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Supporting Decision Making in Purchasing Requires a Differentiated Approach

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Abstract
By now it is beginning to be accepted both in theory and practice that purchasing is a factor of strategic importance for an organisation, rather than a merely administrative and operational activity (see e.g. Van Weele, 1997; Van Stekelenborg, 1997; Lonsdale and Cox, 1997; Telgen, 1997). In this chapter we discuss in detail how as a consequence of present and future developments, the increased importance and complexity of the purchasing function leads to purchasing decisions becoming more important and difficult. Next, we explain why in order to deal with these more important and complex decisions, it makes sense to consider supportive decision models for purchasing. As a result of many years of neglecting purchasing, such models are not yet sufficiently available. Therefore, we argue that it is useful and appropriate to invest research effort in supporting purchasing decision making through models.

Keywords: *Supporting Decision Making, Purchasing Decisions, Differentiated Approach*

1.0 INTRODUCTION

In this chapter we discuss decision making in purchasing in terms of the framework for analysing decision making that we introduced in chapter III. The analysis described here shows that a variety of decision making situations occurs in purchasing. The position of this chapter in the overall stepwise planning is depicted in figure 4.1.

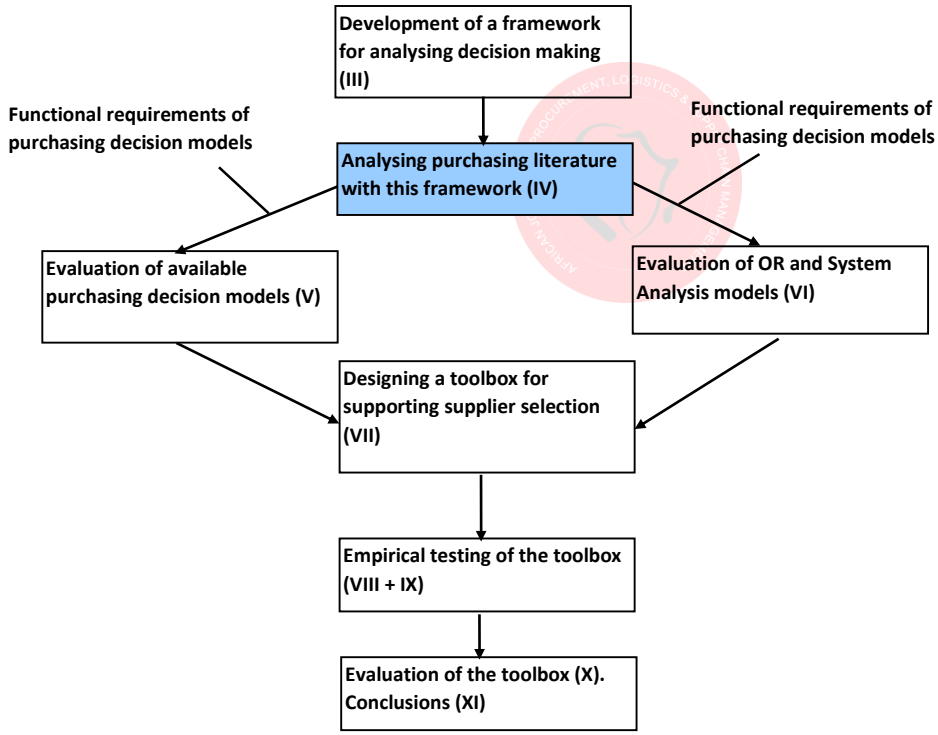

Figure 1: Positioning of Chapter IV

This chapter should thus reveal properties of prescriptive decision models for supporting purchasing decisions. The organisation of this chapter is as follows.

First, we more specifically define purchasing and identify the topics or issues in purchasing that are subject to decision making. Next, we explain why from all possible areas and levels of purchasing decision making, supplier selection decisions are particularly useful to investigate. Subsequently, we study supplier selection situations using the framework from Chapter III and we discuss the resulting functional properties of prescriptive decision models for supplier selection.

1.1 The purchasing literature identifies several areas and levels of decision making

In this chapter decision making in purchasing is described in terms of the framework that was presented in the previous chapter. However, what need to be addressed first are the various topics or issues within or related to the purchasing function that are subject to decision making. In other words: what do we exactly mean when we speak of purchasing and purchasing decisions?

1.2 The purchasing function comprises the responsibility for the execution of six basic activities

In the literature many different definitions of the term purchasing occur (see e.g. Van Weele, 1997; Leenders & Fearon, 1993; Dobler & Burt, 1996). In addition to the term 'purchasing', several related terms circulate e.g. buying, (sub) contracting, procurement and (out) sourcing. To make things even more complicated, these terms are sometimes extended with words such as -process, -function or -department. More often however, in many articles the author simply uses the word 'purchasing' without making clear the exact meaning of the word in the particular sentence. Perhaps sometimes even the author himself is not sure of the exact meaning or aware of the possibility of different meanings. In this thesis, we will use Van Weele's definition of the purchasing function (1997):

The purchasing function comprises the responsibility for the execution of the following activities:
- *Specifying what should be purchased;*
- *Selection of one or more adequate suppliers;*
- *Establishing a contract with the supplier (s) after having negotiated the terms;*
- *Actually ordering the items or services;*
- *Monitoring the delivery of the items or services ordered;*
- *Follow-up on the delivery, e.g. taking care of claims, administrative activities etceteras.*

The use of the term 'function' emphasises the activities rather than the people involved in performing these activities (Wijnstra 1997). Inherent in the 'responsibility for execution' is the necessity for adequate management of purchasing activities, e.g. setting goals, developing systems for performance measurement, assuring sufficient material and human resources, formulating ethical rules for purchasers etceteras.

1.3 There is no such thing as 'the' purchasing process

The six activities mentioned in the definition of the purchasing *function* constitute the elements of any purchasing *process*. Following Van Weele (1997), we distinguish between *initial* purchasing activities, i.e. specification, supplier selection and contracting and *operational* purchasing activities, i.e. ordering, monitoring and follow-up. Van Weele excludes such activities as materials requirements planning, job scheduling, inventory control, inspection of incoming materials and payments.

However, we might argue that especially operational purchasing activities might show a slight overlap with the aforementioned logistical activities. Contrary to what many so-called process models of purchasing suggest, the activities that make up purchasing processes are not necessarily carried out in one straight exercise. Often initial purchasing activities are carried out and organised separately from operational purchasing activities, e.g. contracts for cleaning and catering.

The operational steps may be carried out many times without again performing the initial process. Or as Jones (1997) puts it (p. 9): "The term purchasing process implies a coherence of purchasing activities which is absent in reality". Purchasing processes vary in terms of the sequence, the length, the performers and the initiators of the activities they consist of. An alternative model of purchasing activities as shown in figure 4.2, reflects this recognition of variety.

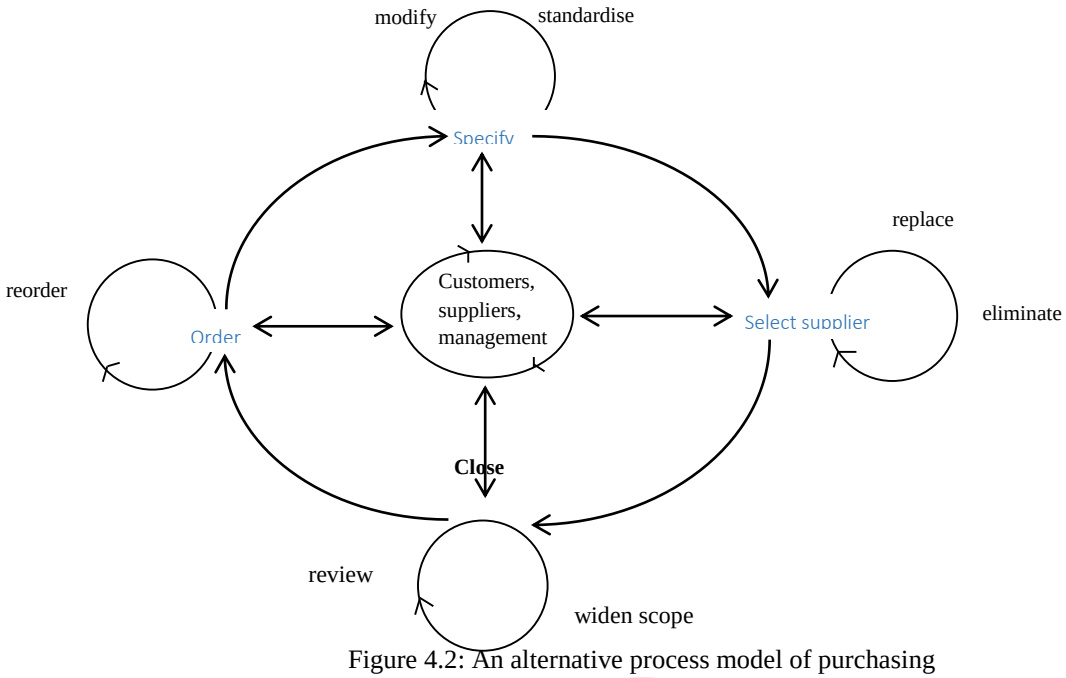

Figure 4.2: An alternative process model of purchasing

In addition to the typical representation of 'the' purchasing process that suggests the sequence (1) specify (2) select supplier (3) close contract and (4) order, any other combination of activities can be constructed with this model. An example of is shown in figure 3.2. In this case, an existing specification is modified and subsequently, a modified product is ordered from an existing supplier. Contracting is not carried out. In the same way, many other combinations of activities can be constructed. The alternative model also shows that suppliers and internal customers may initiate purchasing processes as well as purchasing professionals themselves.

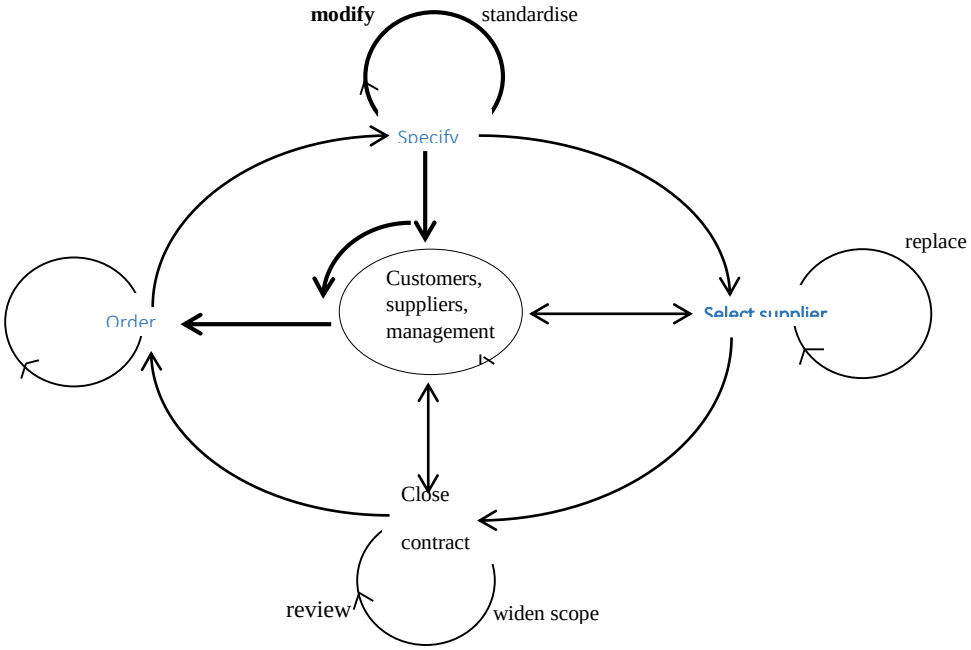

Figure 4.3: Example of a modified rebuy: only specification and ordering are carried out again

Often different people perform the activities within a purchasing process. These people are often not official purchasing officers. In other words: official purchasing departments often only perform a (small) part of all activities within the purchasing process. We will further elaborate on these points in the following subsections where we discuss different levels and areas of decision making concerning the purchasing function. In the sequel we will use the term purchasing for both the purchasing *function* and the purchasing *process*, yet not for the purchasing *department.*

1.4 A variety of items and services is purchased

It is useful to recognise the wide range of items and services (possibly) purchased. A useful classification in this respect is the one developed by Ribbers & Visser (1993), see table 4.1.

		Required in primary processes		
		Items are transformed	Items are not transformed	Not required in primary processes
Purchased items	repetitive need	e.g. regular raw materials	e.g. tools	e.g. stationary
	non-repetitive need	e.g. special component	e.g. machine spare part	e.g. investments in infrastructure
Purchased services	repetitive need	e.g. regular services, e.g. transport		e.g. catering
	non-repetitive need	e.g. exceptional services		e.g. consultancy

Table 4.1: Classification of purchased items and serviced (Based on Ribbers & Visser, 1993)

In many textbooks and articles on purchasing, most if not all attention is focussed on the purchasing of items (with repetitive need) required in the primary processes. In addition, in practice, the purchasing of other classes of items and services (and especially services which are not used in the primary processes) are often not considered as purchases. In this thesis, however, we do not exclude any of these possible classes of items and services. Any item supplied or service rendered is considered a purchase as soon as an (external) invoice is paid in return[1].

Another distinction that is often made concerns the type of organisation that is considered. Again, in this thesis we do not a priori exclude purchasing in organisations other than production companies, e.g. service industries, non-profit organisations, health care, and government. Although each type of organisation may have its specific characteristics and may operate under specific circumstances (see Van Weele, 1997), the concept of purchasing, i.e function and process, as defined in this chapter seem general enough to justify refraining from demarcations with respect to the type of organisations.

1.5 We may link decisions to activities within a purchasing process

A logical approach to answering the question posed in the beginning of this chapter seems to be to take as a frame or reference the various activities in a purchasing process as defined in the previous subsections. Following Van Weele (1997) we distinguished between:

1. I*nitial purchasing*, which involves specification, selection and contracting of suppliers;
2. *Operational purchasing*, which involves ordering, monitoring or orders, receipt and inspection of goods etceteras.

Accordingly, purchasing decision could be grouped into *initial purchasing decisions* (e.g. make-or-buy decisions, the specification of what exactly to buy or outsource, supplier qualification and selection, type of contracts etc) and *operational purchasing decisions* (e.g. decisions regarding the detailed timing of orders, quantities, inspection and acceptance, etceteras.). However, as any organisational process, such purchasing activities need to be initiated, monitored, steered, terminated, facilitated, etceteras. In other words: purchasing processes need to be managed.

[1] Strictly speaking, the term 'purchasing' only applies to products, while the terms 'subcontracting' and 'outsourcing' are used for services. More specifically, subcontracting implies that a supplier temporarily carries out certain activities while the firm is still able to perform the activities in house, i.e. the necessary resources (e.g. hardware) are not sold to the supplier. Outsourcing implies not only that certain activities are carried out by a supplier but also that the firm does not have the necessary resources (anymore) to perform the activities. In this thesis, however, we use the term 'purchasing' for both products and services.

1.6 We can also discern purchasing decisions from purchasing management decisions

According to Van Stekelenborg (1997) purchasing management involves such activities as establishing purchasing policies, (multi-) project management, and operational management of purchasing activities. In addition to sourcing and representing (physical-) supply issues in outsourcing processes, product design and demand management, purchasing management is part of what Van Stekelenborg calls initial purchasing tasks. This is elucidated in figure 4.4 below.

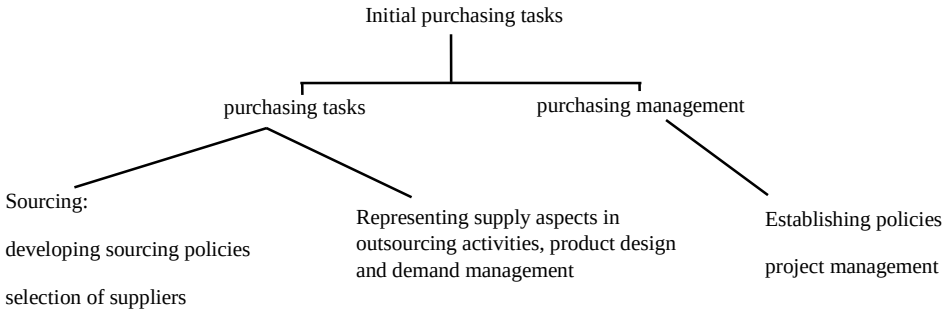

Figure 4.4: Activities in purchasing management (Van Stekelenborg, 1997)

It is clear from this point of view that many additional purchasing(-related) decisions can be considered, or more specifically, purchasing management decisions, e.g. which policies would be developed, what should these policies contain, decisions concerning allocation of personnel to various projects, etceteras.

The distinction between purchasing tasks (and decisions) and purchasing management (decisions) is also suggested by Haakansson (1975), who distinguishes between a structural level and a purchasing level when it comes to decision making. Decisions on a 'purchasing level' are directly related to actual purchases, while decisions on a 'structural level' are concerned with organisational and management issues. Combined with Van Weele's definition of initial and operational purchasing activities, the following overview of levels and areas of purchasing decisions can be derived, as illustrated in table 4.2.

Structural level **. organizational decisions** **. resource allocation** **. policies**	
Purchasing level	
Initial purchasing	Operational purchasing
. supplier selection decisions . contracting decisions	. order quantities . combining/splitting orders

Table 4.2: Areas and levels in purchasing decisions (Based on Haakansson (1975) and Van Weele (1997))

2.0 LITERATURE REVIEW

2.1 Another distinction is the one between 'first-time' and 'improvement' decisions

Kudrna (1975) suggested another classification of purchasing decisions, see also figure 4.5.

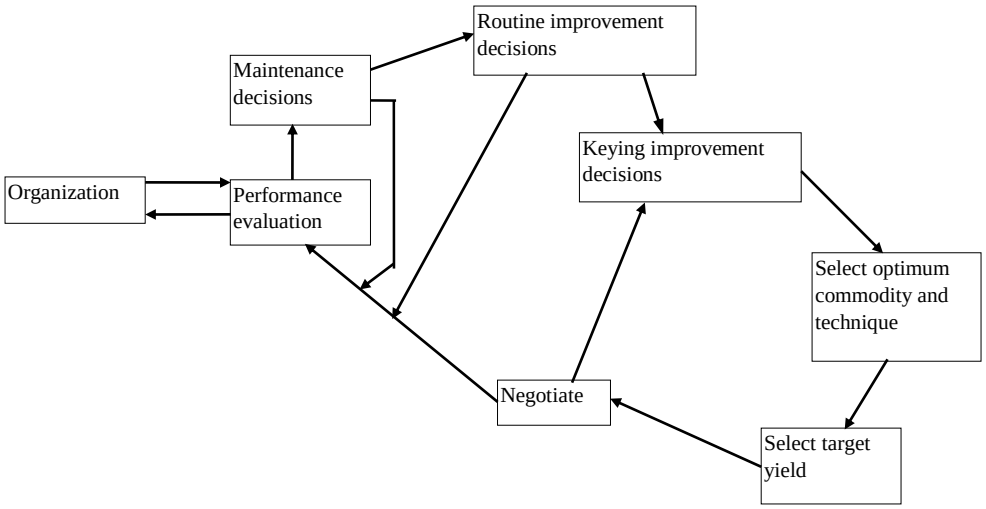

Figure 4.5: Purchasing decision system (Kudrna, 1975)

Kudrna distinguishes between maintenance decisions, routine improvement decisions and keying improvement decisions. *Maintenance decisions* (or first-time decisions) are defined as "..those that even the least effective buyer must make daily in order to complete his clerical duties of order processing[2] and his assurance-of-supply responsibilities. They are the decisions of vendor selection and expediting". In this respect, the concept of maintenance decisions very closely resembles the concepts of initial purchasing decisions, (which includes supplier selection) and operational purchasing decisions (which also covers expediting). The *purchasing improvement decisions* are defined as follows: "The improvement decisions require the buyer to stand back from maintenance duties and identify the most effective methods of modifying normal buying practices to further minimise material related costs". Examples of maintenance decisions and improvement decisions are given in table 4.3.

Purchasing decisions		
Maintenance decisions (first time decisions)	*Improvement decisions*	
- vendor selection - expediting	routine decisions: - combining / splitting of orders - quantity break decisions - price hedging - order elimination - new source development (reactive)	key decisions: - make-or-buy - contracting decisions - redesign decisions - new source development (proactive)

Table 4.3: Breakdown of maintenance decisions and improvement decisions (Kudrna,1975)

[2] Clearly, this notion of 'clerical duties' is not compatible anymore with present-day ideas about the profile of a purchasing professional.

The general conclusion from the foregoing is that there is far more to purchasing decision making than the commonly mentioned decisions within the initial and operational purchasing activities, i.e. decisions concerning specifications, selection of suppliers, contracting, ordering, monitoring and follow-up. Summarised, the contributions from Van Stekelenborg, Haakansson and Kudrna indicate the following additional levels or areas of purchasing decision making:

- Decisions concerning the (formal) structural organisation of the purchasing function;
- Decisions concerning the operational management of actual purchasing activities;
- Decisions aimed at improving existing supply situations and purchasing methods.

2.2 Taken together, purchasing decision making covers several levels and areas

Although the distinctions discussed so far already seem useful, another way of identifying purchasing decisions may be derived from the so-called process-model of organisations developed by Boer and Krabbendam (1996). Within this model, an organisation is defined as a whole of people and resources trying to achieve certain goals. Furthermore, the model distinguishes between different processes within an organisation and thereby different areas and levels of decisions concerning these processes. By applying this process model to the purchasing function, i.e. considering the purchasing function as a separate organisation, we can identify different levels and areas of purchasing activities and related decisions. In the sequel, we will refer to this fictitious organisation as a 'purchasing firm'.

The first step in applying the process model to the purchasing function consists of identifying what the elements of the purchasing firm are, i.e. who are the people within the purchasing firm, which resources are available and which are the goals of the purchasing firm? Within an organisation, principally, everyone may be considered as employee of the purchasing firm. In addition to a formal purchasing department, many if not all other officers and workers are in some way, and at some point involved in one or more purchasing tasks. Moreover, sometimes even people from outside the (official) organisation may be involved, e.g. in case of Vendor Managed Inventory where the supplier takes over some operational purchasing tasks of its customers.

The available resources of the purchasing firm may include IT facilities (hardware, software), procedures, working methods, communication systems etceteras. As to the goal of the purchasing firm, based upon a study of the purchasing literature, Van Stekelenborg (1997) concludes that the objective of purchasing may be defined as achieving cost-effective satisfaction of the needs for goods and services while making use of external resources. Within the process model of organisations, three categories of processes are distinguished: operating processes, regulatory processes and maintenance processes. Operating processes are directly aimed at realising the organisation's goals and transform informational and/or material inputs into informational and/or material outputs that are valuable to the organisation's customers. Applied to the purchasing firm, purchasing processes can be seen as the operating processes of this firm. Maintenance processes are enablers for both operational and regulatory processes by providing these processes with adequate technologies and resources. In case of the purchasing firm, examples of maintenance processes are providing hard and software for supporting purchasers, training, hiring new purchasing personnel etceteras.

Regulatory processes are aimed at aligning operating and maintenance processes with the organisation's goals and are further broken down into: strategic control processes, adaptive control processes and operational control processes. Especially the projection of the latter concepts on the purchasing firm provides us with new perspectives on decision making concerning purchasing. The results of this projection are presented in table 4.4[3].

Regulatory decisions about purchasing: purchasing management decisions
Strategic control decisions: fundamental decisions about the purchasing processes: - which purchasing tasks should we do ourselves and which tasks can/should be outsourced? - central or decentral organisation of purchasing processes - should we strive for single or dual sourcing?

[3] At this point, we limit ourselves to projecting the regulatory processes on the operating process of the purchasing firm. Naturally, a similar exercise can be carried out for the maintenance processes of the purchasing firm.

Adaptive control decisions: *decisions aimed at improving the cost-effectiveness of solutions chosen in previous purchasing processes* - deciding on new supplier-base following a decision to reduce the number of suppliers - deciding on a new supplier following a decision to switch to dual sourcing - deciding on whether or not to extend a current contract or the current contract type
Operational control decisions: decisions about the planning, monitoring and steering of actual purchasing processes - how to plan and co-ordinate activities relating to a specific purchase - what to do when wrong items are supplied - what to do when items are delivered late
Decisions within the operational purchasing process
Initial purchasing decisions: - what and how to specify - which supplier to choose - which contract(type) to use
Operational purchasing decisions: - deciding on the timing and phasing of the order

Table 4.4: Levels and areas of decision making on purchasing

The decision levels identified by using the process model of organisations can be graphically illustrated as is shown in figure 4.6.

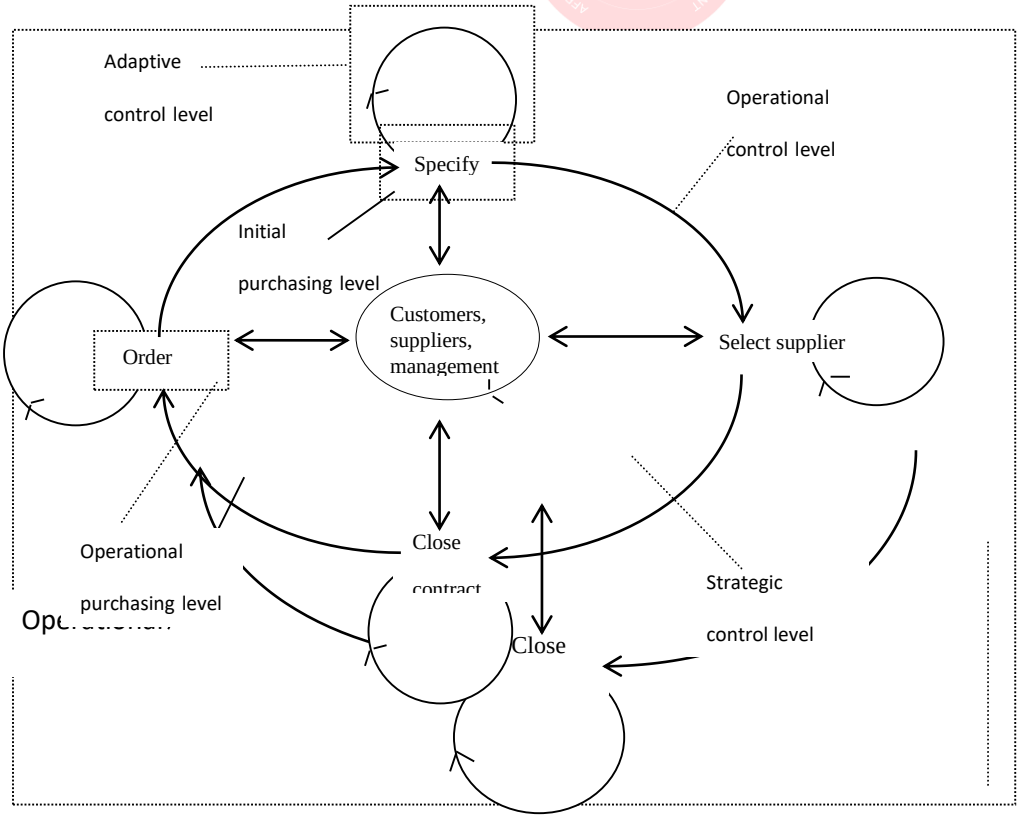

Figure 4.6: Decision levels and areas in purchasing

When comparing the contributions by Haakansson, Kudrna and Van Stekelenborg with the results of applying the process model on the purchasing function, we conclude that Haakanssons model misses out on the adaptive decisions, Kudrna's model misses out on the strategic and operational control decisions, while the model by Van Stekelenborg focuses on initial purchasing and adaptive and operational control decisions. Therefore, it seems that our model, as depicted in table 4.4 and figure 4.6., may serve as a useful and at least comprehensive framework for discussing decision making in relation to purchasing in the sequel of this thesis.

2.3 Supplier selection decisions are a relevant and appropriate focus area

In the sequel of this thesis we will focus on supplier selection decisions. The reason for this demarcation is threefold.

2.4 Operational purchasing decisions have traditionally gained much attention

We argue that it is not particularly useful to focus on operational purchasing decisions. Contrary to all other areas and levels of purchasing decision making, an ever growing number of decision models for operational purchasing problems has been developed, already since the 1950's (see Graves et al., 1993). Moreover, the impact of operational purchasing decisions is completely embedded in the way the initial purchasing decisions as well as the regulatory decisions about purchasing are made. This is illustrated in figure 4.7.

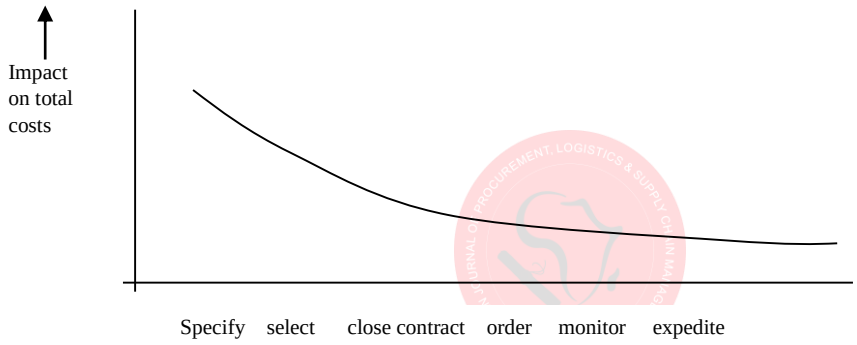

Figure 4.7: Impact of purchasing steps on total costs (Telgen, 1997)

Saving potential decreases as we move from initial purchasing to operational purchasing activities.

2.5 Supplier selection is considered of key-importance at the initial purchasing level

Similar to operational purchasing decisions, contracting and negotiation decisions are made within the borders set by the specification and the supplier selection. In addition, contracting and negotiation have traditionally gained much attention within the purchasing and juridical literature. As to decisions about the specification and the selection of suppliers, we believe that these decisions are closely interrelated and *ultimately* determine purchasing effectiveness.

The importance of the supplier selection decision is widely acknowledged in the literature. Dobler and Burt (1996) state that selection of the right supplier is key to :"..obtaining the desired level of quality, on time, and the right price; the necessary level of technical support; and the desired level of service". Rajagopal and Bernard (1993) write: "Since an organisation is only as good as its sources of supply, decisions concerning the creation and management of the supplier base are among the most important and fundamental in the purchasing process". More specifically in the light of single sourcing, Swift (1995) states: "As a result of a decision to single source, and as a necessity in establishing a long-term relationship, firms are reducing their supplier bases. These relationships that require trust and co-operation can be managed only if the number of suppliers is reduced significantly. However, the selection of an inadequate supplier can produce disastrous results for the firm that has decided to purchase all of its supplies of one product from that supplier". Finally, Leenders and Fearon (1993) state: "It has been long-standing wisdom in the procurement field that the key-decision in supply management centers on supplier selection".

In addition, the increasing need to justify the selection of a supplier (both to superior management and stakeholders within and outside the organisation), makes this decision a decision of particular research interest.

2.6 Supporting supplier selection may pave the way for supporting strategic control decisions

Thirdly, in our opinion, investigating and developing prescriptive decision models for strategic control decisions should follow a thorough treatment of the supplier selection decision rather than preceding it. Supplier selection decisions concern a purchaser's daily affairs and cover a wide spectrum of situations. Providing the purchasing profession with decision models for supplier selection and making purchasers familiar with using these models, may serve as a useful basis for eventually moving towards using such models for strategic regulatory decisions on purchasing. In this respect, it is relevant to specifically discuss the attention in this thesis for the make-or-buy issue. Although we obviously focus on the selection of (and among) external suppliers, this does not mean that we necessarily and categorically keep a stand from the decision whether or not to buy at all. Make-or-buy *analysis* also includes a comparison of a firm's situation with that of (potential) suppliers regarding various criteria, e.g. design, manufacturing and quality capabilities (Dobler and Burt, 1996).

In essence, supplier selection involves comparing and choosing among a number of resource-constellations, which happen to be placed outside the legal boundaries of the firm. Bringing the firm's own resources into consideration as well does not fundamentally change this process as such. Given the objective of this research to contribute to a further professionalization of the *purchasing function*, it seems appropriate to emphasise on supplier selection rather than taking the full make-or-buy issue into consideration. Ultimately, the *fundamental* question underlying and shaping make-or-buy processes (and analyses) is whether or not an activity or item requires or involves capabilities that are directly linked with the firm's so-called core-capabilities (Dobler and Burt, 1996). This fundamental question is however, of a *corporate* nature rather than merely being part of purchasing's responsibility.

2.7 A prescriptive analysis of the literature reveals variation in the nature and the level of the complexity of a supplier selection decisions

In this section, the framework from Chapter III is used to describe purchasing decision making in terms of properties relevant to the development and evaluation of prescriptive decision models. Summarised, these properties include: (1) the number and nature of the decision criteria used (2) the particular decision rules applied (3) the number of decision makers involved and (4) the presence of various types of uncertainty.

The number and the nature of supplier selection criteria varies: Many authors discuss the criteria used in supplier selection. Webster and Wind (1972) argue that the organisational buyer makes a decision over multiple attributes. For example, a number of factors has to be considered such as price, quality and on-time delivery. Vendor selection decisions are complicated by the fact that various criteria must be considered in the decision making process (Weber et al., 1991). The criteria may have quantitative as well as qualitative dimensions. A strategic approach towards purchasing may further emphasise the need to consider multiple criteria. In the case of strategic supplier selection, Ellram (1990) for example stresses the need not only to consider traditional criteria such as price and quality but also more longer term and qualitative criteria such as 'strategic fit' and 'assessment of future manufacturing capabilities'. More examples of the use of several criteria in the decision making process on supplier selection can be found in Dickson (1966), Dempsey (1978), Brand (1992), Desarbo et al. (1995), Hutt and Speh (1991), Powers (1991) and Shipley et al. (1991).

The classifications of criteria as suggested by these authors are summarised in table 4.5.

Author(s)	Quantitative	Qualitative
Ellram (1990)		
traditional criteria	Price, delivery, quality	
additional criteria		Trust, management attitude, strategic fit
Shipley et al. (1991) Dempsey (1978)		
economic, rational criteria	Price, delivery, quality	
relationship criteria		Response to complaints, reputation, personal relationships
Desarbo et al. (1995)		
economic, cost based criteria	Price, operating costs, maintenance costs	
non-economic criteria		Vendor cooperation, references, past experience
Hutt & Speh (1991); Powers (1991)		
rational, economic criteria	Price, quality, continuity of supply	
emotional, non-economic criteria		Status, incentives, personal relationships

Table 4.5 : Classifications of criteria in supplier selection

The results of the literature search suggest that in supplier selection several criteria may be considered. Furthermore, these criteria may concern quantitative as well as qualitative factors.

2.8 Supplier selection decisions are often interrelated with other decisions

In this subsection we first look at the existence of interrelated decision structures in initial purchasing. Interrelated decisions are likely to be present in purchasing. A single buying decision cannot be isolated and evaluated alone (Kingsman, 1985). Once the decision to buy has been made, often a number of decision stages follow (see for example Van Weele, 1997). Typically, a first decision is made in order to create a set of acceptable suppliers. In the stages that follow, this set is further reduced until a final supplier is eventually selected. The question how many suppliers should be selected raises the interrelated question how the purchase order quantity could be allocated best to the (potential) suppliers if two or more suppliers have been or are to be selected. In addition to initial purchasing decisions being interrelated with operational purchasing decisions, these initial purchasing decisions may also be interrelated with decisions in other functional areas, especially with purchasing's increasing strategic importance. Lee (1973) describes three examples in which initial purchasing decisions clearly interrelate with decisions in other areas

such as production planning, capacity planning and financial planning. Decisions as to make or buy a specific component or to select a particular supplier can often not be seen as being mutually exclusive from decisions concerning a company's future technology and marketing strategies.

In the ideal situation, interrelated decisions are treated in a co-ordinated manner in order to avoid suboptimal decisions. However, in practice this may often not be the case, for example because of difference in timing of decision making in the interrelated decision areas.

2.9 Purchasers apply a variety of decision rules when selecting suppliers

Another property that was identified in the general framework was the type of decision rule. Compensatory decision rules allow a low score on one criterion to be compensated by a higher score on some other criterion. Non-compensatory rules do not permit this compensation to take place. The compensatory and the non-compensatory decision rules can be seen as the two ends of spectrum which contains many alternative quasi-compensatory rules. From the literature search it can be concluded that in purchasing several types of decision rules are being used.

Chambers (1983) states: "...the individual will in all likelihood employ some type of choice model, e.g. compensatory or non-compensatory, to select a vendor or vendors". Brand (1992) reports on empirical research, which suggests that in purchasing both compensatory as well as non-compensatory rules are used. Factors that influence the type of rules are for example: time pressure, the extent to which the situation is perceived as new, the number of criteria and the number of supplier to choose from. Naude (1994) also reports the combination of compensatory and non-compensatory decision rules in vendor selection processes. Webster and Wind (1972) also state that buyers may use any one of several decision rules in their decision making process. They mention non-compensatory rules, e.g. conjunctive, disjunctive and lexocigraphical rules as well as compensatory decision rules.

2.9 Several people may be involved in supplier selection decisions

We now look at the decision-making unit in supplier selection processes. The overall conclusion that can be drawn from the literature search is that many purchasing decisions are taken or at least influenced by several actors (see for example an Weele, 1997; Choffray and Lilien, 1978). Webster and Wind (1972) describe organisational buying as a complex process of problem solving in which many individuals with varying backgrounds are involved. These actors may have different objectives. In addition, contrary to popular belief, many industrial buying decisions are not solely in the hands of purchasing agents (Sheth, 1973). Especially in the case of non-production items and services, decision making is often scattered throughout the whole organisation (see De Boer and Telgen, 1995). Chambers (1983) states that: "...the vendor selection process in many organisations is accomplished via group decision making. The issue then becomes one of determining how buying process participants with differing perspectives reach a consensus". Disagreement and conflict seem to be extensive in organisational buying (O' Shaugnessy, 1977).

However, although also Kotler and Lilien (1983) argue that several individuals may influence organisational purchasing decisions, they also point out that the empirical study of joint decision making in purchasing has been difficult and that different models have been proposed to model the process of group decision making, e.g. weighted probability and voting models.

2.10 All forms of uncertainty may be present in supplier selection

By definition, decision making is characterised by imperfect information. This is just as true for purchasing (Ribbers, 1980; Tullous et al., 1991). The general concept of uncertainty is thought of to be relevant when looking at purchasing decisions because of interdependencies of functional areas within a firm, the technical sophistication of many industrial products and other complexities of the organisational buying process (Farmer, 1973, 1974; Webster, 1979). Purchasing is more and more confronted with reduced predictability of the quantitative and qualitative demand (Van Stekelenborg, 1994). An increasing number of purchasing decisions can be characterised as dynamic and unstructured. Situations are changing rapidly or are uncertain and decision variables are difficult or impossible to quantify (Cook, 1992). Apart from uncertainty in a stochastic sense, imperfect information also demonstrates itself as imprecision.

For many purchases it is highly unlikely that point estimates of expected values can be made with a high degree of accuracy (Thompson, 1990). Haakansson (1975) identifies three types of uncertainty that industrial purchasers are confronted with: Need uncertainty; being the ease or difficulty encountered in specifying and measuring product uses and characteristics; Market uncertainty; being not only the (in) stability of the market place but also the degree of difficulty in comparing the characteristics of the potential suppliers; Transaction uncertainty; being the degree of difficulty encountered in delivering the product to the purchaser.

Clearly, the need and market uncertainty indicates the presence of imprecision rather than stochastic uncertainty. The general conclusion from the literature search is that all possible forms of uncertainty and especially imprecision may be present in initial purchasing decision making.

2.11 The importance of the supplier selection decision also varies and co-determines the decision making approach

Just as the perceived complexity of a supplier selection process will vary from one situation to another, so will the perceived importance of this decision. This is reflected in several typologies of purchasing situations that have been developed, for example the taxonomy suggested by Bunn (1993) in which six different buying decision approaches are derived on the basis of an extensive empirical study among manufacturing, service and public administration organisations (see also table 4.6). In this taxonomy it is clear that purchasing decisions situations differ in terms of both importance and complexity.

Description of buying decision approaches						
Variables	Casual	Routine, low priority	Simple, modified rebuy	Jugdmental new task	Complex, modified rebuy	Strategic new task
purchase importance	minor importance	somewhat important	quite important	quite important	quite important	extremely important
task uncertainty	little uncertainty	moderately uncertain	little uncertainty	great amount of uncertainty	little uncertainty	moderately uncertain
extensiveness of choice set	much choice	much choice	narrow set of choices	narrow set of choices	much choice	narrow set of choices
buying power	little or no power	moderate power	moderate power	moderate power	strong power position	strong power position
search for information	no search made	little effort at searching	moderate amount of search	moderate amount of search	high level of search	high level of search
use of analysis tecnhiques	no analysis performed	moderate level of analysis	moderate level of analysis	moderate level of analysis	great deal of analysis	great deal of analysis
proactive focus	no attention to proactive issues	superficial consideration of proactive focus	high level of proactive focus	moderate proactive focus	high level of proactive focus	proactive issues dominate purchase
procedural control	simply transmit the order	follow standard procedures	follow standard procedures	little reliance on established procedures	follow standard procedures	little reliance on established procedures

Table 4.6: Taxonomy of buying decision approaches (Bunn, 1993)

It follows from this that a high level of complexity alone not necessarily leads to a high level of search and (decision making) analysis. The importance of the purchase and the supplier selection decision also determine the actual approach taken by the purchaser.

2.12 We need different models for different situations

From the foregoing we conclude that supplier selection may involve several and different types of criteria, interrelated decision structures, combinations of different decision rules, one or more decision makers/influencers and various forms of uncertainty. In addition to these varying levels (and forms) of complexity, supplier selection decisions also vary in terms of perceived importance. On the basis of the analysis in this chapter, we are now able to more specifically formulate the functional requirements of the purchasing decision models we aim to deliver.

2.13 The decision models should enable the modelling of different levels and forms of complexity in supplier selection

We summarise the analysis (using the prescriptive framework from Chapter III) of the supplier selection literature in table 4.7.

	Spectra of complexity levels in supplier selection		
Criteria	one quantitative criterion	⟷	several quantitative and qualitative criteria
Decision rule	maximising or fully compensatory	⟷	quasi-or non-compensatory
Decision maker(s)	one decision maker	⟷	several decision makers
Uncertainty	alternatives and criterion are given, deterministic search	⟷	decision elements (reason for supplier selection, possible suppliers, criteria, supplier performance etceteras) are not given and cannot be defined precisely;
Focus of decision models	Choice phase: efficient search for the maximal solution	⟷	Problem definition phase as well as the choice phase: defining the problem (reasons, goals, criteria, alternatives) ordering and selecting of alternatives

Table 4.7: Varying levels and forms of complexity in supplier selection

In principal, we should map, investigate and develop decision models that (taken together) cover these spectra of supplier selection situations. Furthermore, what also follows from the framework (see the lower row in table 4.6), is that we need decision models that (again as a group) enable us to place the appropriate emphasis on the different (decision making) stages in supplier selection processes, i.e. defining the supplier selection problem as well as the ultimate choice of a supplier.

2.14 We need a range of decision models that covers the variance in the of importance of supplier selection decisions

Finally, we have seen that the decision making approach taken by the purchaser does not only depend on the level and the form of complexity but also on other factors such as the importance of the supplier selection decision. Therefore, the set of decision models should enable us to capture the complexity of the supplier selection against a 'cost' that is considered acceptable given the importance of the situation.

3.0 CONCLUSION

In chapter, we analysed decision making in purchasing using the framework we developed. After defining purchasing, we concluded that several areas and levels of purchasing decision making could be discerned. First, decisions may be linked to the various activities *within* purchasing processes. Secondly, we may distinguish between such purchasing decisions and purchasing *management* decisions. A third distinction is the one between first-time decisions and subsequent 'improvement' decisions. Next, we arrived at a demarcation of the research as to the level

and area of purchasing decision making to be studied. Based on a number of considerations we concluded that supplier selection constitutes a relevant and appropriate demarcation. Subsequently, we used the framework from chapter III for analysing the literature on supplier selection. This analysis showed that supplier selection decisions may differ strongly in terms of the nature and level of complexity. In addition, also the impact of the supplier selection decision varies and co-determines the decision making approach taken.

Based on the results of the analysis, we concluded that we need different decision models for different (supplier selection) situations. The decision models should enable the modelling of different levels and forms of complexity in supplier selection while still remain practical in relation to the importance of the purchase.

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