of preliminary evidence for the model. At least there does not appear to be much evidence against the validity of the model. Obviously more extensive research efforts are needed in the future to look into this matter in more detail.

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[96] Further evidence for that statement is found in the extent of usage of these solutions: only Internet EDI and procurement solutions are used for substantial sourcing activity of 17% and 37% of total sourcing by firms that use them. Web catalogues are used for only 7% of sourcing and auctions for 5% of sourcing by firms that use them.

	Webedi	Procsol	Webcat	Elauc	Voice	Trust	Logpur	Econper	Stratper
WEBEDI	1.000 . 199	.272 .000 199	.282 .000 199	.014 .842 199	.111 .119 199	.098 .172 198	.033 .647 198	.089 .212 199	.114 .116 190
PROCSOL	.272 .000 199	1.000 . 199	.159 .025 199	.124 .082 199	.146 .039 199	.047 .515 198	.113 .112 198	.053 .455 199	.219 .002 190
WEBCAT	.282 .000 199	.159 .025 199	1.000 . 199	.131 .066 199	.081 .257 199	.062 .387 198	-.016 .825 198	.107 .134 199	.029 .696 190
ELAUC	.014 .842 199	.124 .082 199	.131 .066 199	1.000 . 199	.071 .317 199	-.136 .056 198	.073 .309 198	-.069 .332 199	-.083 .258 190
VOICE	.111 .119 199	.146 .039 199	.081 .257 199	.071 .317 199	1.000 . 200	.611 .000 199	.026 .714 199	.550 .000 200	.521 .000 191
TRUST	.098 .172 198	.047 .515 198	.062 .387 198	-.136 .056 198	.611 .000 199	1.000 . 199	-.016 .824 198	.577 .000 199	.543 .000 191
LOGPUR	.033 .647 198	.113 .112 198	-.016 .825 198	.073 .309 198	.026 .714 199	-.016 .824 198	1.000 . 199	-.023 .751 199	-.054 .455 190
ECONPER	.089 .212 199	.053 .455 199	.107 .134 199	-.069 .332 199	.550 .000 200	.577 .000 199	-.023 .751 199	1.000 . 200	.562 .000 191
STRATPER	.114 .116 190	.219 .002 190	.029 .696 190	-.083 .258 190	.521 .000 191	.543 .000 191	-.054 .455 190	.562 .000 191	1.000 . 191

Table 6.11: correlations between usage of (Internet) EDI, procurement solutions, web (Internet) catalogues, electronic auctions, voice relations, trust, firm size, economic and strategic performance in the survey. Presented are the correlations, significance levels of correlations (2-tailed) and number of firms that were correlated.

Discussion

The role of the Internet in buyer-supplier relations has been a topic of much debate among practitioners in recent years (Kaplan and Sawhney, 2000). While the original electronic markets literature (Malone et al, 1987), which was established prior to the rise of the Internet, suggested that sourcing would shift from hierarchies to markets as a consequence of increasing IT usage, the understanding that is now rising is *that the Internet may not be as much of a turnaround vehicle as some predicted*. In particular in business-to-business markets the Internet may just be another element of relations that will be incorporated over time. The case study and the very limited statistical study presented in this chapter lend some support to this view. There is a variety of Internet-based tools that firms use in their relations with suppliers. These tools have different properties and are best used under different circumstances. Some tools fit well with long-term relations while others help to support single transactions. Then there are tools that focus on measurable, economic benefits and yet others that are used for more diffuse performance criteria. A further step in this area of research is to

conduct studies that look at the effectiveness of such tools given the goals they are set out to achieve. This would probably require a longitudinal measurement among a larger set of firms.

Summary

The role of the Internet in buyer – supplier relations was discussed based on a case and some survey analysis. The Internet is best seen as a tool that is integrated into existing relations. There are various Internet-based solutions that have utility in various situations. Based on a performance dimension and a relation dimension a model was presented to depict which solutions fit what situations. A case study of an electronic auction was used to illustrate this model and the statistical analysis provided some limited initial evidence for this model.

Samenvatting (in Dutch)

Ondernemingen hebben vele doelen. Een belangrijk doel van ondernemingen is om voortdurend het bedrijfsresultaat te verbeteren. Het vakgebied strategisch management houdt zich bezig met de vraag welke methoden geschikt zijn om betere bedrijfsresultaten dan de concurrentie te behalen. Dit proefschrift is een voorbeeld van een strategisch management studie. In het bijzonder ligt in dit proefschrift de vraag op tafel hoe bedrijven hun resultaten proberen te verbeteren door hun inputs op een strategische manier te betrekken (dit wordt 'sourcing strategie' genoemd). Hierbij gaat het om drie strategische keuzen:

1. Welke activiteiten doen bedrijven zelf en welke activiteiten besteden ze uit aan externe leveranciers (wat bekend staat als 'outsourcing')?
2. Wat voor relaties bouwen bedrijven op met hun externe leveranciers (ook wel 'supplier relations')?
3. In hoeverre betrekken bedrijven hun inputs uit Nederland dan wel de Europese Unie of uit de rest van de wereld (het vraagstuk van 'global sourcing').

In dit proefschrift wordt elk van deze drie onderwerpen behandeld. Telkens wordt de vraag gesteld of bedrijven hun resultaten kunnen verbeteren door een bepaalde strategie te kiezen.

In de eerste twee hoofdstukken van het proefschrift wordt de bestaande literatuur over sourcing strategie besproken en geëvalueerd. Er is al veel over dit onderwerp geschreven in verschillende vakgebieden van de bedrijfskunde, zoals strategisch management, international business, industriële marketing, inkoopmanagement en organisatietheorie. Toch blijken er diverse hiaten te zijn in de kennis op dit gebied. De twee belangrijkste gebreken zijn (a) dat er nauwelijks overlap bestaat tussen de verschillende vakgebieden en de drie onderwerpen en (b) dat er vrij weinig onderzoek in Europa is gedaan naar dit onderwerp. Het eerste gebrek is problematisch, omdat hierdoor te weinig gebruik gemaakt wordt van de mogelijkheid bestaande kennis te integreren. Het tweede gebrek leidt er toe dat we veel weten over sourcing strategie in de Verenigde Staten, maar over Europa, een andere economische grootmacht, veel minder.

In het derde hoofdstuk wordt een theorisch model opgesteld dat de formele relaties definieert tussen de strategische keuzen die een onderneming maakt en de resultaten van de onderneming. Dit gebeurt op grond van eerder onderzoek in de praktijk alsmede theorie. Het model wordt gevormd met behulp van diverse theorieën (transactiekosten, resource based, exit-voice, sociale systeemtheorie) die voornamelijk gebaseerd zijn op inzichten uit de economische en sociologische wetenschappen. Er wordt een onderscheid gemaakt tussen de bedrijfsresultaten op korte termijn (met name financieel van aard) en de bedrijfsresultaten op lange termijn (de marktpositie en vaardigheden van de onderneming). Het model gaat er van uit dat veel uitbesteden op lange termijn negatief is voor de resultaten. Op korte termijn zou het zowel positief als negatief kunnen zijn. Van internationaal uitbesteden (global sourcing) wordt verwacht dat de effecten zowel op korte termijn als op lange termijn positief zijn. Omgekeerd heeft binnen Nederland uitbesteden dan een negatief effect. Van intensieve samenwerkingsrelaties met leveranciers wordt verwacht dat die op korte termijn negatief

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uitwerken, maar op lange termijn juist positief. Voor relaties waarin uitbesteder en toeleverancier niet samenwerken wordt juist het omgekeerde verwacht.

In hoofdstuk 4 worden de vier onderzoeksmethoden besproken die deze studie gebruikt om het model te testen. De eerste methode is losse interviews. Om een goede indruk te krijgen van wat er speelt in de praktijk zijn diverse interviews gehouden met managers. De tweede methode is die van gevalsstudies. Een project van Ford rond internationaal uitbesteden wordt besproken in hoofdstuk zeven. Bij hoofdstuk zes hoort een studie van een internetveiling uitgevoerd door Philips Medical Systems. De derde onderzoeksmethode is statistisch onderzoek op basis van een grote database met cijfers van het Centraal Bureau voor de Statistiek over industriële uitbesteding door bedrijven in de Nederlandse industrie. De vierde onderzoeksmethode is de statistische analyse van de resultaten van een door 204 managers van industriële bedrijven in Nederland ingevulde vragenlijst over hun sourcing strategie. Deze vragenlijst werd speciaal voor dit onderzoek ontworpen en uitgevoerd.

De hoofdstukken 5, 6, 7 en 8 houden zich allemaal bezig met de analyse van de verschillende onderzoeksmethoden. In hoofdstuk 5 ligt de nadruk op de eerste van de drie hoofdvragen: in hoeverre kunnen ondernemingen het uitbesteden van activiteiten gebruiken om hun concurrentiepositie te verbeteren? De bevindingen van deze studie zijn dat uitbesteden nauwelijks effecten op het lange termijn bedrijfsresultaat heeft. Op korte termijn, voor de winstgevendheid van ondernemingen blijkt er wel een effect te zijn en wel een negatief effect. Dit betekent dat bedrijven die veel uitbesteden minder winstgevend zijn. Dit staat haaks op de trend van de laatste 15 jaren om steeds meer uit te besteden. Er worden in dit proefschrift meerdere verklaringen gegeven voor dit opvallende resultaat. Een eerste deelverklaring is dat het juist de bedrijven zijn die het slechter doen, die veel uitbesteden. Toch is er meer aan de hand: het lijkt er ook op dat ondernemingen onderschatten hoe belangrijk de samenhang is tussen verschillende activiteiten en er daarom te weinig het belang van zien om die activiteiten te bundelen binnen de onderneming. Verder onderschatten veel bedrijven de coördinatiekosten die gemoeid gaan met uitbesteding en de afhankelijkheid die ontstaat van toeleveranciers. Men zou ook kunnen stellen dat de macht van 'de markt' om effectief te produceren overschat wordt. Er spelen overigens diverse andere factoren mee, zo blijkt het in sectoren met veel innovatie nog minder gunstig te zijn om uit te besteden.

In hoofdstuk 6 wordt nader ingegaan op de tweede hoofdvraag, namelijk of intensieve samenwerkingsrelaties met leveranciers tot betere resultaten leiden. Het antwoord luidt bevestigend: zowel op korte termijn als op lange termijn leiden samenwerkingsrelaties en veel onderling vertrouwen tot betere resultaten. Dit druist in tegen de gedachte dat als partijen op afstand staan en er alleen op eindprestaties wordt gestuurd, de resultaten beter zijn. Hier wordt dus verder bewijs gevonden dat 'de markt' waar partijen op afstand staan, minder effectief is dan het aangaan van relaties tussen partijen. Het opzetten van een samenwerkingsrelatie vergt overigens veel tijd en investeringen. Ook in dit hoofdstuk zijn andere factoren van belang. Onder meer bleek dat als een leverancier veel macht heeft, dit tot slechtere resultaten bij de uitbesteder leidt op korte termijn, maar niet op lange termijn, omdat dan complementaire vaardigheden belangrijk zijn en niet macht.

Samenvatting (in Dutch)

In hoofdstuk 7 ligt de derde hoofdvraag op tafel: leidt internationaal uitbesteden tot betere resultaten? Eerst wordt geanalyseerd in hoeverre bedrijven daadwerkelijk internationaal uitbesteden. Nederlandse industriële bedrijven blijken vooral binnen Nederland en de rest van de Europese Unie uit te besteden. Uitbesteding buiten de EU ('global sourcing') is een beperkt fenomeen, wat vooral bij enkele grotere bedrijven voorkomt. Voor het veronderstelde positieve effect van uitbesteden buiten Nederland of buiten de EU wordt geen bewijs gevonden. Dit betekent dat bedrijven die meer internationaal uitbesteden het noch beter noch slechter doen dan hun concurrenten. Met andere woorden: global sourcing heeft geen significante invloed op de resultaten van bedrijven.

In hoofdstuk 8 wordt door een combinatie van databronnen geprobeerd om de verschillende vragen naast elkaar te leggen. Hier wordt dus een vergelijking gemaakt tussen de effecten van uitbesteden, het opbouwen van samenwerkingsrelaties en internationaal uitbesteden. In hoofdstuk 8 worden de resultaten van de eerdere hoofdstukken in grote lijnen bevestigd. Daarna worden de drie vragen conceptueel met elkaar verbonden in een model. Het blijkt dat er belangrijke interacties zijn tussen de verschillende vragen, dat wil zeggen dat hoe een onderneming omgaat met één vraag, consequenties heeft voor de andere twee vragen. Bedrijven die veel uitbesteden zijn bijvoorbeeld sterk gebaat bij een groot vermogen om samenwerkingsrelaties aan te gaan. Bedrijven die veel uitbesteden zullen eerder internationale toeleveranciers moeten zoeken. En als bedrijven internationaal uitbesteden zal het aangaan van echte samenwerkingsrelaties moeilijker worden.

Hoofdstuk 9 tenslotte, bevat de conclusies en beperkingen van deze studie. Diverse beperkingen worden besproken zoals onvolkomenheden in de gegevens en het feit dat de studie zich alleen op Nederland richt. Ondanks deze beperkingen vormt deze studie een belangrijke aanvulling op eerder werk, dat zelf weer allerlei andere beperkingen kende. Richting ondernemingen worden diverse conclusies benadrukt. Ten eerste moeten ondernemingen uitermate kritisch omgaan met het instrument uitbesteding. In het wilde weg veel uitbesteden, zoals in de jaren negentig in Nederland gebeurd is, leidt tot slechtere resultaten. Ten tweede loont het opzetten van samenwerkingsrelaties met leveranciers inderdaad, hoe moeilijk het ook mag zijn. Ten derde is global sourcing geen zinvol instrument om de prestaties van de onderneming sustantieel te verbeteren. Daarnaast worden diverse implicaties voor de strategisch management literatuur gegeven. De studie sluit af met een roep om meer multidisciplinair onderzoek naar sourcing strategie, waarin nadrukkelijk de samenhang van diverse dimensies van sourcing strategie in ogenschouw moet worden genomen.

Summary

This PhD thesis on global sourcing strategy is concerned with how firms obtain competitive advantage through managing their input side. The issue of competitive advantage is core to the field of strategic management but this study also draws significantly from the fields of international business, organisation theory, industrial marketing and purchasing & supply chain management.

In chapter 1 an overview is provided of the literature on sourcing strategy. The review results in the identification of 3 research areas, which are subdivided into 5 dimensions of decision-making on sourcing. The three areas of interest are make-or-buy decisions, supplier management, and international sourcing. All three have been studied in the management literature and interest in them appears to be growing. The make-or-buy area consists of one dimension, labelled ownership. At least since the work of Williamson (1975), academics have been discussing the merits of outsourcing versus vertical integration. The supplier management area consists of two separate dimensions, supplier relations and network management. Supplier relations have been studied extensively throughout the late 1980s and 1990s, for example by Helper (1987), who frames them in terms of exit versus voice, and Dyer and Singh (1998). Issues of network management and embeddedness have also gained attention in that period, see for instance the work of Granovetter (1985) and Ford (1998). The third area, international sourcing, is subdivided in supplier internationalisation and international supply decisions. Supplier internationalisation is concerned with the extent of internationalisation of the supply base, see Kotabe and Omura (1989), who suggest a distinction between domestic versus international sourcing, and Kotabe (1992). International supply decisions is a less developed area of study, but see Faes et al (2000) or Handfield (1994).

Chapter 1 then provides an extensive review of the international sourcing area, since this has not been reviewed thoroughly before. This leads to the conclusion that most sourcing is not very international in nature and that decision-making is seldom of an integrated, global nature. Thus in previous research global sourcing is the exception rather than the rule.

In chapter 2 the literature is assessed further with the explicit goal of identifying holes in that literature. Several important findings emerge. First, the literature on sourcing strategy is quite fragmented, not only because of an apparent lack of communication between various fields of study, but also because the three areas of study identified above are by-and-large treated separately. Second, the geographical spread of empirical studies is uneven: there are many studies of firms in the United States and fairly few of other regions of the world, in particular Europe. As a third point of concern, it appears that there has not been a great deal of research that specified and found convincing evidence for the performance effects of various sourcing strategies. This is particularly true for the third area of study, international sourcing.

Building upon these criticisms, a conceptual framework is constructed in chapter 3. This framework relates the dimensions of (1) internal versus external sourcing, (2) exit versus voice relations, and (3) domestic versus international sourcing to firm performance. Similar to

Summary

previous studies (e.g. Murray et al, 1995) firm performance is seen as a two-headed phenomenon. In the short run firms strive for economic performance, which is often expressed in terms of profitability or other efficiency measures. In the longer run a firm aims at obtaining strategic performance, which is a stock variable taking the form of market positions and firm capabilities.

Then, building upon existing literature, several hypotheses are formulated concerning the relation between these three dimensions of sourcing and the economic and strategic performance of a firm. These are complemented by hypotheses concerning the moderating (interaction) effect from other, related variables. Finally, a range of control variables is specified. This results in the construction of one general model, which consists of three submodels that are each constructed around one of the dimensions of sourcing.

Chapter 4 is concerned with the methodological base of the study. Two methods employed sparingly in this study, interviews and case studies, are briefly discussed. Then a database consisting of around 5,000 manufacturing firms in the Netherlands is presented. This database is primarily applicable to the first dimension of internal versus external sourcing. The rest of chapter 4 is devoted to discussing a survey that was constructed and executed as a part of this study. Some 204 respondents from manufacturing firms in the Netherlands, an effective response rate of 30.4%, provided data on all three dimensions of their firms' sourcing strategies. The chapter discusses the nature of the sample and the quality of the response. The final part of chapter 4 is devoted to constructing several multidimensional scales.

In chapter 5 the first of three dimensions, internal versus external sourcing, is investigated empirically using multiple regression and interesting results emerge. The most important finding is that external sourcing is strongly negatively related to firm profitability (economic performance). This counters a trend among both academics and practitioners to promote outsourcing of items as a means of improving financial results. Several moderating effects are found as well. Under conditions of high asset specificity, high R & D intensity, and high uncertainty it is even worse to outsource. There is also a moderately positive relation between external sourcing and strategic performance (market share).

In chapter 6 the second dimension, exit versus voice relations, is discussed. Again there are several interesting findings. This study finds confirmation for the positive effect of voice relations on supplier satisfaction both in the short run (economic performance) and in the long run (strategic performance). Alongside with trust, a co-operative relation (voice) is needed to improve the performance of suppliers. Furthermore interesting other effects are found. It appears power is a useful tool to extract economic rents, but does not increase strategic performance. Loyalty to the supplier on the other hand is only moderately useful for economic performance but a necessity in the long run.

Chapter 7 deals with the third dimension of domestic versus international sourcing. Empirical evidence is provided to support the statement that global sourcing is the exception rather than the rule in this sample of firms, although larger and more international firms do source more from abroad. Then the performance implications of international sourcing are investigated. No direct relation between international sourcing and economic performance could be

established. There is a relation between international sourcing and strategic performance (market share) but this is later explained away as a 'size of the firm effect', implying reversed causality. Thus there really is no evidence for any performance effect of international sourcing, contrary to parts of the literature and a widespread belief among practitioners.

In chapter 8 an attempt is made to look at all three dimensions of sourcing strategy simultaneously. Given limitations of the data there are severe caveats to the empirical investigation into this integrated view. However, a conceptual discussion is then offered, which shows that there is an important overlap between the three dimensions of sourcing. Chapter 9, the conclusions of this study, therefore presents as one of the recommendations for further study a more integrated view of different dimensions of sourcing strategy. Another general conclusion presented is that in the current climate managers appear to overestimate the force and efficiency of the market at the expense of organising.

Curriculum Vitae

Michael J. Mol was born in Gouda (NL) on May 9th, 1973. In 1991 he enrolled as a student of business at Rotterdam School of Management / Faculteit Bedrijfskunde, Erasmus University Rotterdam, where he graduated in 1997 with majors in both Strategic Management and Logistics Management. His company-sponsered M.Sc. thesis deals with outsourcing of IT services. In 1994-1995 he spent a semester at Wirtschaftsuniversität Wien, Austria. In 1996 he received a Siemens Future World Scholarship to study a semester at the Technische Universität of Berlin, Germany where he also worked as an intern for Siemens AG in 1997. Between 1995 and 1997 he held a position as a research assistant in a project on outsourcing in the Port of Rotterdam, sponsored by the Rotterdam Port Authority (GHB). In 1997 he graduated in Stockholm as a Master of the Community of European Management Schools (CEMS). In September 1997 he became a PhD student at Rotterdam School of Management, on the topic of global sourcing strategy. In 1998 he was one of the recipients of a substantial grant from the Carnegie Bosch Institute at Carnegie Mellon University, Pittsburgh, PA (USA) for research on the role of the Internet in sourcing relations. This research was completed in 2000. In 2001 he spent a month as a visiting researcher at the Fox School of Business at Temple University, Philadelphia, PA (USA). In October 2001 he took up a job as assistant professor of international management at Nijmegen School of Management, Nijmegen University. He has been a consultant on sourcing issues for various organisations including the United Nations' ITC and NEVAT, the Dutch suppliers association. He has taught various courses in strategy and international business. His work has appeared or is forthcoming in various journals including the Academy of Management Executive and the Journal of Global Information Management and has been presented at major international conferences. He has also (co-)authored a book and various book chapters. More information on his current activities can be obtained through the web site www.michaelmol.com.

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